National Airspace System Capital Investment Plan

FY 2014–2018

Federal Aviation Administration

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Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2014–2018

1 Introduction

1.1 The Capital Investment Plan

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) describes the planned investments in the National Airspace System (NAS) for the next five years. The Continuing Appropriations Act of 2013 continues the requirement from the 2012 Appropriations Act to submit the five Year CIP. The language within the 2012 Consolidated and Further Continuing Appropriations Act, 2012 H.R. 2112 states ‘That upon initial submission to the Congress of the fiscal year 2013 President’s budget, the Secretary of Transportation shall transmit to the Congress a comprehensive capital investment plan for the Federal Aviation Administration which includes funding for each budget line item for fiscal years 2013 through 2017, with total funding for each year of the plan constrained to the funding targets for those years as estimated and approved by the Office of Management and Budget.’

Section 1 continues with discussions on Strategic Planning and the CIP and Important Factors Affecting the Planning for the Future. Section 2 - Key Considerations in Capital Planning provides considerations in the development of the plan. Section 3 - Capital Investment Plan Summary provides an overview of the FY 2014 budget request and funding amounts for fiscal years (FY) 2015 through FY 2018. Section 4 - Next Generation Air Transportation System (NextGen) Operational Improvements and Implementation Timelines describes and outlines the implementation timelines for the NextGen Operational Improvements (OIs). Section 5 - Enterprise Architecture Roadmaps contains the Roadmaps describing the programs and systems within the architecture and shows relationships and timelines for all NAS systems.

Appendix A links capital investment programs to FAA strategic goals, outcomes, and performance metrics. Appendix B provides the capital investment program descriptions, links programs to performance metrics and provides program milestones and implementation schedules. Appendix C provides the FY 2014 President’s budget request and outyear funding amounts from FY 2015 through FY 2018 by Budget Line Item (BLI). Appendix D lists major new investment and facility programs and identifies any cost or schedule changes from the original baseline. Major programs are those classified as Acquisition Category (ACAT) 1, 2 or 3 which typically are programs with total Facilities and Equipment (F&E) costs greater than $100M. For more information on ACAT see, http://fast.faa.gov/AcquisitionCategories.cfm?p_title=Special Topics. Appendix E provides acronym and abbreviation definitions.

In accordance with Presidential Sequestration Order dated March 1, 2013, sequestration impacts the Facilities and Equipment account in FY 2013, and funding impacts this year will likely have a continuing effect in FY 2014 and beyond for program plans (e.g. implementation schedule delays and out year cost estimate adjustments).

1.2 Strategic Planning and the CIP

Capital programs support the FAA's Strategic Plan (Destination 2025) Goals, Outcomes and Performance Metrics. The Strategic Plan includes the most important goals for improving performance in the delivery of aviation services. These goals guide the FAA in upgrading NAS systems and operating procedures to meet the demands of current and future growth. Outcomes and Strategies have been developed with Performance Metrics to track progress towards accomplishment of the Strategic Goals. These Outcomes and Strategies often require capital investments to meet the Performance Metrics. To measure success of capital investments actual performance is compared to the Performance Metrics and the results are used to determine whether adjustments need to be made to achieve the targeted performance.

The FAA strategic plan (Destination 2025) describes five goal areas as follows:

- **Move to the Next Level of Safety —** *"By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide."*
- **Workplace of Choice —** *"We will create a workplace of choice marked by integrity, fairness, diversity, accountability, safety and innovation. Our workforce will have the skills, abilities, and support systems required to achieve and sustain NextGen."*
- **Delivering Aviation Access through Innovation —** *"Enhance the flying experience of the traveling public and other users by improved access to and increased capacity of the nation's aviation system. Ensure airport and airspace capacity are more efficient, predictable, cost-effective and matched to public needs."*
- **Sustaining our Future —** *"To develop and operate an aviation system that reduces aviation's environmental and energy impacts to a level that does not constrain growth and is a model for sustainability."*
- **Improved Global Performance through Collaboration —** *"Achieve enhanced safety, efficiency, and sustainability of aviation around the world. Provide leadership in collaborative standard setting and creation of a seamless global aviation system."*

Each capital investment program summary in Appendix B identifies the primary Goal, Outcome and Performance Metric that the program supports. Many FAA programs will contribute to more than one Goal, Outcome or Performance Metric; however, the program linkage in the CIP (appendices A and B) is for the program's most significant contribution. In the summary tables in appendix A, several programs normally appear under each performance measure because many programs are interdependent; one program may not be successful in meeting a performance metric without completing other supporting programs. Also, in the complex system used for air traffic control (ATC), system improvements must address several different operating conditions to reach the overall performance target, and often it takes multiple programs to address each of the variables, which individually contribute to overall system improvements.

To better explain how a program contributes to a strategic goal, a section titled "Relationship of Program to FAA Performance Metric" in Appendix B gives more specific information about how each program helps meet a Strategic Plan Performance Metric.

1.3 Important Factors Affecting Planning for the Future

1.3.1 Economic Considerations

Implementing NextGen will contribute to economic growth. NextGen modernizes the existing ATC system by introducing new technologies and advanced decision support tools to make air travel more efficient, safer and environmentally friendly. A study by the ATO Performance Analysis Service Unit, "The Economic Impact of Civil Aviation on the U.S. Economy," published in August 2011, estimated that aviation accounted for over $1.3 trillion in economic activity in 2009, which is 5.2 percent of the total U.S. economic activity. The spending on aviation-related economic activity supported an estimated 10.2 million aviation-related jobs, and air carriers transported over 53 billion revenue ton-miles of air cargo. A reliable worldwide aviation network is essential for today's economy. Domestic and international commerce rely on the access and passenger and freight capacity it provides to cities around the world to sustain economic growth.

Aviation spending also has a significant impact on the economy of most states as shown in figure 1-1 below. It encourages the growth of local economies and supports employment opportunities in a variety of occupations. Civil aviation's contribution to state economies is as high as 20.1 percent in Hawaii. A significant factor in the amount of the economic impact of aviation is the contribution from tourism. Spending on air services and the related spending on food, hotels and entertainment provide a boost to several segments of local economies. In addition, in states like Alaska, air service is an economic necessity for transporting a wide variety of goods and services due to lack of other modes of transportation. In several states, economies benefit from a large manufacturing base dedicated to producing aircraft and related aviation equipment.

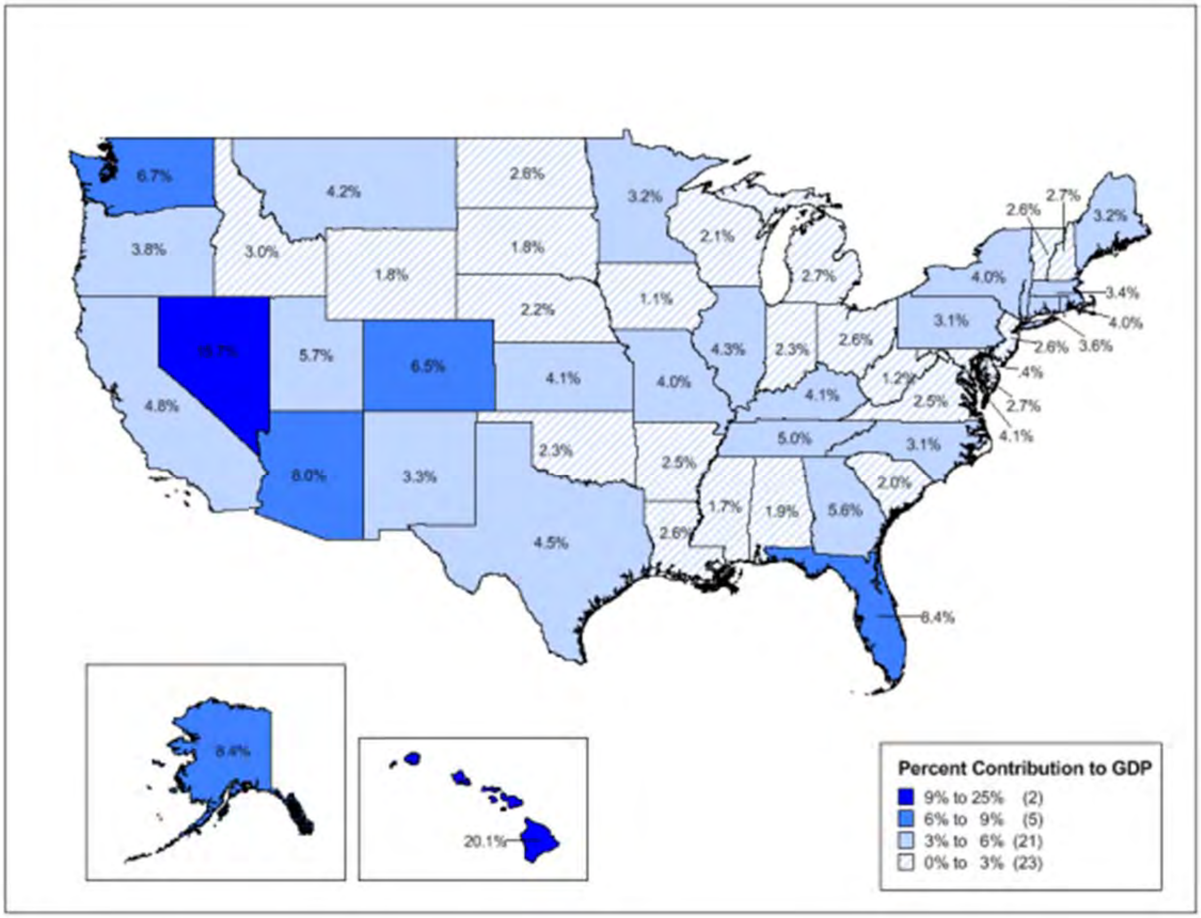

Figure 1-1 Aviation Percent of State Gross Domestic Product[1]

1.3.2 Air Travel Demand

Historically, the demand for air travel is closely related to changes in the economy. As figure 1-2 shows the growth trend in revenue passenger miles (RPM) over the last 30 years corresponds positively with the growth in Gross Domestic Product (GDP). The U.S. inflation-adjusted (real) economic output long-term growth trend has supported the continuing increases in the number of passengers and the miles traveled. There are some deviations in both GDP and RPM growth, which are caused by abnormal events, such as the terrorist attacks of September 11, 2001 and the slower than normal pace of economic recovery. Based on the data available for calendar year 2012, economic growth is still positive. FAA expects continued future growth in air travel, which normally leads to more aircraft operations, and translates into increased workload for the FAA. It also translates into more pressure on the core airports to handle additional operations. Significant increases in operations at these airports could increase delays, therefore advanced

[1] Source: "The Economic Impact of Civil Aviation on the U.S. Economy," August 2011.

NextGen capabilities to provide the improved services must be implemented to handle this growth.

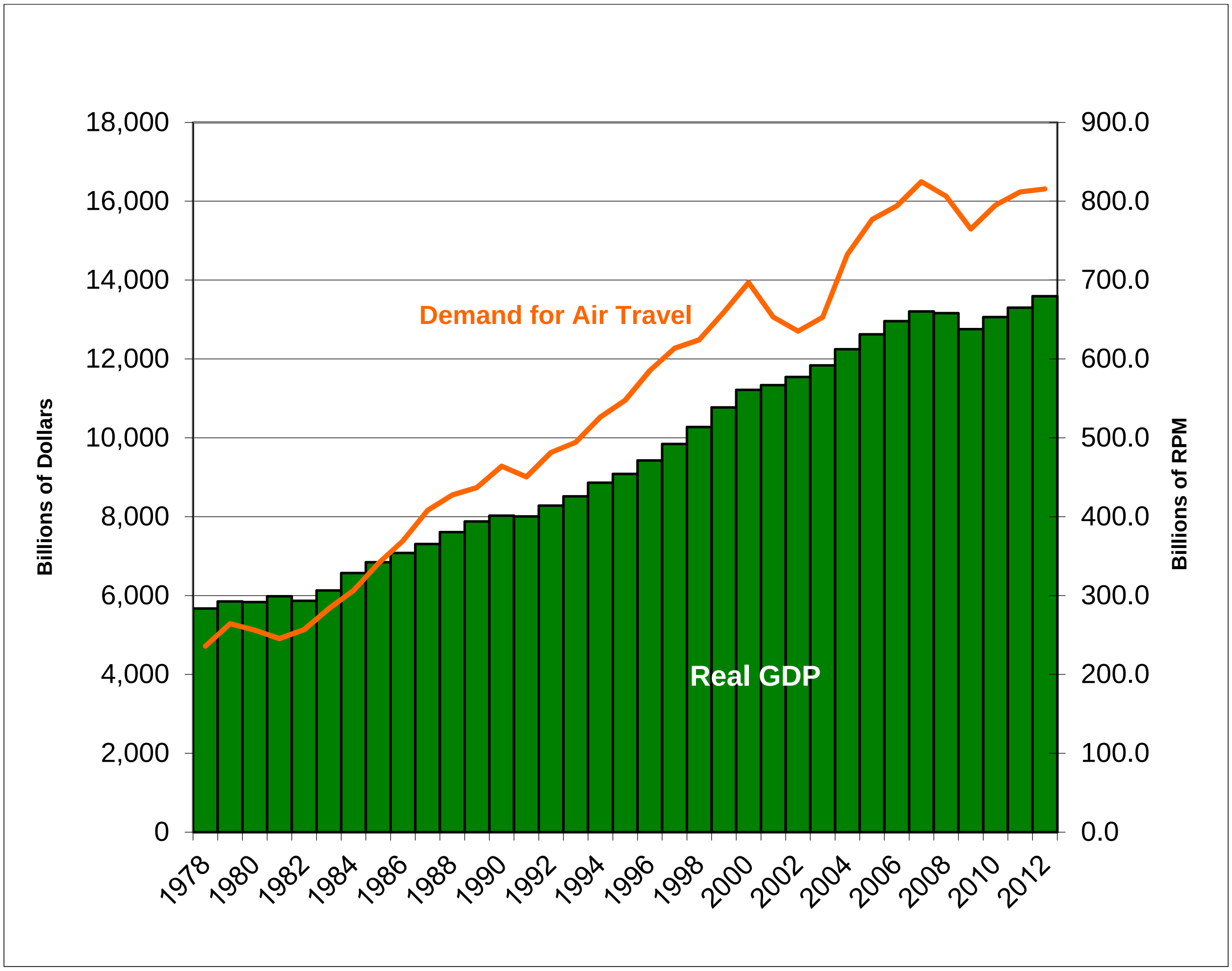

Figure 1-2 Air Travel Demand Growth Compared to Growth in GDP

1.3.3 Airport Expansion Projects

An ongoing effort to increase airport capacity affects the need for capital investment, especially at the core airports, which are experiencing delays. Fort Lauderdale has an active project to extend a runway to support air carrier operations. Columbus is nearing completion of its runway relocation project. Chicago O'Hare and Philadelphia airports have major airport reconfiguration projects underway, and Denver is planning a new runway to improve efficiency of operations. Increasing capacity at large, delay-prone airports is critical to overall NAS performance because delays at the large airports may propagate to other airports where passengers are waiting for incoming flights. In addition passengers on delayed flights may miss connections for their next flight. The 29 large hub airports handle about 60% of airline enplanements. The combined total of 65 large and medium hubs supports about 88% of all U.S. passenger enplanements.

When local airport authorities (in coordination with FAA) build new runways or otherwise expand capacity, sometimes the FAA may need to consider adding supporting equipment and developing procedures to make that capacity fully usable. New or relocated runways often require that airspace around the airports be reconfigured to accommodate new approach and departure patterns. This frequently requires installing new navigational aids and precision landing systems to help pilots in the approach patterns for the runways. To achieve the full benefits of precision approach guidance systems, approach lights must be installed and visibility sensors positioned along the runway so that precision guidance can be used down to the lowest visibility approved for that airport. Some airports need new surveillance systems to cover expanded departure and approach patterns. Capital investment may also be needed to expand or relocate air traffic control facilities. In cases where significant increases in demand may be accommodated, additional controller positions may eventually be needed.

2 Key Considerations in Capital Planning

Capital investments normally require extensive planning and development time. They often take several years to implement because the systems being purchased are technologically complex and require development of both new software and hardware. New systems require extensive testing to ensure that they meet the reliability standards before they can be used for air traffic control. To be prepared for future increases in air traffic, capital investments to improve the capacity of the NAS must be made many years in advance of the anticipated growth.

Capital investing must also be balanced between adding new capabilities and ensuring the existing systems operate reliably until they can be replaced. FAA must provide adequate funding to sustain the performance of the current air traffic control system until a more capable system to handle future growth is in place.

2.1 Sustaining Current System Performance while transitioning to NextGen

The air traffic control system requires very high reliability and availability. Once an aircraft is airborne in controlled airspace, maintaining its separation from other aircraft for the entire flight from takeoff to landing depends on reliable operation of communication, navigation and surveillance systems. Each system in the NAS has a high level of redundancy to support system reliability and to minimize service disruptions. Much of this equipment must be replaced regularly to avoid the problems of obsolescence and to reduce the potential for system failures that cause deterioration in system performance.

The air traffic control infrastructure is a complex system made up of several thousand components. There are 21 air route traffic control centers (ARTCC) that house automation equipment used by air traffic controllers to control en route air traffic. There are over 500 towers and 167 terminal radar control (TRACON) facilities that control air traffic approaching, landing and departing airports. The flow of air traffic is assisted by several hundred surveillance and weather radars; navigation systems for en route and airport approach guidance, and thousands of communication radios that allow pilots and air traffic controllers to be in continuous contact during an aircraft's flight.

NextGen will incrementally replace much of this equipment to introduce new efficiencies in handling air traffic control, but some existing systems will remain in service. Many of the buildings housing existing ATC equipment will remain in service to house the new replacement NextGen systems. Communication, navigation and surveillance equipment will stay in operation in the future and will supplement or back up NextGen capabilities. To sustain the high level of reliability and availability required for the safety of flight, a continued level of investment in this valuable infrastructure will be necessary.

There are ongoing reviews to identify the level of support needed to renovate and replace existing infrastructure so that the air traffic control system can continue to operate efficiently. Preliminary data indicates that:

- Many en route control facilities require renovations and physical plant upgrades to protect equipment and employees from potentially unsafe working conditions,
- Tower renovations and replacements to meet operational needs and correct material defects in existing facilities will have costs that exceed $100 million per year,
- Many of the radar systems were replaced in the 1990s will be retained as a back up for NextGen so they must be modernized and eventually replaced,
- Many navigation systems will be retained as either a back up to NextGen or to support operational improvements. These systems are old and a portion will have to be replaced over the next ten years,
- Radio communications between pilots and controllers is a key element of air traffic control and the radios must be updated with the newer technology that supports NextGen operations,
- Virtually all of the communications, navigation and surveillance systems are housed in FAA constructed shelters which must be renovated regularly. Defects that endanger the equipment inside must be addressed quickly to avoid disruptions to the flow of air traffic.

Reliable electrical power is critical for the operation of the system. Super Storm Sandy is a recent example of commercial power failing and impacting the operation of the NAS and how the FAA Power Services minimize the impact. Massive commercial power outages occurred across the middle and northern Atlantic states starting on October 29, 2013. NAS facilities were without commercial power for a total of 9,438 hours. The FAA's backup power systems provided power to the NAS facilities for over 4,500 hours of those hours. Because of the backup power capability, no flight operations were affected and there were no delays.

Emergency power generators have been installed at most air traffic facilities, and maintaining this backup power requires constant attention and replacement of both the power generators and the systems that condition the power so it doesn't damage ATC automation systems.

The FAA has numerous other facilities that support operations including:

- A large training facility for new air traffic controllers and maintenance technicians,
- A logistics center that warehouses and ships parts to operational facilities,
- Repair shops that rebuild complex components that can be reused, and
- Several facilities that support research, test and evaluation of safety systems and new equipment.

2.2 Planning for the Future through NextGen Investments

NextGen is an umbrella term for the ongoing, wide-ranging transformation of the NAS to ensure that future safety, capacity and environmental needs are met. NextGen will fundamentally change the way air traffic is managed by combining new technologies for surveillance, navigation, and communications with automation system enhancements, workforce training, procedural changes, and airfield development. The movement to the next generation of aviation is being enabled by a shift from air traffic control to air traffic management, satellite-based navigation and surveillance, data communications, enhanced weather predictions and new procedures that combine to make air travel more convenient, predictable and environmentally friendly. NextGen will enhance safety, reduce delays, save fuel and reduce aviation's adverse environmental impact. NextGen advances will enable precise monitoring of aircraft on the ground and in flight, direct routes for travel between cities, improved decision support to manage traffic flows strategically on busy routes, and precise navigation aids for fuller use of existing airspace and runway capacity. The transition to NextGen is happening now, and the FAA is making meaningful progress with the implementation of technologies and procedures on the ground and in the airspace surrounding our nation's airports, at air traffic control facilities, and in the cockpit.

The NextGen Implementation Plan provides more information concerning the vision, benefits and implementation details. http://www.faa.gov/nextgen/implementation/plan/

3 Capital Investment Plan Summary

3.1 FAA's FY 2014 President's Budget Request

FAA's total FY 2014 Budget Request is $15.6 billion, which includes $9.7 billion for Operations, $2.8 billion for Facilities and Equipment, $2.9 billion for Airport Improvement Grants and $166 million for Research, Engineering and Development. This capital investment plan outlines the out-year projections for only the F&E account. It begins with a base funding request of $2.778 billion in FY 2014 reflecting the President's Budget Request and outyear funding totals of $2.852 billion for FY 2015, $2.906 billion for FY 2016, $2.971 billion for FY 2017 and $3.036 billion for FY 2018. The FAA's FY 2014 Budget Request can be found at the following: http://www.dot.gov/mission/budget/faa-fy-2014-budget-estimates

3.2 Five Year Capital Plan Overview

Capital investments are typically multi-year investments to support long term Agency goals and objectives. New systems or facilities can take several years to plan, procure and implement. When a program is approved and baselined, the long term funding requirements to accomplish the program are identified and committed. A program may have interdependencies with other programs and its success may depend upon the delivery of systems or interfaces implemented by other programs. Successful completion of many programs requires a long term commitment.

FAA's capital investment portfolio is divided into maintaining Legacy Systems and Infrastructure ($1,408M, 51% of CIP funding in FY 2014), Field Installation – program management and personnel supporting the installation of equipment for both legacy and NextGen systems (Personnel Compensation, Benefits, and Travel (PCB&T)) ($482M, 17% of CIP funding FY 2014), and new capabilities through NextGen ($887M, 32% of CIP funding FY 2014). Figure 3-1 shows the balance between legacy systems and infrastructure investment and NextGen over the 5 year window of the CIP.

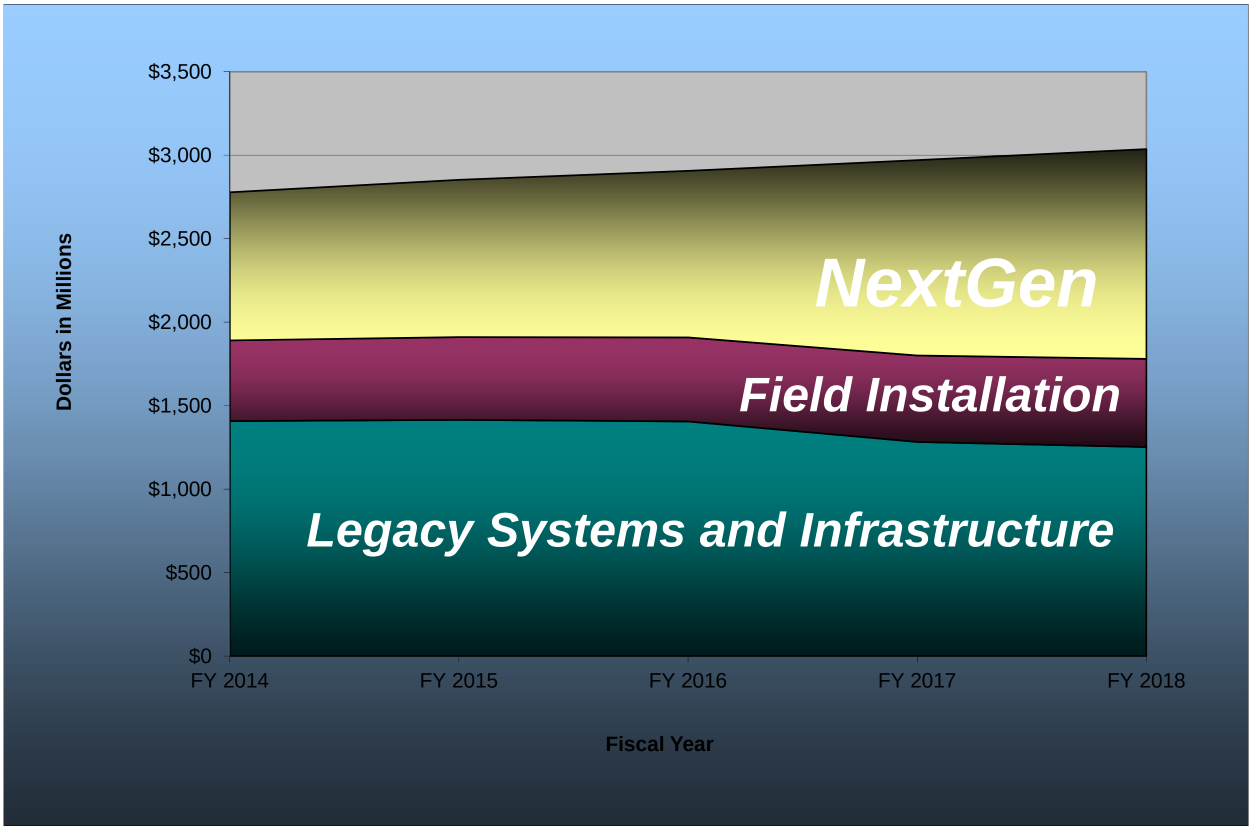

Figure 3-1 FAA's Capital Investment Portfolio

3.3 Facilities and Equipment Budget Activities

Within the F&E account, the budget is broken down into five different activities. Activity 1 programs support the initial design, engineering, development, test and evaluation activities associated with producing end-product systems, technologies and capabilities for the NAS. Activity 2 supports major systems acquisitions and facilities infrastructure programs in the implementation phase. Activity 3 supports modernization of systems and support infrastructure for non-air traffic control facilities. Activity 4 provides mission support services across the FAA organization. Activity 5 covers PCB&T.

Activity 5 funding is included in the CIP but is not described as a stand alone program plan in Appendix B because this activity supports the management and implementation of most of the programs in the CIP.

Table 3-1 presents the Capital Investment Portfolio allocated to budget Activities. The breakout shows yearly funding amounts for Activities 1 through 4 by NextGen and Legacy Systems and Infrastucture. Activity 5 Field Installation is broken out by NextGen and Legacy for FY 2014 only. NextGen personnel costs are refined each year in support of the budget submission.

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Activity 1 - NextGen	$339.8	$412.7	$479.4	$595.7	$601.3
Activity 1 - Legacy	$52.5	$51.3	$52.2	$57.6	$59.9
Activity 2 - NextGen	$523.9	$498.4	$488.3	$551.1	$630.0
Activity 2 - Legacy	$999.3	$1,014.1	$994.4	$878.2	$836.4
Activity 3 - NextGen	$15.0	$15.0	$15.0	$15.0	$15.0
Activity 3 - Legacy	$133.6	$117.9	$124.3	$109.3	$106.8
Activity 4 - NextGen	$9.1	$15.0	$15.0	$10.0	$10.0
Activity 4 - Legacy	$222.6	$231.8	$233.5	$237.5	$249.2
Activity 5 - NextGen	$41.0	*	*	*	*
Activity 5 - Legacy	$441.0	$495.9	$503.9	$516.7	$527.4

NextGen Total	$887.7	$941.0	$997.7	$1,171.8	$1,256.3
Legacy Total	$1,408.0	$1,415.1	$1,404.4	$1,282.5	$1,252.3
Field Installation Total	$482.0	$495.9	$503.9	$516.7	$527.4
	$2,777.8	$2,852.0	$2,906.0	$2,971.0	$3,036.0

Table 3-1 Capital Investment Portfolio allocated to Budget Activities ($M)

A more detailed breakdown of funding amounts for each budget line item within each Activity is provided in Appendix C. Outyear programs are grouped and aligned to the FY 2014 budget line item structure and as the budget is revised each year the BLI titles and numbers may change to adjust for programs that are ending or new programs that are added.

3.4 Legacy Systems and Infrastructure

The FAA has a large base of automation, navigation, surveillance, communications, and weather systems and thousands of facilities to house personnel and systems. These systems and facilities provide the basic infrastructure for the future NAS and must be maintained and replaced as they age or when operational needs change. The FY 2014 budget request provides $1,408M for legacy systems and infrastructure is distributed to Activities 1 through 4 as shown in Table 3-1. The total funding amounts in this area for FY 2015 through 2018 is $5,354M. Most of the program funding in FY 2014 have continuing funding requirements in the succeeding years.

Some areas for investment in 2014 that are key to supporting the NAS long term system modernization are:

- **Terminal automation –** A long term effort is underway to upgrade all of the terminal automation systems. This effort is needed to replace systems that are not sustainable and do not provide the capability to support NextGen operational improvements. In addition, tower cab information systems will be upgraded and replaced to provide tower controllers information needed to better manage surface flow.
- **Enroute automation –** The new ERAM platform is planned to be installed and operational at all sites by the end of FY 2014. This new platform will have continuing enhancements to support implementation of many NextGen operational enhancements.
- **Navigation/Landing –** The WAAS program will continue to augment Global Positioning System (GPS) to support the implementation of many operational improvements dependent on satellite navigation capabilities. Instrument Landing System (ILS) and other Navaid systems will be installed to replace older unreliable and unsupportable systems.
- **Surveillance/Weather –** Modernization of enroute and terminal primary and secondary surveillance radars will be implemented to upgrade or replace aging unsupportable systems. Weather sensing and processing equipment will also be renewed.
- **Air Traffic Control Facilities –** Air Route Traffic Control Centers, Air Traffic Control Towers and Terminal Radar Approach Control Facilities need continual renewal and replacement as those facilities age. These upgrades are needed to support installation and operation of future systems.
- **Power systems –** NAS systems are dependent on reliable and high quality power. Emergency backup systems and power system components must be replaced as they age in order to maintain overall system reliability. New NAS systems supporting NextGen have increased sensitivity to power fluctuations so upgrading and replacing power systems is essential for future equipment investments.
- **Decommissioning –** The FAA has embarked on a concerted effort to eliminate those systems and facilities that are no longer needed. Decommissioning will reduce system maintenance, utilities and lease costs.

More details on all of the legacy systems and infrastructure are provided in Appendix B.

3.5 NextGen

The total NextGen F&E FY 2014 budget request includes $887M for NextGen programs and $41M for personnel costs totaling $928M. The $887M for NextGen programs is distributed to Activities 1 through 4 as shown in Table 3-1. NextGen includes programs for the development and implementation of operational improvements (OIs) and the implementation of transformational programs. The total funding amount for FY 2015 through 2018 is $4,366M.

Development of NextGen operational improvements can include concept development, modeling, safety analyses, demonstrations, international coordination, standards development, and other pre-implementation activities. When a concept matures and a solution is determined the improvement is implemented by procedure changes, system enhancements, air space changes, training, and avionics as necessary to support the improvement. Development of operational improvements will involve participation by Operations, Research and Development, and F&E organizations and NAS users. Capital investment programs in Activity 1 develop the solutions for NextGen OIs and support the activities leading up to the initial investment management decisions for implementation. A solution, when fully developed, is baselined for acquisition and implementation. Activities 2 through 4 support the implementation of the solutions by developing system enhancements or new systems. Descriptions of the operational improvements in each solution set are provided in Section 4.

The developmental NextGen work is conducted in support of the following Solution Sets:

- **Trajectory Based Operations (TBO) –** Efforts in this set will be developing oceanic tactical trajectory management and conflict advisory concepts and procedures (BLI 1A08),
- **Arrival/Departures at High Density Airports (HD) –** Concepts and procedures to improve surface tactical flow and surface conformance monitoring will be developed in this solution set (BLI 1A10),
- **Flexible Terminal Environment (FLEX) –** This set will address wake turbulence, closely space runways, ground based augmentation, and alternative positioning, navigation and timing (BLI 1A12),
- **Collaborative Air Traffic Management (CATM) –** This solution set includes efforts to improve strategic flow management, develop concept and procedures for flight object information and to standardize and disseminate NAS information (BLI 1A11),
- **Reduce Weather Impact (RWI) –** Efforts in this set will be developing improvements to weather observation and forecast capabilities (BLI 1A09),
- **Safety, Security and Environment (SSE) –** This set will develop concepts to identify airborne security threats (BLI 1A16X); and
- **Transform Facilities (FAC) –** Efforts in this set will develop concepts for system networked facilities (BLI 1A13, System Networked Facilities).

NextGen Activity 1 BLIs for Demonstrations and Infrastructure Development (BLI 1A06), System Development (BLI 1A07) and System Networked Facilities (1A13) provide cross cutting support to the above solution sets and do not have Solution Set diagrams.

NextGen transformational programs are core technologies to provide the foundation that allows introduction of new NextGen operational improvements. Each of these technologies supports multiple OIs are described below. The six transformational programs are:

- **ADS-B –** Automatic Dependent Surveillance-Broadcast provides more accurate and timely surveillance data needed to improve NAS operations (BLI 2A13),
- **DataComm –** Provides data link communications between controller and pilot to facilitate information transfer (BLI 1A05),
- **NVS –** The NAS Voice System will provide a nationwide network of digital voice switches for terminal and en route air traffic facilities. These new systems will provide voice switch configuration flexibility required to support NextGen operational improvements (BLI 2B13),
- **CATMT –** Collaborative Air Traffic Management Technologies provides improvements to the traffic flow management decision support tools that are required to support NextGen operational improvements (BLI 2A16),

- **SWIM –** System Wide Information Management provides the standards and software to enable information management and data sharing required to support NextGen operational improvements (BLI 2A12), and
- **CSS-Wx –** Common Support Services – Weather provides the FAA and NAS users with same-time access to a unified aviation weather picture via the System Wide Information Management network, allowing the flexibility to proactively plan and execute aviation operations ahead of weather impacts (BLI 2A12).

More details on all Nextgen programs are provided in Appendix B.

4 NextGen Operational Improvements and Implementation Timelines

This section describes the operational capabilities and benefits that have already been realized in the solution set. The OI description also identifies significant capital programs and systems that support the OI. For information concerning the supporting systems and capital programs, refer to the NAS Enterprise Architecture Roadmaps in Section 5. To obtain more information on NextGen accomplishments visit the following site: *http://www.faa.gov/nextgen/snapshots/*

The publicly released NextGen Implementation Plan (NGIP) provides the overall roadmap for how and when the FAA will accomplish the NextGen operational improvements and capabilities. The OI timelines illustrated below are consistent with FAA's 2013 NGIP (available at *http://www.faa.gov/nextgen/implementation/plan/*), while the grouping of OIs are depicted by Solution Sets, consistent with the budget request.

In the diagrams below, green triangles represent OIs that have been delivered. The bars depict the timeframe of when the OI is expected to become available. Note that activities will not necessarily be occurring during the entire timeframe, it represents a window of anticipated delivery of the improvement. Green bars represent OIs that have been deployed to at least one location in the NAS and additional locations or enhancements are planned for implementation. OIs planned for development through 2020 are identified and briefly described. Far-term OIs shown on the diagrams are still under development and will be described in future plans as they mature.

Each OI has a 6 digit number assigned and these numbers are included as a reference in the text below. The first 3 digits identify the NAS Service, for example, ATC Separation Assurance/ Separation Management. The second 3 digits are a unique ID. The OIs are grouped by NAS Service within the solution set diagrams. Additional information can be found on the NAS Enterprise Architecture Web site at: https://nasea.faa.gov

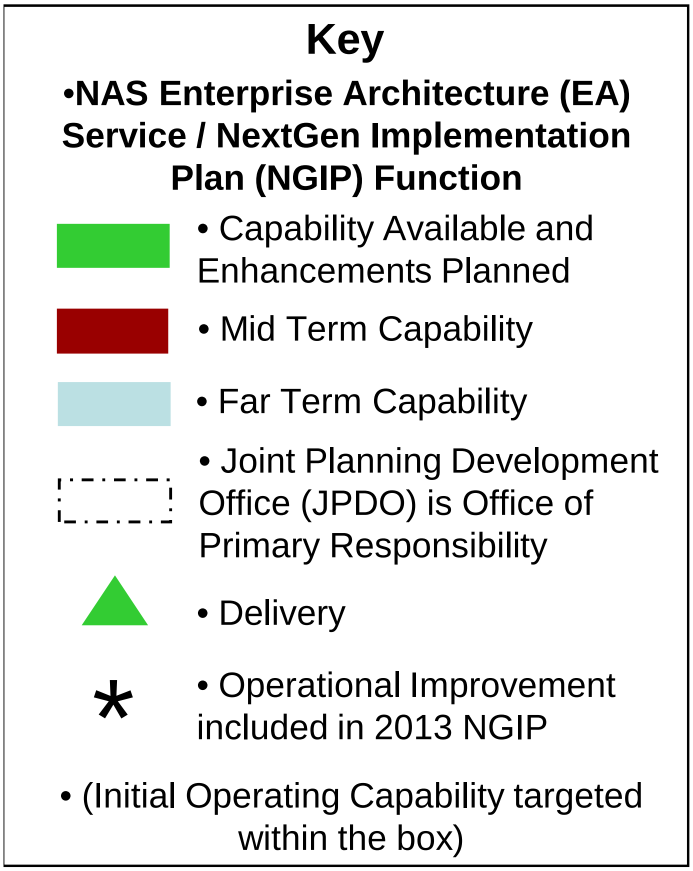

Figure 4-1 Service Roadmap Legend

4.1 Initiate Trajectory Based Operations

Summary Description:

Trajectory-Based Operations (TBO) improve efficiency. Aircraft will be assigned to fly negotiated trajectories, which allows airspace to be used more efficiently. Computer automation—ground and airborne—creates these trajectories, and the trajectories are exchanged with aircraft by DataComm, a data link system that can automatically transmit data from FAA facilities to aircraft and receive return messages. ADS-B continually updates the aircraft position, so the controller can determine whether the aircraft will remain free of conflicts with other aircraft and restricted airspace. Key elements in making TBO work are the accurate exchange of complex information that DataComm provides and FAA's ability to negotiate with pilots via DataComm on how to maneuver if they have to deviate from their approved trajectory. This solution set focuses primarily on en route cruise operations, although all phases of flight will benefit from TBO.

TBO Operational Capabilities and Benefits Accomplished to Date

Oceanic In Trail Climb and Descent operational trials have been successfully completed which will allow aircraft to achieve user preferred flight level changes improving flight efficiency.

Automatic Dependent Surveillance-Broadcast (ADS-B), continues steady deployment of ground based installations to provide surveillance services, with full coverage of the NAS projected by 2014. NAS users benefiting from this system include:

- UPS employs ADS-B to maximize the flow of its cargo planes into the Louisville, KY hub and improve flow rates at its Philadelphia hub.
- Helicopter operators experience fewer and shorter delays flying over the Gulf of Mexico to and from oil platforms because controllers use ADS-B to gain a more accurate depiction of their location.
- General aviation aircraft on the East Coast have access to broadcasts of air traffic near their aircraft and other flight information including up-to-date weather.

Required Navigation Performance (RNP) departure routes and approaches have been developed at several airports. Properly equipped aircraft can fly more precise routes saving time and fuel. Airports where RNP benefits have been achieved include Houston, Atlanta, Seattle, Minneapolis, Portland and Newark. Some examples of RNP benefits:

- Redesigned departure and arrival routes for Houston reduce average distance traveled by 9 miles and time flown by 2 minutes for the new approaches.
- Atlanta is using RNP procedures to reduce congestion for planes taking off that are projected to save the airlines approximately $10 million per year.
- A major airline has adopted NextGen arrival procedures and estimates savings of 18 gallons of fuel per flight by flying routes defined by precision satellite navigation.
- RNP approach procedures were established in Seattle to provide integrated optimal decent for reduced fuel consumption and avoidance of noise sensitive areas.

Use of satellite based navigation is expected to cut a total of seven million nautical miles from flight plans around metroplex cities each year. Shorter routes and gradual descents are projected to save more than 20 million gallons of fuel annually, resulting in 220,000 metric tons less carbon – or the equivalent of taking 43,000 cars off our roads.

Timeline:

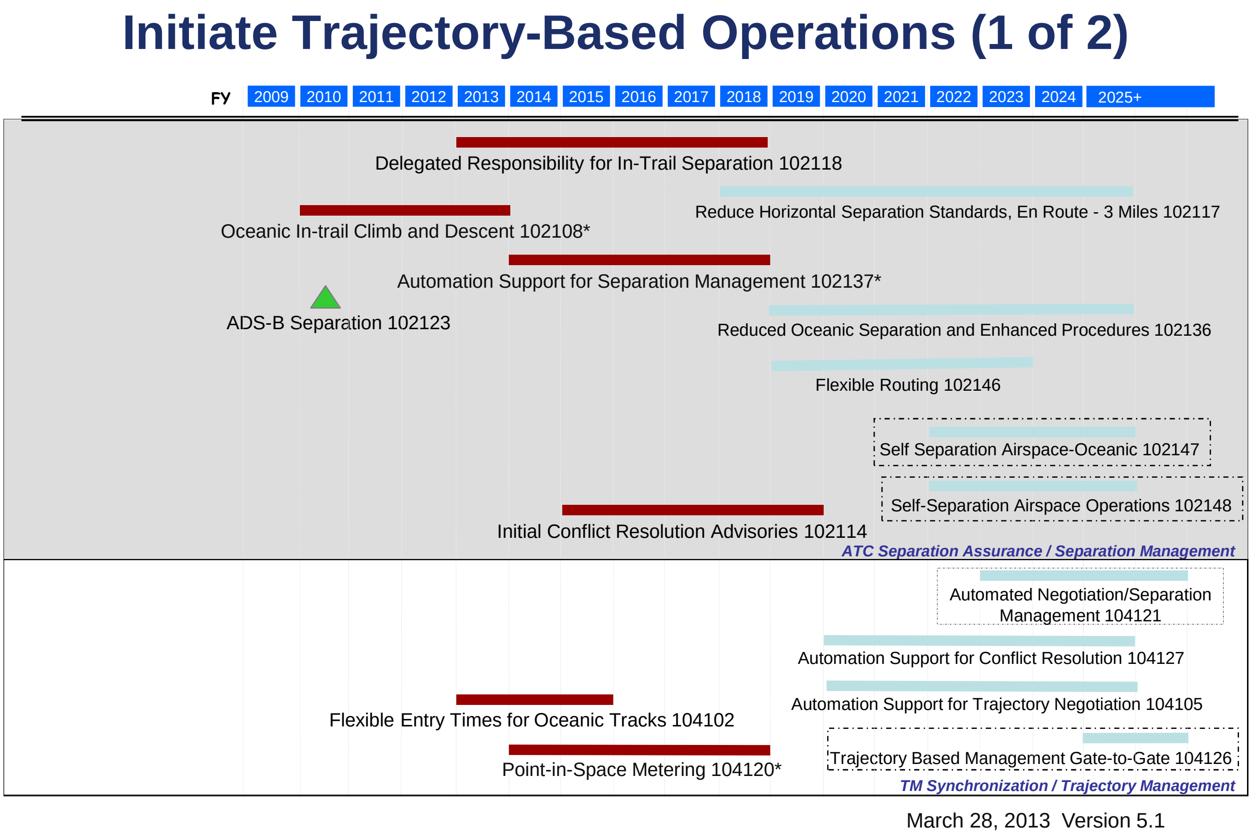

Figure 4-2 Trajectory Based Operations (1)

Operational Improvements

This section describes the mid-term-planned operational improvements associated with TBO. In figure 4-2, the ATC Separation Assurance/ Separation Management services area, planned improvements are the following:

1. Delegated Responsibility for In-Trail Separation (102118) would allow pilots, when authorized by the controller, to maintain safe spacing with other aircraft. The aircraft would have to be equipped with Cockpit Display of Traffic Information (CDTI) and Automatic Dependent Surveillance – Broadcast (ADS-B). The CDTI provides a cockpit display of surrounding aircraft. Improvements supporting this improvement are En Route Automation Modernization (ERAM) Mid-Term Work Package and ADS-B.

2. Oceanic In-Trail Climb and Descent (102108), when authorized by the controller, would allow aircraft to safely reduce separation from the aircraft in front of them for quicker entry to their desired altitude on climb, and also fly more optimal descent profiles on arrival to save fuel. Separate procedures for ADS-B and ADS-C based In-Trail Climb and Decent are being evaluated via trials in the Pacific. The aircraft would have to be equipped with ADS-B or ADS-C (a system similar to ADS-B that is used in oceanic airspace) and Controller Pilot Data Link Capability (CPDLC) and meet Required

Navigation Performance 4 (RNP 4). FAA investments would include upgrades to ATOP (an oceanic air traffic automation system).

3. ADS-B Separation (102103) provides aircraft position data in non radar airspace allowing controllers to provide radar like separation standards and services. The ADS-B positional reports are incorporated into the surveillance data processing systems and displayed to the controller. The ADS-B program provides the surveillance service and the automation upgrades needed to process the surveillance data.
4. Automation Support for Separation Management (102137) would provide controllers with the tools to manage aircraft with differing navigation capabilities and provide safe separation when following aircraft are affected by the wake turbulence of an aircraft in front of them. Investment supporting this improvement is the En Route Automation Modernization (ERAM) mid-term work package.
5. Initial Conflict Resolution Advisories (102114) are an enhancement to the existing conflict probe software to provide rank-ordered advisories to the controller to better accommodate pilot requests for trajectory changes. The investment supporting this improvement is ERAM Mid Term Work Package.

In the TM Synchronization/Trajectory Management services area the planned improvements are the following:

1. Flexible Entry Times for Oceanic Tracks (104102) will allow aircraft to reach their preferred trajectories sooner, which will minimize fuel burn. The investments supporting this improvement are Time Based Flow Management (TBFM), Dynamic Ocean Track System (DOTS) or 4D Oceanic Trajectory Management (OTM4D) system and the accelerated Terminal Data Link System (TDLS). DOTS analyzes weather data and calculates the most efficient tracks for oceanic flights, and the TDLS provides automated departure clearances to aircraft.
2. Point-in-Space Metering (104120) uses scheduling tools to ensure smooth flow of traffic and efficient use of airspace. Pilots are assigned a specific trajectory and scheduled times to reach specific points on the assigned trajectory. This maximizes use of airspace by reducing the need to alter aircraft flight paths to maintain separation. Investments supporting this improvement are Collaborative Air Traffic Management Technologies (CATMT); ERAM D-Position Upgrade and System Enhancements (ERAM System Enhancements and Technology Refreshments and ERAM Sector Enhancements); System Wide Information Management (SWIM) and the TBFM tool.

Timeline:

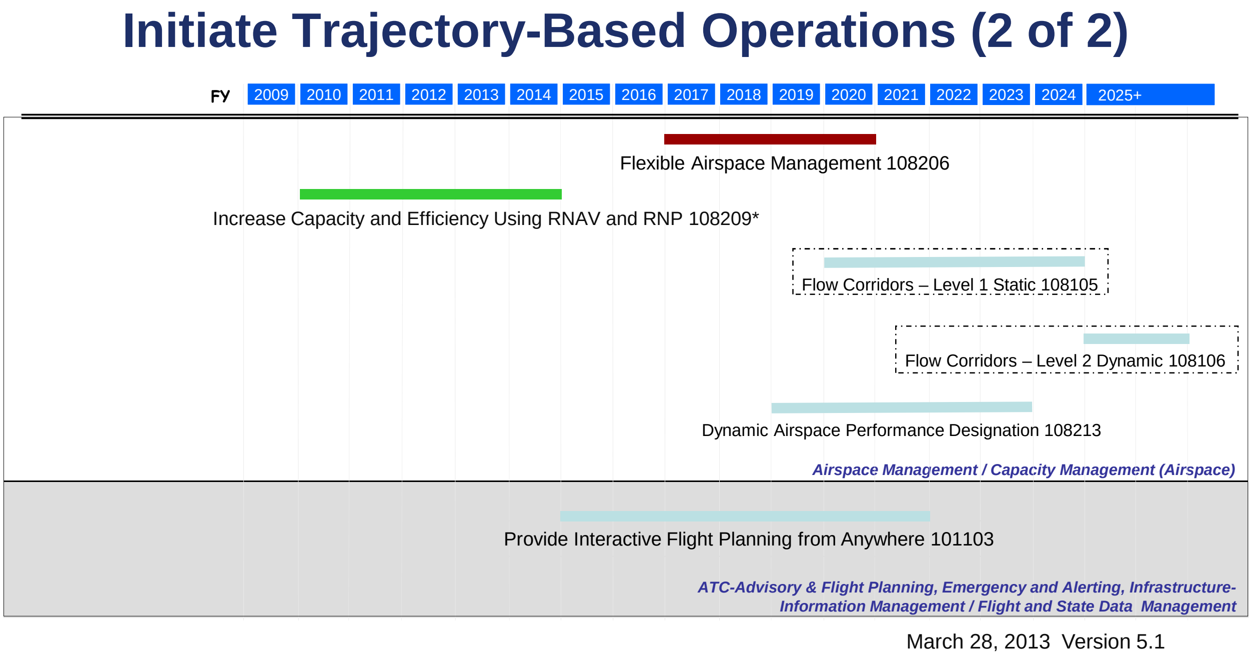

Figure 4-3 Trajectory Based Operations (2)

In figure 4-3, the Airspace Management/Capacity Management service area's planned mid-term improvements are:

1. Flexible Airspace Management (108206) upgrades automation to support reallocation of aircraft status information to different controller positions and, in some cases, to different facilities. These improvements will allow facility managers to better match the volume of traffic with available staffing. The FAA investments to implement this capability are Airspace Information Management (AIM) system, the ERAM Mid Term Work Package, Surveillance Interface Modernization (SIM), System Wide Information Management (SWIM) including Common Support Services, and the NAS Voice System (NVS).
2. Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP) (108209) expands the number of approach and departure routes at airports for those aircraft equipped with highly accurate aircraft navigation systems and qualified pilots. The FAA investments to implement this capability include CATMT, ERAM mid-term work package and additional Distance Measuring Equipment (DME) systems.

4.2 Increase Arrivals and Departures at High Density Airports

Summary Description:

This solution set addresses improving use of available capacity at airports:

- With large numbers of operations;
- That have multiple runways with both airspace and taxiing interactions; and
- In close proximity to other airports that have the potential for airspace interference.

Operational issues make it difficult for an airport to achieve its maximum arrival or departure capacity. If the arrival stream to an airport contains a mixture of small and large aircraft, maximizing use of runway capacity is not possible. Differences in aircraft arrival speed or the effect of wake turbulence from heavy category aircraft can require increased separation between aircraft. Wake turbulence from a heavy category aircraft requires controllers to increase separation to 5 miles or more between the two aircraft when a small aircraft is following a heavy category aircraft. Multiple runways at an airport can also complicate movement of aircraft on the ground and create restrictions on the number of takeoffs from available runways. In major metropolitan areas, multiple major hub airports that have overlapping terminal airspace must share that airspace, and significant restrictions on terminal operations result, when winds dictate that an approach path used for the active runways at one of the airports limits the use of approach paths for certain runways at nearby airports. Operational improvements in this solution set address some of these limitations in order to make more efficient use of the available runways.

High Density Airport Operational Capabilities and Benefits Accomplished to Date

Implementing updated criteria for Closely Spaced Parallel Runways have resulted in improvements at some of the most challenged airports. In San Francisco, updated criteria will enable departure increases of potentially 25 to 50 percent per hour.

Approved changes for simultaneous dependent parallel approach procedures have been approved at Newark and San Francisco resulting in increased airport capacity.

Enhancements to surface operations at JFK were tested successfully and procedural changes are now in use. Holding aircraft at the gate reduces taxi time and congestion on taxiways, and saves fuel. Systems that allow improved control of surface operations have also been tested at Dallas-Ft. Worth airport.

Traffic Management Advisor's (TMA's) Adjacent Center Metering (ACM) capability is delivering efficiency benefits by providing to controllers better estimates of arrival times resulting in more efficient slot and delay allocation. It also enables controllers to better manage ground operations which increases the airlines ability to depart on time. Atlanta and Newark airports have experience significant saving in miles in trail restrictions (80% reduction at Atlanta) and holding events (70% reduction at Atlanta) as a result of ACM. ACM has been installed at 19 major airports.

Timeline:

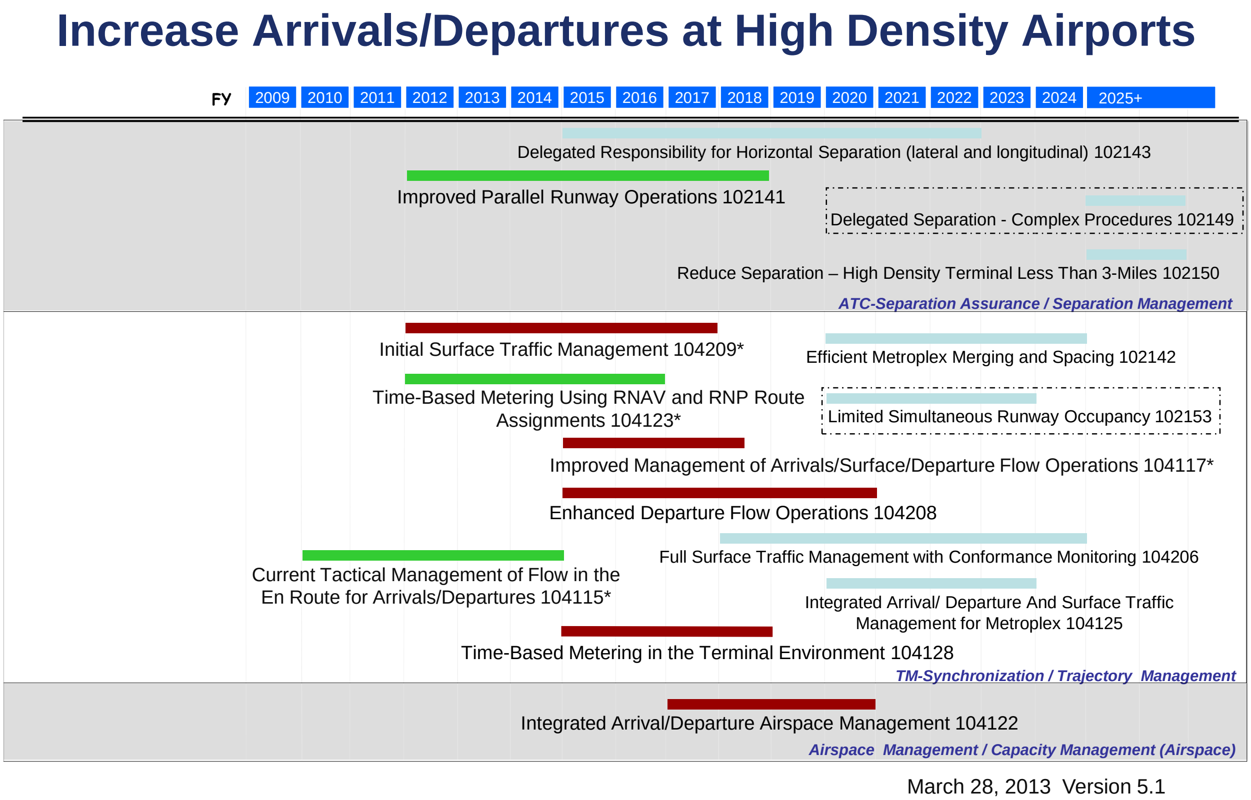

Figure 4-4 Increase Arrivals/Departures at High Density Airports

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Arrivals/ Departures at High Density Airports. In figure 4-4 the ATC Separation Assurance/Separation Management service area's planned improvement is:

> Improved Parallel Runway Operations (102141) will recover lost capacity by reducing separation standards for two aircraft approaching side by side to closely spaced parallel runways. When parallel runways are less than 4,300 feet apart, special procedures are required to maintain separation for aircraft approaching the two runways. Depending on the amount of runway separation, these procedures can be for dependent (terminal controller must adjust separation) or independent (ATC shares separation responsibility with the flight deck) operations in lower visibility conditions. The investments supporting this capability are Terminal Automation Modernization Replacement (TAMR) and Wake Turbulence Mitigation Arrivals (WTMA).

In the Traffic Management Synchronization/Trajectory Management services area, the planned improvements are the following:

1. Initial Surface Traffic Management (104209) uses automation tools for departure scheduling to improve flow of surface traffic at high-density airports. Automation provides surface sequencing and staging lists for departures and predicts departure

delays. By better scheduling departures from the gate, the time between leaving the gate and takeoff is reduced resulting in fuel and time savings. Investments that support this improvement are Time Based Flow Management (TBFM), Tower Flight Data Manager (TFDM), Airport Surface Detection Equipment (ASDE), CATMT, and System Wide Information Management (SWIM).

2. Time Based Metering Using RNAV and RNP Route Assignments (104123) allows more efficient use of runways and airspace in high-density airport environments. For those aircraft that are equipped to fly more precise routes and conform to time metering, arrival and departure paths are shortened to save fuel and minimize delays. Investments that support this improvement include the ERAM Mid Term Work Package, TBFM, and Distance Measuring Equipment (DME).

3. Improved Management of Arrivals/Surface Departure Flow Operations (104117) integrates advanced arrival and departure flow management with advanced surface operations to improve overall airport capacity and efficiency. Arrival and departure scheduling tools and 4D trajectory agreements are used to make collaborative real-time adjustments to aircraft sequencing to optimize use of airport capacity. Investments that support this improvement are Collaborative Air Traffic Management Technologies (CATMT), TFDM, and SWIM.

4. Enhanced Departure Flow Operations (104208) incorporate taxi instructions, surface movement information, and aircraft wake category in decision support tools. Clearances are developed, delivered, monitored and provided in digital data or textual format to the flight deck display. Surface decision support and management systems use ground and airborne surveillance and a scheduling and sequencing system to develop and maintain schedules of departing aircraft to optimize runway use and facilitate transmission of other operational information.

5. Current Tactical Management of Flow in the En Route for Arrivals/Departures (104115) provides controllers the tools to sequence and space air traffic thereby maximizing NAS efficiency and capacity in the arrival and departure phases of flight. Controllers synchronize aircraft by monitoring flows, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. The investment supporting this capability is Time Based Flow Management (TBFM).

6. Time Based Metering in the Terminal Environment (104128) optimizes use of terminal airspace and surface capacity. Automation develops trajectories and allocates time-based slots for various points within the terminal environment, using RNAV routes, enhanced surveillance, and data communications. It extends current metering capabilities into the terminal environment and supports end-to-end metering and trajectory-based operations. It also supports capabilities designed to expand the use of terminal separation standards in transition airspace, and builds the foundation for future advanced airborne-based applications that will use ground-based automation to maintain the sequence of aircraft into and out of high density terminal locations. Investments that support this improvement include the ERAM mid-term work package, TBFM and TAMR.

In the Airspace Management/Capacity Management services area, the planned improvement is the following:

Integrated Arrival/Departure Airspace Management (104122) to take advantage of terminal procedures and separation standards in adjacent en route airspace to increase flow and introduce additional routes and flexibility. Investments that support this improvement are CATMT, ERAM Mid Term Work Package, TBFM, TAMR, SWIM, and Surveillance Interface Modernization (SIM).

4.3 Increase Flexibility in the Terminal Environment

Summary Description:

This solution set concentrates on improvements in the access, situational awareness, and separation services at airports. Unlike the high-density solution set that focuses on increased sophistication of traffic management to manage demand at large airports, this solution set reflects the common needs that all airports have: precision landing guidance, surface situational awareness, and improved management of flight data.

Flexible terminal operations will serve a mix of Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) traffic, with aircraft types ranging from airline transport to small general aviation aircraft. Airports can be towered or non-towered, depending on traffic demand. Some satellite airports will experience higher traffic demand due to migration of aircraft with less sophisticated avionics to these smaller airports to avoid traffic congestion. These airports can serve an important role by handling the potential increase in use of personal aircraft for pleasure and business.

Flexible Terminal Operational Capabilities and Benefits Accomplished to Date

Optimized Profile Descent (OPD) is operational at Anchorage, Atlanta, Charleston, El Paso, Honolulu, Las Vegas, Los Angeles, Louisville, Miami, Philadelphia, Phoenix, Raleigh-Durham, Reno, Sacramento, San Diego, San Francisco, Seattle and Washington DC. The vertical profiles are designed to allow aircraft to descend using reduced thrust settings from the top of descent to final approach. OPDs reduce fuel consumption, emissions, and noise during descent. Preliminary data from Washington indicate a fuel burn savings of $2.3M per year.

Traffic Situational Awareness with Alerts (TSAA) is available at Boston, Chicago and Denver to warn controllers if a ground vehicle is entering an active runway.

Expanded Low Visibility Operations lowers RVR minima from 2400 feet to 1800 feet (or lower, depending on the airport and requirement) at selected airports. This reduced minima increases airport capacity during inclement weather.

Re-Categorized Wake Separation Standards are in effect at Memphis. Estimates are that wake re-categorization will allow up to 20 percent more runway throughput when airports are operating under IFR.

Category I Ground Based Augmentation System (GBAS) is operational at Houston and Newark which provides precision landing guidance without traditional ILS capability.

Timeline:

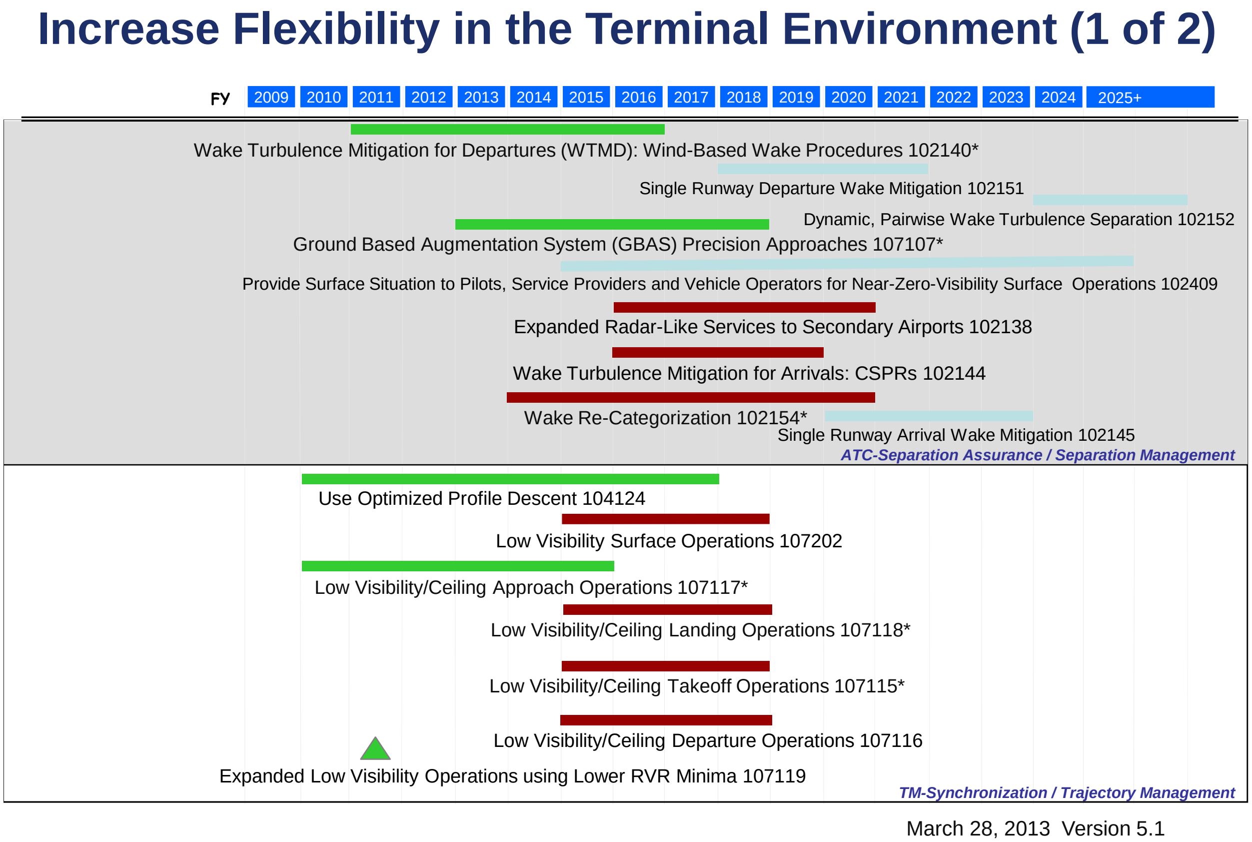

Figure 4-5 Increase Flexibility in the Terminal Environment (1)

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Flexibility in the Terminal Environment. In figure 4-5 the ATC Separation Assurance/Separation Management services area planned improvements are the following:

1. Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures (102140). Based on wind measurements, wake turbulence separation standards can be adjusted quickly to allow more departure operations on an airport's Closely Spaced Parallel Runways (CSPR), which would improve use of runway capacity. Observed and forecasted airport wind information can be processed and displayed in the tower to indicate which runways can be used for immediate departures after a heavy category aircraft departs on an adjacent CSPR. The WTMD system measures and forecasts runway crosswinds to determine when there will be sufficient crosswind to prevent the wake from a departing aircraft from moving into the takeoff corridor of an aircraft departing on an adjacent runway. Using WTMD during periods of favorable crosswinds will allow controllers to maximize the departure capacity of an airport's CSPR.

2. Ground Based Augmentation System (GBAS) Precision Approaches (107107) is a capability for airports to provide GPS augmentation to support precision approaches to

Category I and eventually Category II/III minimums for properly equipped runways. GBAS can support curved precision approaches and high-integrity surface movement requirements. This is an economical way to increase the number of runways with instrument approaches that allow operations in low-visibility conditions. Investment by airports in GBAS supports this improvement.

3. Expanded Radar-Like Services to Secondary Airports (102138) will be available in Instrument Meteorological Conditions (IMC) at secondary airports. Equipped aircraft will automatically receive airborne broadcast traffic information and, at select airports, surface traffic information. Enhanced surveillance coverage will also be available in areas of mountainous terrain where radar coverage is limited.

4. Wake Turbulence Mitigation for Arrivals (WTMA): CSPRs (102144) allows controllers to reduce the instrument flight rules wake mitigation separation for two aircraft landing on an airport's adjacent CSPR. When crosswinds are stable and strong enough so that the wake of the lead aircraft landing on one runway cannot be transported into the path of the following aircraft, controllers can reduce wake mitigation separations. Observed and forecasted airport wind information will be processed and provided to controller displays to show the minimum diagonal separation between approaching aircraft. Investments that support this improvement are: Terminal Automation Modernization Replacement (TAMR), WTMA, and Integrated Terminal Weather System (ITWS).

5. Wake Re-Categorization (102154) - Legacy world-wide air traffic control wake mitigation separation standards have been updated based on data collected and subsequent analysis of aircraft wake generation, wake decay, and wake encounter effects for representative aircraft. The updated standards allow more efficient use of existing airport runways. As more automation and information sharing NextGen capabilities are enabled, even more efficient wake separation standards can be established that consider real-time atmospheric and aircraft configuration information.

The Traffic Management Synchronization/ Trajectory Management service area (shown in figure 4-5) planned improvements are the following:

1. Use Optimized Profile Descent (104124) permits aircraft to minimize power settings during descent to an airport to save fuel. These descent profiles are being used, and they save significant fuel. Investments that support this improvement include ERAM mid-term work package and TAMR.

2. Low Visibility Surface Operations (107202) will use ground surveillance systems to inform controllers of surface movements and runway status lights will alert pilots when it is unsafe to enter or cross a runway. Investments that support this improvement are: TFDM, ADS-B, Airport Surface Detection Equipment (ASDE-X), Airport Surface Surveillance Capability (ASSC) and Runway Status Lights (RWSL).

3. Low Visibility/Ceiling Approach Operations (107117) improves the ability of aircraft to complete approaches in low visibility/ceiling conditions. The user investment that supports this improvement is the Enhanced Flight Vision System (EFVS).

4. Low Visibility/Ceiling Landing Operations (107118) permit aircraft to land in low visibility/ceiling conditions when equipped with EFVS.

5. Low Visibility/Ceiling Takeoff Operations (107115) allows aircraft to takeoff when visibility is very limited. The aircraft must have advanced vision capabilities such as a heads up display, synthetic vision system, or an enhanced flight vision system.
6. Low Visibility/Ceiling Departure Operations (107116) allows appropriately equipped aircraft to depart in low visibility conditions. The user investment that supports this improvement is the EFVS.
7. Expand Low Visibility Operations Using Lower RVR Minima (107119) provides greater access to selected airports during low visibility conditions by lowering RVR minima from 2400 feet to 1800 feet (or lower, depending on the airport and requirement). A greater number of aircraft can complete scheduled flights thereby reducing diversions or delays which can cause a rippling impact throughout the NAS.

Timeline:

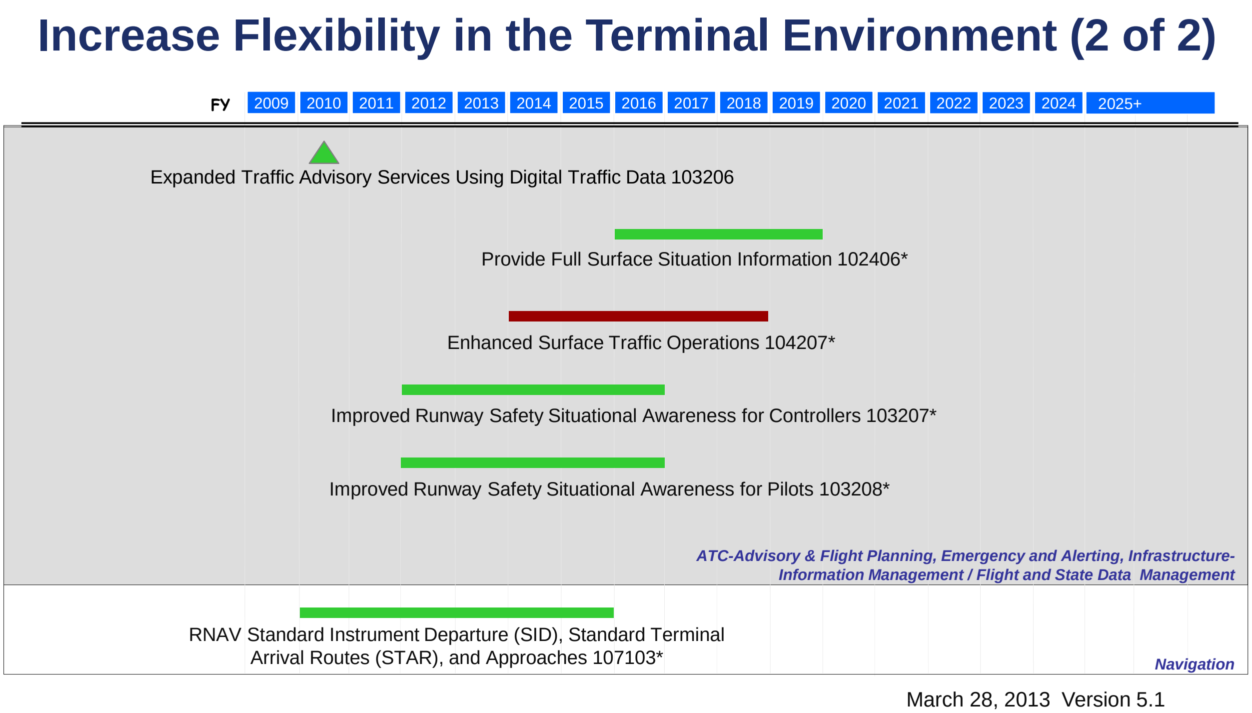

Figure 4-6 Increase Flexibility in the Terminal Environment (2)

In figure 4-6, the ATC Advisory and Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's planned improvements are the following:

1. Expanded Traffic Advisory Services Using Digital Traffic Data (103206) provides traffic information to the flight deck, including automatic dependent surveillance (ADS) information, the rebroadcast of non-transmitting targets and traditional traffic advisories. This improves situational awareness in the cockpit by providing more accurate and timely digital traffic data directly to aircraft.

2. Provide Full Surface Situation Information (102406) by broadcasting aircraft and vehicle position to ground and aircraft displays would provide a comprehensive picture of the airport surface to controllers, equipped aircraft and flight operation centers to enhance safety and efficiency. This would also help prevent runway incursions. Investments that support this operational improvement are TFDM, ASDE X, ASSC and ADS-B.
3. Enhanced Surface Traffic Operations (104207) would use data communications to exchange taxi clearances, amendments and requests between ATC and aircraft. This would decrease the time to provide clearances to aircraft and potentially decrease taxi and takeoff delays. Investments that support this improvement are DataComm and TFDM.
4. Improved Runway Safety Situational Awareness for Controllers (103207) will develop additional ground based capabilities including improved runway markings and initial controller taxi monitoring capabilities. All of these improvements will increase the controller's awareness of the location of surface traffic. Investments that support this improvement are TFDM and ASDE.
5. Improved Runway Safety Situational Awareness for Pilots (103208) improves pilot awareness of their location on the airport surface. Equipped aircraft will have a surface moving map to display their position and in future enhancements it will show the location of other aircraft near them. Investments that support this improvement are TFDM, ASDE-X, ADS-B, and Runway Status Lights (RWSL).

The Navigation service area (shown in figure 4-6) planned improvement is the following:

Area Navigation (RNAV) Standard Instrument Departure (SID), Standard Terminal Arrival Route (STAR), and Approaches (107103) supports the development of departure and approach procedures using Global Positioning System (GPS) and Distance Measuring Equipment (DME) based avionics to provide the required aircraft position accuracy along a specified route. The resulting procedures provide more efficient (time and fuel) arrivals and departures.

4.4 Improve Collaborative Air Traffic Management (CATM)

Summary Description:

This solution set covers strategic and tactical air traffic flow management, including interactions with operators to guide choices when the FAA cannot accommodate the desired route of flight. CATM includes flow programs and collaboration on procedures that will shift flights to alternate routings, altitudes, or times when there is severe weather affecting operators' planned routes, or when demand for certain routes exceeds capacity. CATM also includes development of systems to distribute and manage aeronautical information, manage airspace reservations, and manage flight information from preflight to post flight analysis.

Existing ATM tools for managing system demand and capacity imbalances are relatively coarse. Optimal solutions would minimize the extent to which flights are either over-constrained or under-constrained. Flight restrictions can unnecessarily interfere with optimizing operator efficiency and increase the cost of travel. Restrictions also inhibit operators from specifying a preferred alternative and constrain their involvement in resolving imbalance issues. The overall philosophy driving delivery of CATM services in NextGen is to accommodate flight operator preferences as much as possible. Restrictions should be imposed only when a real operational need exists. If restrictions are required, the goal is to maximize opportunity for aircraft operators to maintain operating efficiency based on their priorities while complying with the restrictions.

CATM Operational Capabilities and Benefits Accomplished to Date

The Enhanced Congestion Prediction tool matches user preferences to airspace with available capacity. This capability provides accurate planning of traffic management initiatives (TMIs) to match strategic prediction of congestion and capacity.

Execution of Flow Strategies provides controllers the ability to make flight specific changes incrementally with the ability to observe the effect before taking additional action. This capability protects the flight plan from additional reroutes and negotiated trajectories.

Collaborative Departure Queue Management (CDQM) assigns times to departing aircraft based on exchanging airport capacity and aircraft readiness information at Memphis and Orlando. This reduces taxi time by providing an efficient flow of aircraft to the runway.

Broadcast of Flight and Status Data to Pilots is operational at 10 ARTCCs which provides on-demand NAS information to pilots.

SWIM is currently providing weather information and enterprise messaging services for airport surface products to 17 users.

Timeline:

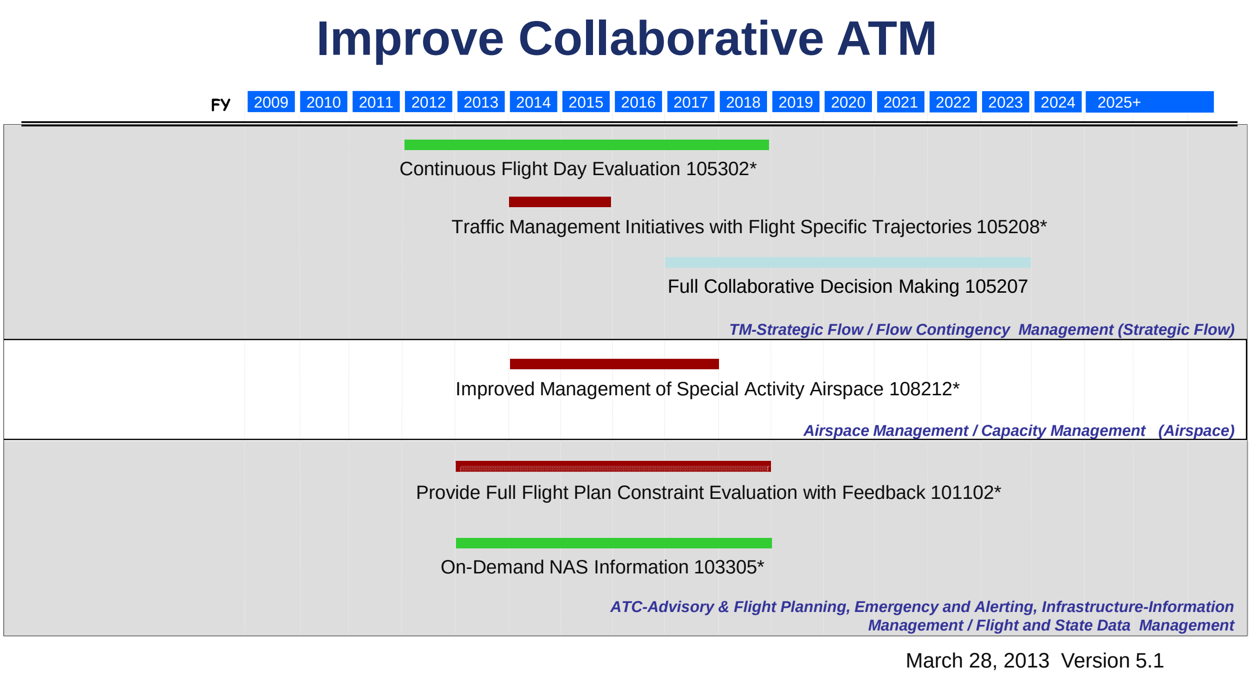

Figure 4-7 Improve Collaborative ATM

Operational Improvements

This section describes the mid-term planned improvements associated with Improve Collaborative Air Traffic Management.

In figure 4-7, the Traffic Management Strategic Flow/Flow Contingency Management service area's planned improvements are the following:

1. Continuous Flight Day Evaluation (105302) involves both real-time NAS performance and post-event analysis of traffic management initiatives. Real-time constraints are transmitted to the ATC Command Center to help determine whether ground stops need to be implemented or other air traffic constraints are required. Real-time information minimizes the delays associated with flow restrictions and continuous evaluation of past performance improves future decisions about when they should be used. Investments that support this improvement are the Aeronautical Information Management (AIM), CATM, and System Wide Information Management (SWIM).
2. Traffic Management Initiatives with Flight Specific Trajectories (105208) will generate and send flight specific trajectory changes for aircraft to FAA facilities for approval when these initiatives are implemented. This capability will increase the ability to adjust and respond to dynamically changing conditions such as severe weather, air traffic congestion, and system outages. Investments that support this improvement are CATM, ERAM, and SWIM.

In the Airspace Management/Capacity Management service area the planned improvement is the following:

Improved Management of Special Use Airspace (108212) calls for upgrading the automated links used to transfer information concerning status of airspace reserved for special purposes such as military operations. Status changes are transmitted to the flight deck via voice or DataComm. Trajectory planning can then be managed dynamically based on real-time information. The ability to use special use airspace can shorten route lengths and avoid the congestion caused by forcing aircraft into narrow paths between restricted areas. This improvement builds on existing systems with the important upgrade of almost instantaneous information transfer regarding when it is safe to use this airspace. Investments that support this improvement are AIM, CATMT, ERAM, ADS-B and SWIM.

In the ATC - Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area, the planned improvements are the following:

1. Provide Full Flight Plan Constraint Evaluation with Feedback (101102) incorporates constraint information into FAA automation systems and makes this information available to users for pre-departure flight planning. The constraint information includes equipment outages, air traffic congestion, status of special use airspace, and significant weather information. Providing this information will allow selection of the most efficient flight path and avoid adjustments while in flight that increase flight time and fuel burn.

Investments that support this improvement are Future Flight Service Program (FFSP), AIM, ERAM mid-term work package, CATMT and SWIM including Common Support Services.

2. On-Demand NAS Information (103305) will provide NAS status and aeronautical information to authorized users and equipped aircraft on demand. This will allow pilots to make informed decisions on routes and conditions at departure and destination airports. Investments that support this improvement include FFSP, AIM, CATMT, ERIDS, Information Display System (IDS), ADS-B, and SWIM including Common Support Services.

4.5 Reduce Weather Impact:

Summary Description:

Currently, NAS weather data is not well integrated into either manual procedures or automated decision-support systems. Moreover, data is not readily available to the full spectrum of decision makers, and forecast weather is not sufficiently accurate. To support the predicted volume of future air traffic operations, improvements are needed. Unpredicted changes in weather are of prime concern because of the significant impact and disruption they create throughout the entire NAS. The current system does not respond well to unpredicted weather situations or to weather systems that evolve differently than expected. This solution set will improve weather predictions to support proactive planning operations rather than adjusting for impacts after the weather has changed.

Improvements include providing accurate, consistent, and integrated weather information to Air Traffic Management Specialists, other air traffic control facilities, airline flight operations centers (FOC), and the flight deck to support both tactical and strategic operational decision-making tools. Other refinements will be developed that improve weather observations, upgrade forecasts, and disseminate weather information to mitigate the severity of weather impacts. Improved forecasts will incorporate a better characterization of uncertainty and assist operators in safely planning and conducting four dimensional, gate-to-gate, trajectory-based operations to not only avoid storm hazards and provide comfortable flight conditions, but also to increase overall efficiency by improving routing/rerouting decision making. Decision support systems will directly incorporate weather data to aid decision makers in developing the best response to potential weather-related operational effects, thus minimizing the level of traffic restrictions required in 0–8 hours planning horizons.

The FAA will deploy a Common Data Distribution capability as part of its enterprise solution for information management in conjunction with the SWIM Segment 2 Enterprise Solution. The Common Data Distribution capability will provide as its first products the dissemination of weather information to support both real-time operations as well as strategic planning products to enhance collaborative and dynamic NAS decision making. It will provide network access to weather information from many different sources.

Weather Operational Capabilities and Benefits Accomplished to Date

Integration of the Convective Weather Avoidance Model (CWAM) for the Route Availability Planning Tool (RAPT) is operational. CWAM helps air traffic controllers and airline dispatchers determine which departure routes will be affected by operationally significant convective weather up to 90 minutes into the future.

Corridor Integrated Weather System (CIWS) aviation weather has extended forecast capability from 0-2 hours out to 8 hours and provided this capability to Airlines on a trial basis. Airlines have estimated a savings of $26M per year since 2010.

Flight Information Service – Broadcast (FIS-B) is providing weather information to general aviation pilots to provide situational awareness of weather conditions and forecasts.

Timeline:

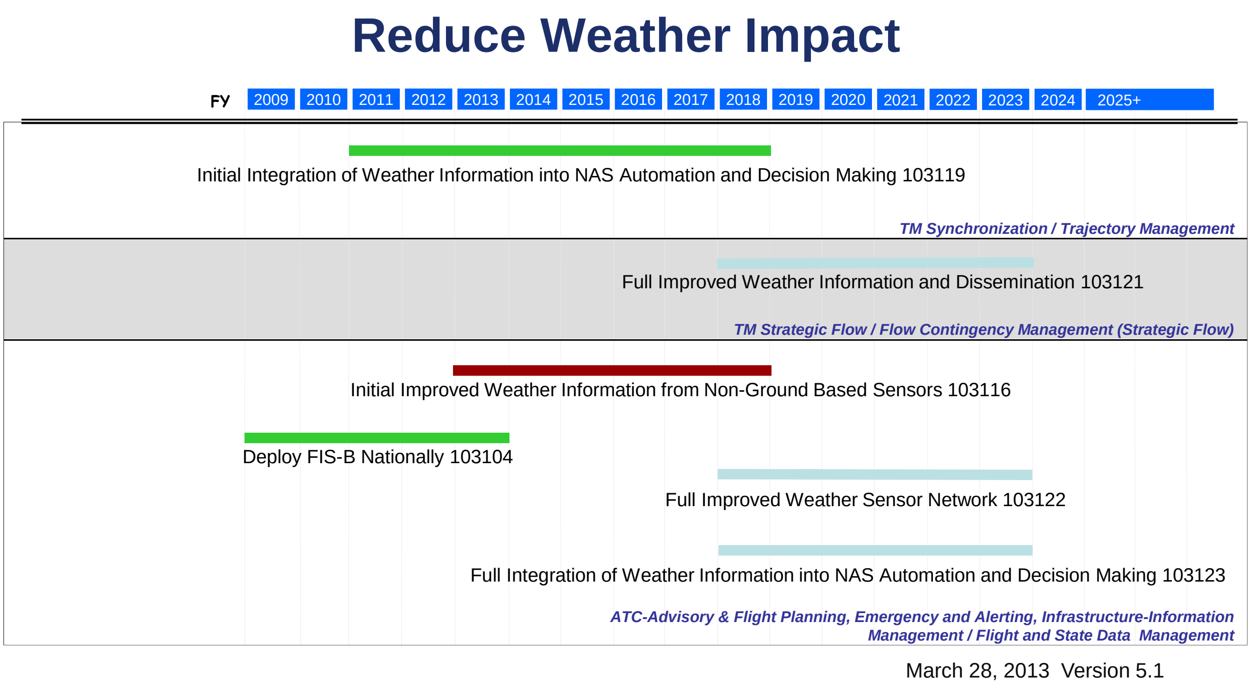

Figure 4-8 Reduce Weather Impact

Operational Improvements

This section describes the mid-term planned improvements associated with the Reduce Weather Impact solution set.

In figure 4-8, the Traffic Management Synchronization/Trajectory management service area's planned improvement is the following:

> Initial Integration of Weather Information into NAS Automation and Decision Making (103119) will disseminate timely, more accurate weather information to the FAA and

airline dispatch decision support tools. Better access to improved weather forecasts and integrating this information into decision support tools will improve efficiency of operations by avoiding unnecessary deviations from planned flight paths resulting in time and fuel savings. Investments that support this improvement are Collaborative Air Traffic Management Technologies (CATMT), ERAM Mid Term Work Package, Tower Flight Data Manager (TFDM), Time Based Flow Management (TBFM), System Wide Information Management (SWIM) and SWIM Common Support Service.

The ATC Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's planned improvement is the following:

Initial Improved Weather Information from Non-Ground Based Sensors (103116) would collect weather information from aircraft in flight and satellites to supplement the existing network of ground sensors. It will increase the reliability of forecasts of turbulence, convective weather, and in-flight icing. The improved accuracy of this weather information will be route and altitude specific improving both safety and efficiency. Investments that support this improvement are SWIM and Common Support Service.

4.6 Increase Safety, Security, and Environmental Performance

Safety:

Summary Description:

Safety is FAA's highest priority. NextGen will interweave safety analysis with every initiative that is part of the NextGen effort. As NextGen technologies are introduced in the NAS, cross-cutting teams of safety experts from FAA lines of businesses (LOB's) will ensure that potential risks due to system changes are identified and adequately mitigated. Integrated safety assessments of NextGen conceptual initiatives will identify hazards and potential contributory factors (e.g., high workload, training, fatigue, and situational awareness) to help validate requirements for system design and implementation.

An integrated Safety Risk Management (SRM) capability for NextGen portfolios will enable safety stakeholders to take a system-of-systems approach to ensure safe design and implementation of NextGen mid-term capabilities. This also includes individual system safety risk assessments to ensure that system and procedure related specific hazards are identified and controlled. Risk-based models for NextGen concepts/solution sets will be developed at the NextGen Integration and Evaluation Capability (NIEC) lab in coordination with the aviation research stakeholders on human factors during NextGen development.

The ATO safety management groups will integrate and fuse ATC safety data sources, current and future, to support the safety data analysis for prognostic safety risk management of NextGen initiatives.

Safety, Security, and Environmental Performance Operational Capabilities and Benefits Accomplished to Date

Aviation Environmental Design Tool Version 2A was completed providing capabilities for integrated environmental analysis for fuel burn, emissions, and noise. The software is available for use by external stakeholders.

Drop-In 50-50% HRJ/HEFA Blend Fuels. ASTM International approved a 50-50 blend of hydroprocessed renewable jet (HRJ)/hydroprocessed esters and fatty acids (HEFA) and Jet-A fuel for use in aviation.

Safety Timeline:

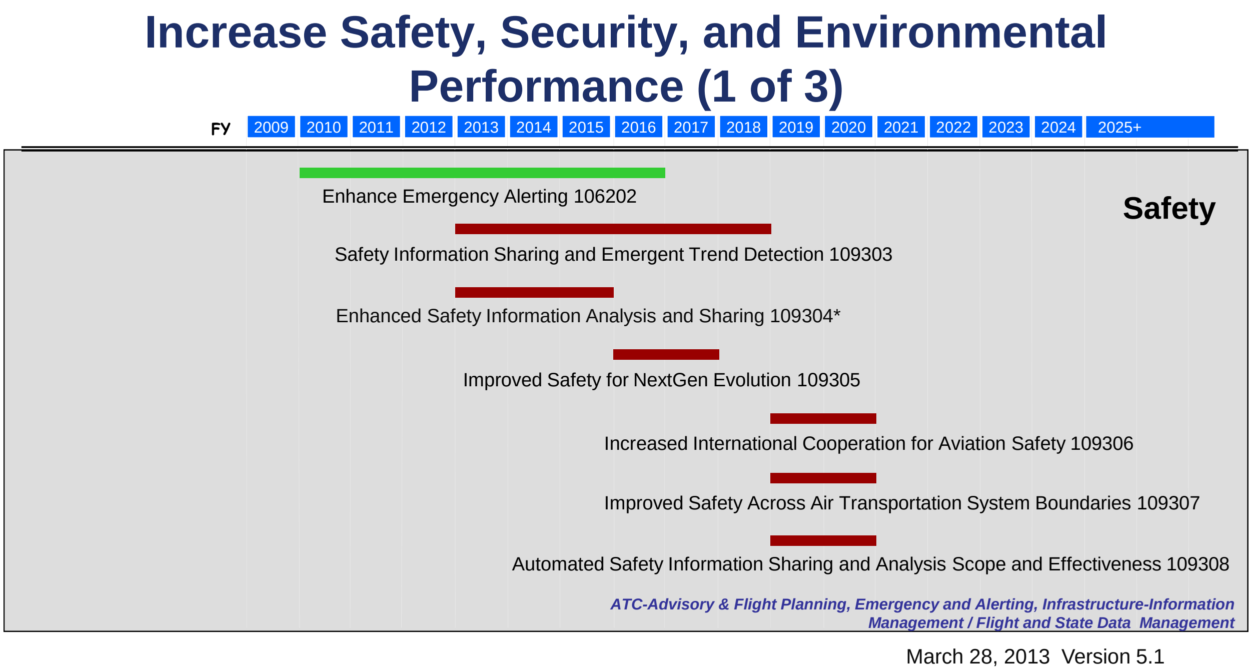

Figure 4-9 Increase Safety

Operational Improvements

This section describes the mid-term planned improvements associated with the Increase Safety timeline.

In figure 4-9, the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's operational improvements are the following:

1. Enhance Emergency Alerting (106202) improves a controllers' ability to assist in locating a downed aircraft and in identifying and tracking flights not under ATC control. The combination of GPS and ADS-B can provide a downed aircraft's location and its identification number. This capability has proven successful in Alaska and has saved

lives because it reduces the search time. Aircraft using ADS-B report their position frequently, and the coverage can be more comprehensive than radar. Investments that support this improvement are Future Flight Services Program (FFSP), ADS-B and the integration of ADS-B into all automation systems.

2. Safety Information Sharing and Emergent Trend Detection (109303). The System Safety Management Transformation and the Aviation Safety and Information Analysis and Sharing (ASIAS) activities will integrate, evaluate and share high-quality, relevant, and timely safety information that is critical to the success of the Safety Management System (SMS). These activities directly support safety promotion and safety assurance initiatives with analytical results such as baseline information and trends. They also support safety risk management through identifying issues and providing tools for analysis of hazards.
3. Enhanced Aviation Safety Information and Analysis and Sharing (109304) will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of risk management.
4. Improved Safety for NextGen Evolution (109305) mitigates the safety risk associated with changes to the air transportation system. This improvement provides: advanced capabilities for an integrated and predictive safety assessment of new equipment and procedures; an improved validation and verification process for certification of new equipment; an enhanced focus on developing safe operational procedures; and enhanced training concepts for promoting safe system operation. Investments that support this improvement are Performance Data Analysis and Reporting System (PDARS), Integrated Reporting Information System (IRIS), System Safety Management Transformation, implementation of SMS, Independent Operational Test and Evaluation (IOT&E) and ASIAS.
5. Increased International Cooperation for Aviation Safety (109306) will reduce safety risk associated with international operations by harmonizing standards, regulations and procedures. A special focus will be on the handling of dangerous goods
6. Improved Safety Across Air Transportation Boundaries (109307) will address similar issues to item 5 above.
7. Automated Safety Information Sharing and Analysis Scope and Effectiveness (109308) will automate risk identification and notification processes. This capability will be expanded to include additional data sources and enhanced by actions that improve data security, quality and scope. Investment required for this operational improvement is ASIAS.

Security:

Summary Description:

NAS operations require facility and information security. Facility security deals with protecting air traffic control, communication, and navigation facilities. Information security protects the data within the NAS and is a baseline requirement of each new and existing NAS program. Continuous upgrades are provided as information security technology and best practices improve.

Security Timeline:

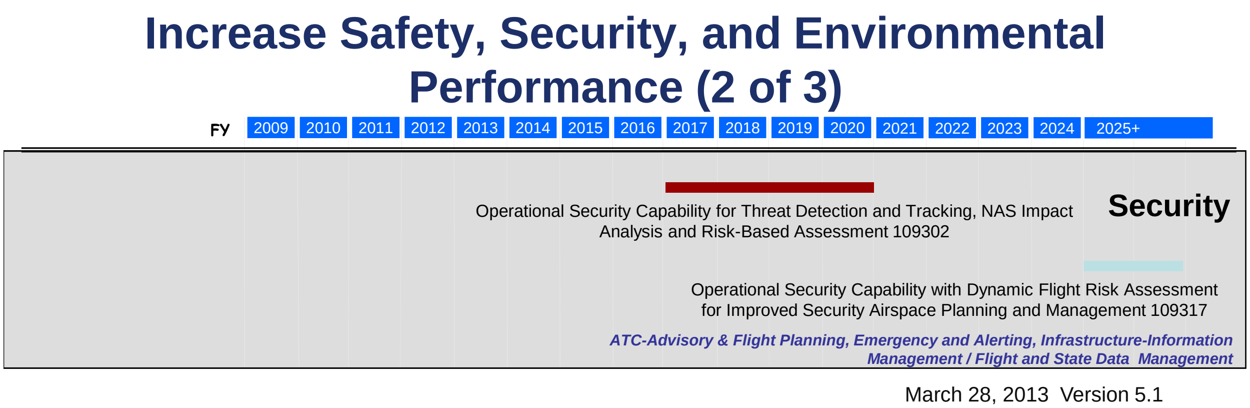

Figure 4-10 Improve Security

Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Security timeline.

In figure 4-10 the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's operational improvement is the following:

> Operational Security Capability for Threat Detection and Tracking, NAS Impact Analysis and Risk Based Assessment (109302) address NAS airborne security threats with more effective and efficient prevention, protection, response and recovery based on a net-enabled shared situational awareness and a risk-informed decision-making capability.

Environment:

Summary Description:

Increased attention is being directed at aviation's impact on the environment — not only regarding longstanding noise and air quality impacts, but also in global climate change and energy consumption. Although aviation has been a relatively small source of emissions and has made significant strides in lessening its environmental "footprint," the anticipated growth in air transportation demand will increase pressure on aviation to reduce emissions and fuel consumption. NextGen planning must consider and minimize environmental consequences of emissions and noise caused by NextGen operational improvements while improving energy efficiency.

Environmental Timeline:

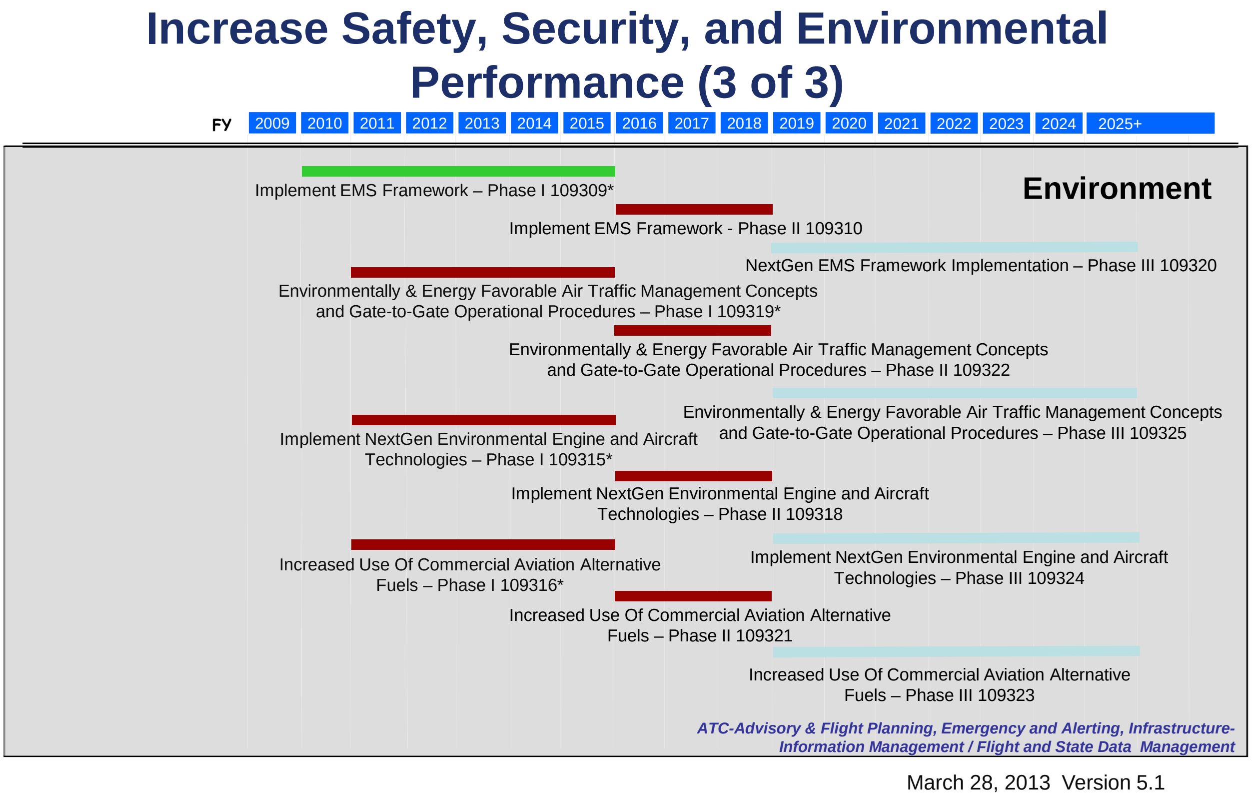

Figure 4-11 Improve Environmental Performance

Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Environmental Performance timeline, figure 4-11. Many of the Operational Improvements shown below are supported by the program – Environment & Energy – which provides the funds to model and demonstrate the initiatives aimed at achieving these improvements.

In the Environment service area, the operational improvements include the following:

1. Implement Environment Management System (EMS) Framework – Phases I and II (109309-109310) will refine EMS framework, communication and outreach activities for stakeholders' coordination and participation in developing decision support tools to mitigate environmental issues.
2. Environmentally and Energy Favorable Air Traffic Management Concepts And Gate to Gate Operational Procedures Phases I and II (109319-109322) will explore, develop, demonstrate, evaluate and support the implementation and deployment of operational changes to the NAS that have the potential to reduce the environmental impacts of aviation.
3. Implement NextGen Environmental Engine and Aircraft Technologies Phases I and II (109315-109318) will reduce aircraft noise, emissions, and fuel burn through

improvements in engines and airframe technologies based on the Continuous Low Emissions, Energy, and Noise (CLEEN) program.

4. Increased Use of Commercial Aviation Alternative Fuels Phases I and II (109316-109321) will determine the feasibility and market viability of alternative aviation fuels for civil aviation use. This effort will seek to obtain certification of alternate jet fuels from fossil and renewable resources that are compatible with the existing infrastructure and aircraft fleet and will meet the requirements for a “drop in” fuel.

4.7 Transform Facilities

Summary Description:

Future air traffic control facilities will be more flexible, scalable and maintainable. Airspace boundaries will no longer be based on geographical boundaries. Infrastructure, automation, equipage, procedures and regulations will support a seamless operational concept as the NAS evolves from a geographic focus to a broader air traffic management concept.

To support this new approach to the NAS, Future Facilities will optimize resources by establishing new facilities, changing the number and sizes of existing facilities and combining/eliminating other facilities. Allocation of staffing and facilities, continuity of operations and training the workforce will also be considered.

To support the transformation to NextGen facilities, FAA operates specialized test and evaluation facilities to support the development and implementation of NextGen capabilities. These facilities are unique in their flexibility to assess multiple capabilities; integrate new technologies into a realistic NAS environment and assess groups of capabilities.

Timeline:

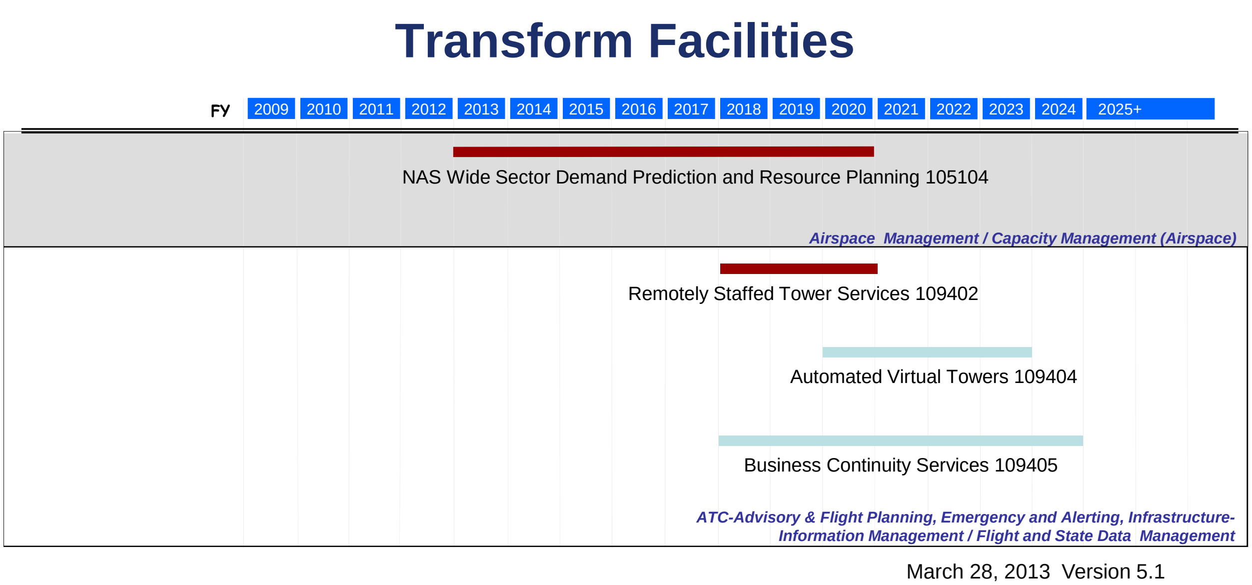

Figure 4-12 Transform Facilities

Operational Improvements

This section describes the mid-term planned improvements associated with the Transform Facilities solution set.

In figure 4-12, the Airspace Management/Capacity Management service area's operational improvement is:

> NAS Wide Sector Demand Prediction and Resource Planning (105104) uses an integrated model of capacity resource drivers and demand information from collaborative decision making (CDM) to determine the capacity impact of key resource constraints such as: (1) gate, airspace or runway blockages (for safety, security or weather); (2) fleet mix and performance characteristics; (3) flow structure which modifies the complexity of the operation; and (4) workload. It also models strategic resources (e.g., airspace, sectors, personnel, facilities, NAS systems) in parallel with systemic changes in demand due to increases in air traffic, seasonality, or airline business decisions. Future traffic loads are modeled against various solutions to mitigate adverse impacts to users. These variables will affect the design and location of NextGen facilities.

In the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area, the operational improvement is:

> Remotely Staffed Tower Services (109402) to provide ATM services for operations into and out of selected airports without constructing, equipping and/or sustaining tower facilities at these airports. Investments that support this improvement are ERAM mid-term work package, Terminal Automation Modernization Replacement (TAMR), Tower Flight Data Manager (TFDM), NAS Voice System (NVS), ADS-B, Airport Surface Detection Equipment (ASDE), NextGen Facilities and System Wide Information Management (SWIM).

5 Enterprise Architecture Roadmaps

The detailed roadmaps appearing in the following subsections are an integral part of the NAS Enterprise Architecture and show progression from the present system to NextGen. The roadmaps show planned modernization that extends beyond the 5-year financial horizon covered in the CIP, because planning to meet new demands and technology improvements to the NAS is a continuing process. The roadmaps present an executive view of the schedule for modernizing or replacing systems and the length of time those systems or their replacements will remain in service. They help FAA anticipate future engineering and financial challenges and integrate the modernization efforts by showing program managers the schedule for updating systems that interact with their program.

Many changes shown in the roadmaps will also require aviation users to add equipment to their aircraft and adopt new procedures so the roadmaps serve to inform them of the schedule they should expect for changes to their equipment and crew training. These roadmaps are updated annually to reflect results of studies, demonstration projects, and economic analysis related to programs; however, the roadmaps are, and should be reasonably stable from year-to-year. For more detailed information on the roadmaps, view the Enterprise Architecture and Roadmaps (also called Infrastructure Roadmaps) at: https://nasea.faa.gov

The roadmaps in this section organize the architecture based on functional areas, so the programs cross into all four different F&E funding activities, which are described in Chapter 3. The funding tables within each section contain the BLIs for that functional area. They depict the FY 2014 budget request and outyear capital investments. To associate the BLIs with the programs and systems in the FAA Enterprise Architecture, BLI number references are included at the end of each of the descriptions contained within this section.

The remainder of this chapter is broken down into the following sections:

- Automation
- Communications
- Surveillance
- Navigation
- Weather
- Facilities

Figure 5-1 shows and defines the symbols used in the roadmaps. The solid red lines indicate the time the systems, or their replacements will remain in operation and the dashed lines indicate that a system is scheduled to be taken out of service and replaced by better technology. The boxes with names identify programs, functions or systems, which are either described in the text or, when they are not described, their acronyms are spelled out in appendix E.

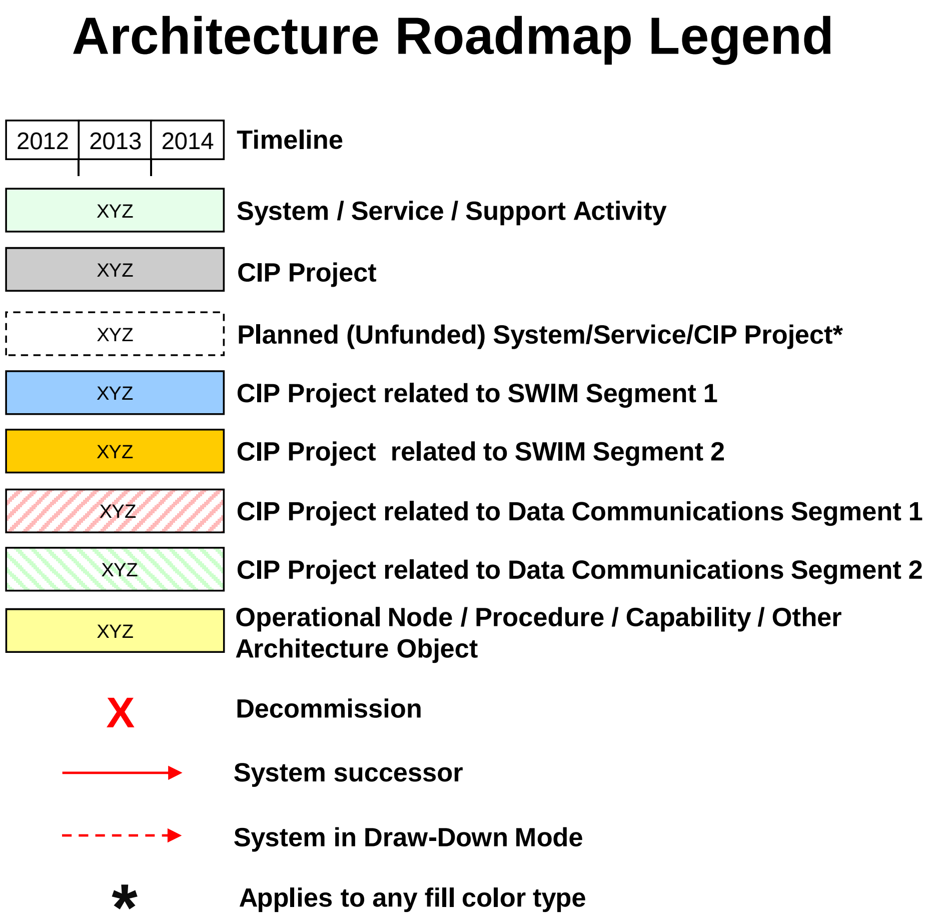

Figure 5-1 Architecture Roadmap Legend

5.1 Automation Roadmaps

Automation is a core element of the air traffic control system. Controllers require a real-time display of aircraft location as well as information about the operating characteristics of aircraft they are tracking — such as speed and altitude — to keep the approximately 50,000 daily flights safely separated. Automation gives controllers continuously updated displays of aircraft position, identification, speed, and altitude as well as whether the aircraft is level, climbing, or descending. Automation systems can also continue to show an aircraft's track when there is a temporary loss of surveillance information. It does this by calculating an aircraft's ground speed and then uses that data to project an aircraft's future position.

Other important features of automation include the following:

- Maintaining flight information and controller-in-charge data from pre-flight to post-flight, which supports coordination between air traffic controllers as they hand off responsibility of the flight from the tower to the terminal to the en route sector and then back to terminal and tower as the aircraft approaches its destination.

- Generating symbols displaying information on routes, restricted areas, and several other fixed features of the controller's sector.
- Providing automated alerts to controllers regarding potential aircraft conflicts and warnings that an aircraft may be approaching a terrain hazard.
- Displaying data from weather sensors, giving the status of runway lights and navigational aids, and providing flight plan information on monitored aircraft.
- Providing traffic management capabilities and decision support tools to forecast and provide solutions for future demand. The solutions may involve adjusting routes or speed, controlling airport departures, or other actions.

Automation implementation is broken down into two different roadmaps:

1. Roadmap 1 (figure 5-2) - Air Traffic Control and Air Traffic Management
2. Roadmap 2 (figure 5-3) - Oceanic Air Traffic Control and NAS Information Management

The automation roadmaps in figures 5-2 and 5-3 depict the planned architecture from 2012 to 2025. They show how FAA will upgrade and ultimately replace current systems with more capable systems. These newer systems and the enhanced software will allow controllers to use airspace more efficiently and offer more sophisticated services, such as early approval of direct routes. They will also allow better allocation of workload among facilities.

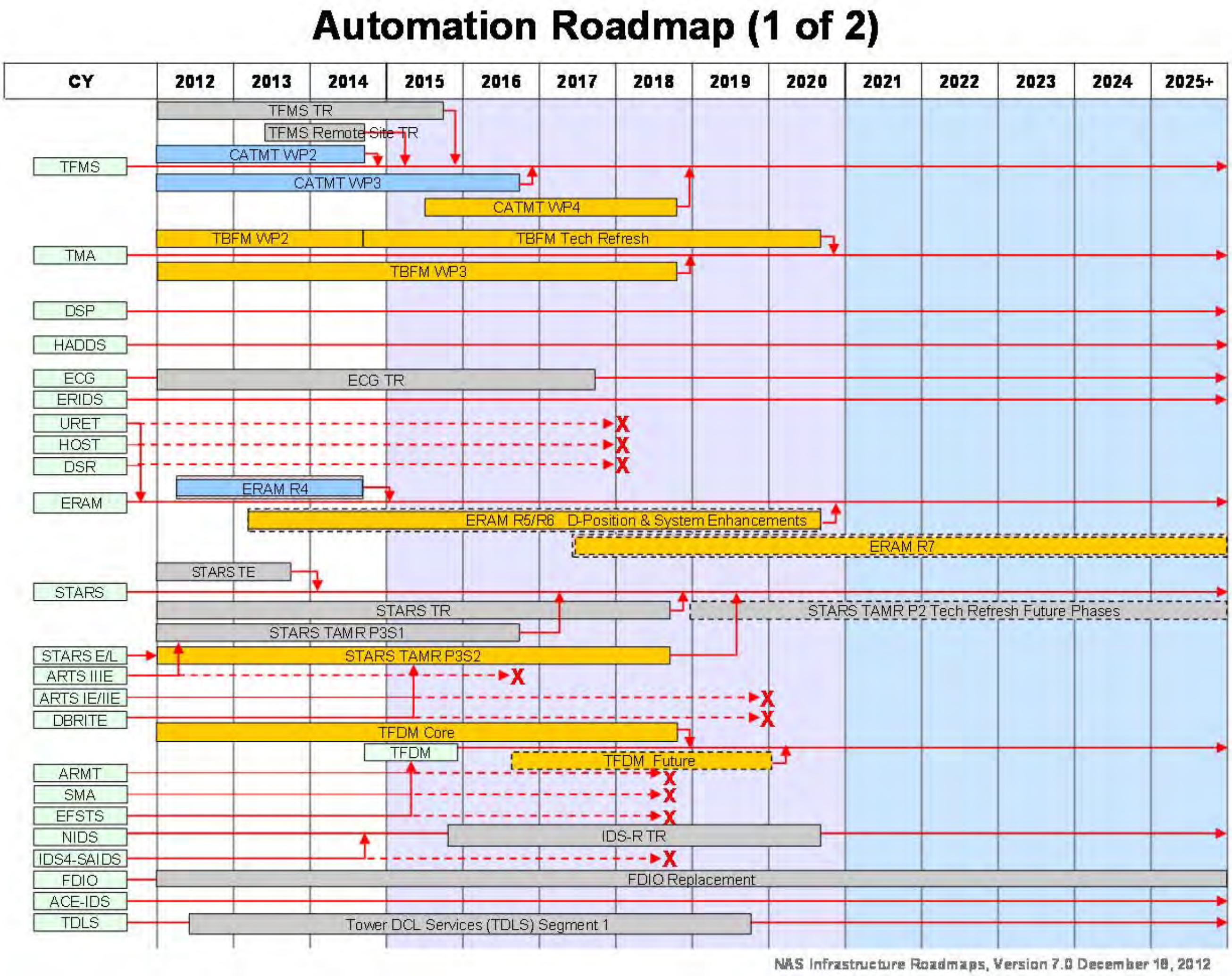

Figure 5-2 Air Traffic Control and Air Traffic Management Roadmap

The first three systems on the left side of the roadmap are used for traffic management. The Traffic Flow Management System (TFMS), Traffic Management Advisor (TMA) and Departure Spacing Program (DSP) are installed at air traffic control facilities including the Air Traffic Control System Command Center (ATCSCC), en route centers, and busy terminal control facilities. They are used to analyze future demand for en route and terminal services and to strategically plan for how to best accommodate that demand. These systems use real-time displays both of aircraft in flight and of weather affecting aviation to assess which routes are best and to prevent severe congestion at airports. The FAA will continue to improve TFMS and TMA with a combination of technology refreshment (TR) of the equipment and the Collaborative Air Traffic Management (CATM) and the Time Based Flow Management (TBFM) work packages which will expand collaboration to individual pilots and improve information exchange between the FAA and airline dispatch offices. The TMA will be enhanced to authorize trajectory based operations which allow aircraft to fly more direct routes with fewer deviations for conflicting air traffic. DSP used by airports will continue to optimize taxi and takeoff clearances to efficiently use available runway and airspace capacity. TFMS infrastructure and software enhancements are funded through BLIs 2A06 and 2A16.   TMA infrastructure and software enhancements are funded through BLIs 1A10 and 2A18.

The next seven blocks on the left side are components of the en route control system. The Host ATM Data Distribution System (HADDS) supplies data to the air traffic management systems discussed above and will remain in operation throughout the roadmap timeframe. The En Route Communication Gateway (ECG), which formats data for the en route automation system, remains a separate program and will receive a technology refresh. The En Route Information Display System (ERIDS) will continue in service throughout the roadmap timeframe. The En Route Automation Modernization (ERAM) program incorporates three of the component pieces shown above it (User request Evaluation Tool (URET), Host Computer, and Display System Replacement (DSR)). These systems are components of the existing en route automation system and are being replaced with new hardware and revised ATC software. ERAM is in deployment, and it provides the foundation for the agency's transition to NextGen. ERAM and ECG are funded through BLIs 2A01 and 2A03 respectively.

Improvements to ERAM will be added with a series of releases to add new capabilities to support various elements of NextGen. ERAM D-Position Upgrade and System Enhancements is being restructured into 2 programs: ERAM System Enhancements and Technology Refresh and ERAM Sector Enhancements. The System Enhancements segment is intended to improve aircraft separation services by reducing levels of missed and false alerts from tactical and strategic conflict alerting functions. ERAM Technology Refresh consists of any necessary upgrades or modernization of system components; as well as enhancements outside the scope of the original core ERAM system. ERAM enhancements and technology refresh are funded through BLI 2A02.

ERAM Sector Enhancements provides software and hardware enhancements to the ERAM system for the En Route sector controller team. It is a multi-year effort to improve the efficiency and effectiveness of En-Route Sector operations by facilitating increased strategic and tactical cooperation between the Radar Controller position (R-Position) and the Radar Associate position (D-Position) as well as establish a common processing platform, with similar tool sets, that may be tailored for either position. ERAM Sector Enhancements is funded through BLI 2A02.

The next five systems (STARS, STARS E/L, ARTS IIIE, ARTS 1E/IIE, and DBRITE) are different terminal automation and display models that the FAA will maintain until the Terminal Automation Modernization and Replacement (TAMR) program replaces them. STARS TAMR Phase 3 Segment 1 (STARS TAMR P3 S1) will initially update 11 larger ARTS systems and STARS TAMR Phase 3 Segment 2 will replace all the remaining ARTS systems. The upgraded STARS systems will be able to process position information from the ADS-B system along with information from terminal radars. DBRITE is a tower display that allows tower cab controllers to determine the location of approaching traffic before it becomes visible to them. STARS is funded through BLIs 2B03 and 2B04.

The Tower Flight Data Management (TFDM) system supports a phased implementation of a new terminal local area network (LAN)-based infrastructure to reduce redundant displays and integrate flight data functions. TFDM will provide System Wide Information Management (SWIM)-enabled flight data exchanges with other NAS subsystems. TFDM Core is the initial capability that will integrate data from three existing systems. TFDM is funded through BLI 2B18.

The Airport Resource Management Tool (ARMT) provides an assessment of available airport capacity. The Surface Movement Advisor (SMA) provides the status of aircraft moving from the gates to the runways and improves taxiing efficiency. The Electronic Flight Strip Transfer System (EFSTS) is a system to transfer flight information to towers and TRACONs electronically rather than by paper.

Information Display Systems (IDS) and SAIDS sites will be updated by the NIDS (NAS IDS) program and receive a technology refresh beginning in 2015. The IDS and the System Atlanta Information Display System (SAIDS) provide weather and other information to tower controllers. IDS is funded through BLI 2B14.

Flight Data Input/Output (FDIO) provides flight plan and other data to operational facilities. It will be replaced incrementally throughout the roadmap timeframe. FDIO is funded through BLI 2B05.

The Automated Surface Observing System (ASOS) Controller Equipment-Information Display System (ACE-IDS) provides weather information to tower controllers. These services will be provided throughout the roadmap timeframe. The Tower Data Link Services (TDLS) provides datalink clearances to pilots preparing to depart an airport. The Departure Clearance (DCL) is being upgraded in segments.

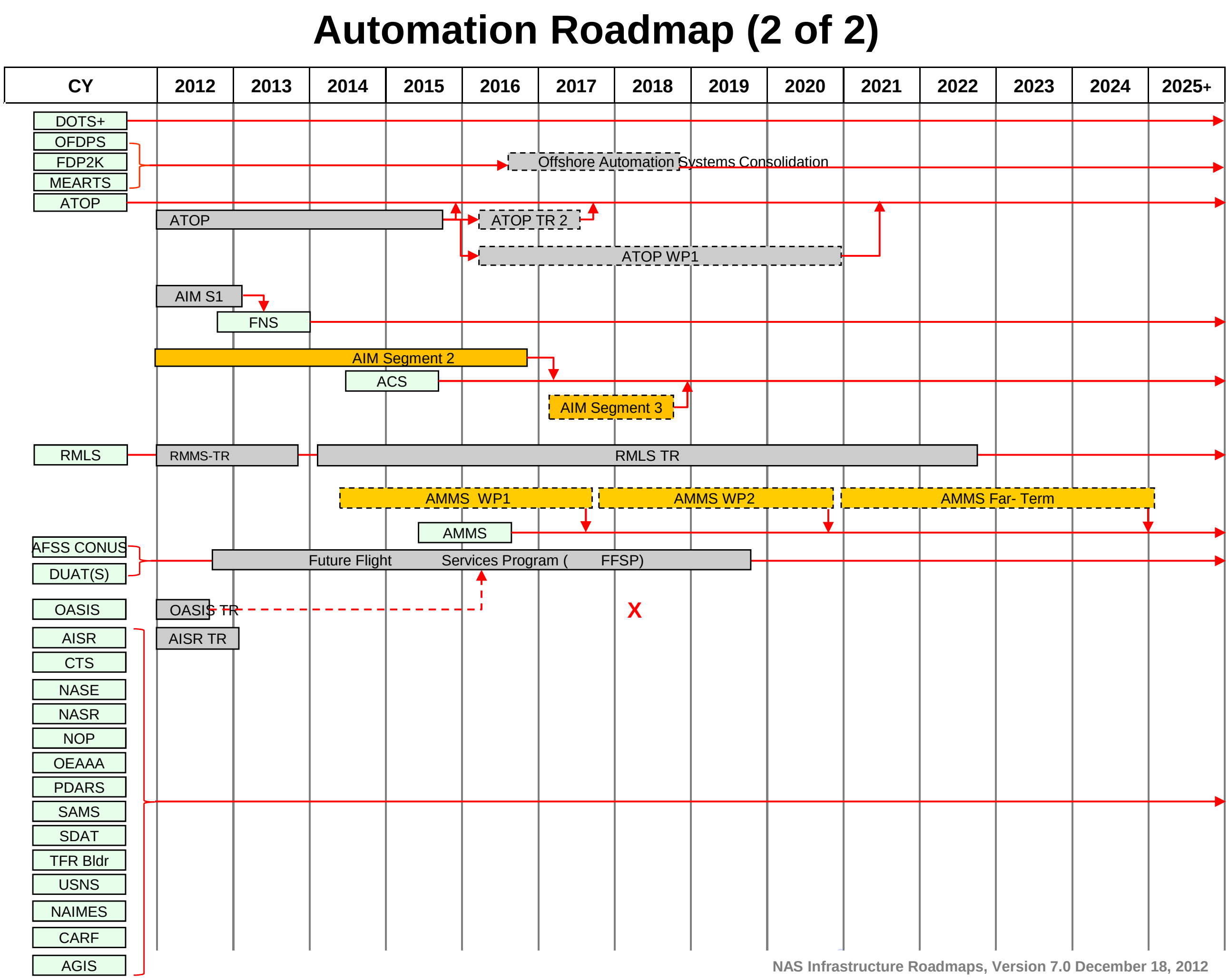

Figure 5-3 Oceanic Air Traffic Control and NAS Information Management Roadmap

Figure 5-3, the first group of five systems on the left side are support oceanic ATC. The DOTS+ system uses weather information to determine the most fuel-efficient routes based on wind velocity and direction. It will continue in operation through the timeframe of the roadmap. The oceanic automation systems process data regarding the position of aircraft on oceanic and offshore flights to aid controllers in separating flights in FAA controlled airspace. The FAA will be examining a potential replacement for the Offshore Flight Data Processing System (OFDPS), Flight Data Processing 2000 (FDP2K), and the Microprocessor En Route automated Radar Tracking System (MEARTS) in 2016. Three centers (New York, Oakland and Anchorage) house the oceanic control system, Advanced Technologies and Oceanic Procedures (ATOP), which remain in operation throughout the roadmap timeframe with ongoing technology refresh and upgrades. ATOP is funded through BLI 2A10.

The Aeronautical Information Management (AIM) Segments 1, 2, and 3 are funded through BLI 4A09 to consolidate and automate the storage and dissemination of aeronautical data used by pilots and aviation planners. They will upgrade the systems shown below:

- FNS – Federal NOTAM (Notice to Airmen) System – this system collects and provides access to NOTAMs, which are notices of temporary changes, such as temporary flight restrictions and runway closures for construction.
- ACS – The Aeronautical Common Services system stores information about airports, navigational aids and other aeronautical data.

The Remote Maintenance Logging System (RMLS) serves two functions. It allows the maintenance staff to monitor equipment performance electronically from a central location, and it provides software for management of workforce hours and maintenance actions. The existing system is undergoing a technology refresh and will be supplemented by the Automated Maintenance Management System (AMMS). RMLS technology refresh and AMMS are funded through BLI 2B15.

AFSS CONUS, DUATS and OASIS are automation systems that provide aeronautical and weather data to support flight services. Flight services include flight planning and pilot weather briefings which are primarily used by general aviation pilots. Flight services in the lower 48 States and Puerto Rico are provided by contractor flight service personnel using the Automated Flight Service System (AFSS CONUS). The Direct User Access Terminal Service (DUATS) is a web-based service that allows pilots to access weather and aeronautical data for self-briefings and to file flight plans. The OASIS automation system is used at the Flight Service Stations in Alaska by FAA flight service specialists to provide flight services to general aviation pilots.

The Future Flight Service Program (FFSP) is expanding web services and in the long term plans to transition flight services away from human delivery to automation for all FSS facilities. FFSP is funded through BLI 2C02.

Figure 5-3 shows fourteen systems that continue in operation, without upgrades beyond technology refreshes, through the roadmap timeframe. A brief description of each system's capability and impact of providing service for airports, airspace, and navigation facilities is provided below:

- Aeronautical Information System Replacement (AISR) – distributes information on weather, flight plans, NOTAMS, Pilot Reports and other NAS status items to FAA facilities, DoD, and pilots;
- Coded Time Source (CTS) – program is identifying how to standardize the official source of time that synchronizes the information flows in the air traffic control equipment. The CTS program will also determine an appropriate backup to the primary source that can be used in case the primary source fails;
- NAS Adaptation Services Environment (NASE) – is a system that contains detailed information about the airspace, geography, equipment, and procedures required to make each ATC system work properly;
- National Airspace System Resources (NASR) – is a system that contains information pertaining to Instrument Approach Procedures (IAPs), Departure Procedures (DPs), Standard Terminal Arrival Routes (STARs), and Military Training Routes (MTRs);

- National Offload Program (NOP) – allows FAA to download radar information from en route automation systems for analysis and review;
- Obstruction Evaluation/Airport Airspace Analysis (OEAAA) – evaluation tool contains data about obstructions around airports that would present a hazard for aircraft taking off and landing;
- Performance Data Analysis and Reporting System (PDARS) – is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the ATC system and its environmental impact. PDARS is funded through BLI 1A01B;
- Special Airspace Management System (SAMS) – informs controllers when airspace ordinarily reserved for military use is available for civilian use;
- Sector Design and Analysis Tool (SDAT) – helps design the shape and size of air traffic control sectors;
- Temporary Flight Restriction Builder (TFR Bldr) – an automated system for establishing temporary flight restrictions that prohibit aircraft from flying over areas where special events such as the super bowl are being held;
- United States NOTAM (Notice to Airmen) System (USNS) – an automated system used to process, store and distribute NOTAM information. NOTAM information is that aeronautical information that could affect a pilot's decision to make a flight;
- NAS Aeronautical Information Management Enterprise System (NAIMES) – consists of a suite of NAS safety/mission critical systems and services that directly support the collection, validation, management, and dissemination of aeronautical information in the NAS;
- Central Altitude Reservation Function (CARF) – system used by military and civilian pilots to reserve altitudes for their planned flights; and
- Airport Geographic Information System (AGIS) – stores data on airport configuration and physical location and size of all elements of the airport. It is used to develop airport modernization plans, and it is necessary for developing new approach and departure procedures.

Figure 5-4 shows future capital investments for automation programs. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Automation Functional Area	**$377.1**	**$371.5**	**$447.0**	**$463.4**	**$464.0**
2A01	En Route Automation Modernization (ERAM)	$26.1	$0.0	$0.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements (ERAM System Enhancements and Technology Refreshments and ERAM Sector Enhancements)*	$65.0	$71.0	$110.0	$145.0	$187.5
2A03	En Route Communications Gateway (ECG)	$2.2	$8.7	$2.9	$2.0	$2.0
2A06	Air Traffic Management (ATM)	$13.8	$1.9	$0.0	$0.0	$0.0
2A10	Oceanic Automation System	$4.8	$2.0	$0.0	$0.0	$0.0
2A16	Collaborative Air Traffic Management Technologies (CATMT)*	$29.4	$3.3	$15.6	$18.0	$30.0
2A18	Tactical Flow Time Based Flow Management (TBFM)*	$10.5	$0.5	$3.6	$1.8	$0.1
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$45.5	$56.7	$79.3	$60.0	$46.8
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$136.6	$143.6	$132.2	$89.7	$20.0
2B05	Terminal Automation Program	$2.6	$2.6	$2.7	$2.7	$2.8
2B14	Integrated Display System (IDS)	$4.1	$16.9	$13.3	$5.7	$1.1
2B15	Remote Monitoring and Logging System (RMLS) Technology Refresh	$1.0	$2.2	$1.1	$3.4	$4.5
2B18	Terminal Flight Data Manager (TFDM)*	$23.5	$42.0	$55.3	$107.1	$137.4
2C02	Future Flight Services Program (FFSP)	$3.0	$5.0	$16.0	$18.0	$21.8
4A09	Aeronautical Information Management Program*	$9.1	$15.0	$15.0	$10.0	$10.0

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-4 Funding amounts in the Automation Functional Area

5.2 Communications Roadmaps

Communication between pilots and controllers is an essential element of air traffic control. Pilots and controllers normally use radios for communication, and because en route control sectors cover areas that extend beyond direct radio range, remotely located radio sites are used to provide extended coverage. The controller activates radios at these sites and ground telecommunication lines carry the information exchange to and from air traffic control facilities. If ground links are not available, communication satellite links can be used to connect pilots with controllers. Backup systems are always available to provide the continued ability to maintain communications when the primary systems fail.

Communication system implementation is broken down into four different roadmaps:

1. Roadmap 1 (figure 5-5) - Telecom and Other Communications
2. Roadmap 2 (figure 5-6) - Voice Switches and Recorders
3. Roadmap 3 (figure 5-7) - Air to Ground Voice and Oceanic Communications
4. Roadmap 4 (figure 5-8) - Air to Ground Data Communications

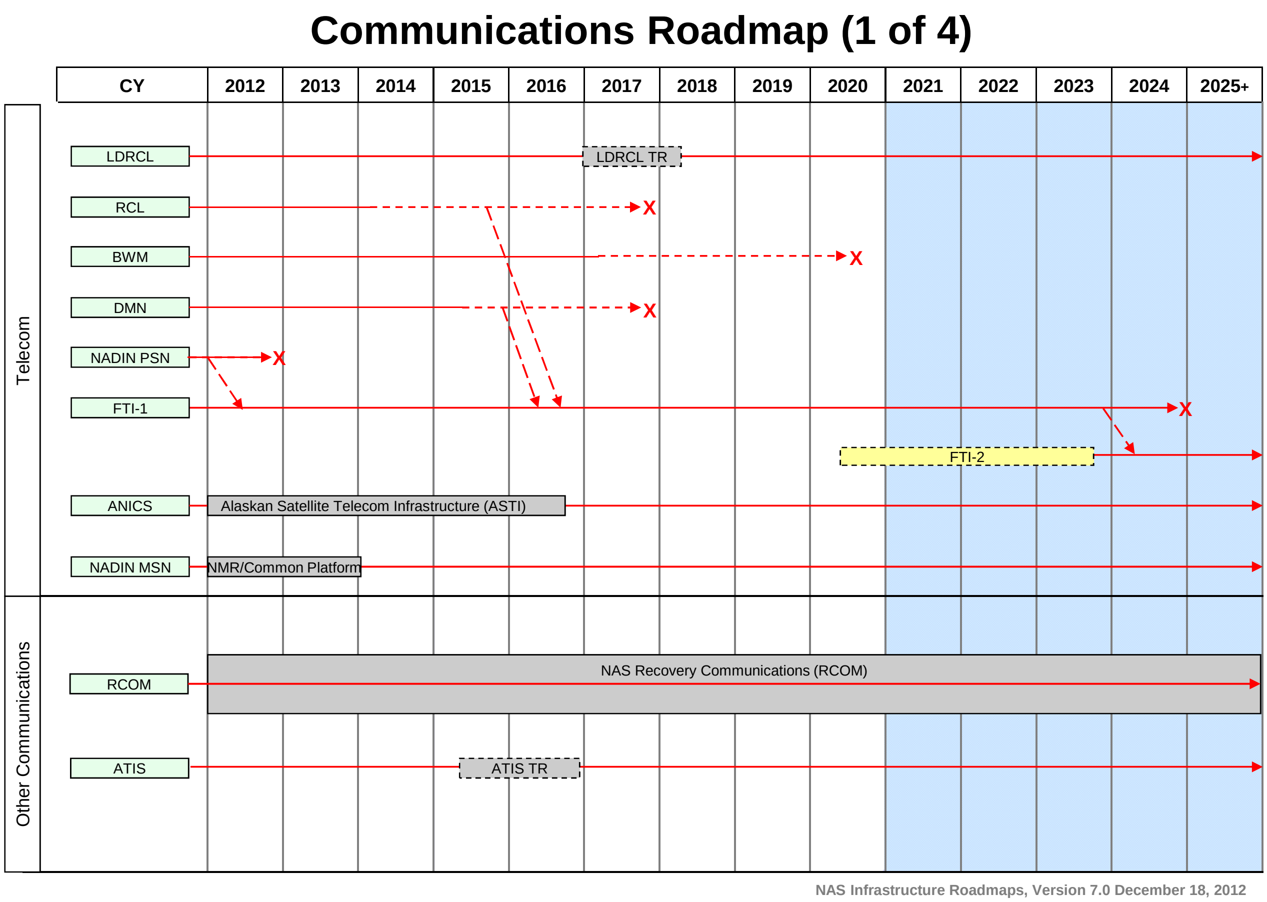

Figure 5-5 Telecom and Other Communications Roadmap

The Low Density Radio Communication Link (LDRCL) and the Radio Communication Link (RCL) are microwave systems that transmit radar data from remote radar sites to FAA air traffic control facilities, and these systems have been linked in a national network to transmit operational and administrative information to and from air traffic control facilities. Many of the RCL communication links have already transitioned their functions to the FAA Telecommunications Infrastructure (FTI) to carry this data. The LDRCL will remain in service because they provide services in areas with limited commercial services. The Band Width Manager (BWM) improves efficiency of information flow on the microwave network. It will not be needed when the FAA shuts down RCL. The Data Multiplexing Network (DMN) and National Airspace Data Interchange Network – Package Switching Network (NADIN PSN) transmit flight plans and other important aeronautical information to air traffic facilities. The FAA will transition functions of DMN and NADIN PSN to the FTI network and its follow on contract. NADIN Message Switching Network (MSN) will be sustained by the NMR (NADIN MSN Rehost) to comply with international standards for transmitting flight plans.

The FTI is a contract service to provide communications services to and from FAA facilities. In 2020, work will begin on preparing for a transition to a new FTI - Phase 2 (FTI-2) contract.

The Alaska National Airspace System Interfacility Communications System (ANICS) consists of ground stations that send and receive data from communications satellites to connect the operational facilities in Alaska. It has been renamed Alaska Satellite Telecommunications Infrastructure (ASTI) program and it is the follow-on effort to ANICS to modernize the infrastructure. Because there are far fewer ground telecommunications connections in Alaska, a satellite system is used to ensure that important air traffic information is reliably transmitted between smaller and larger facilities. ASTI is funded through BLI 2E05.

Recovery Communications (RCOM) is an emergency network to be used for command and control of the ATC system when all other communications systems fail. RCOM is funded through BLI 3A04.

The Automated Terminal Information System (ATIS) broadcasts weather and other pertinent information to pilots as they approach an airport. We are planning a technology refresh in 2015 and will maintain the ATIS functions during the entire timeframe of the roadmap.

Figure 5-6 shows the Roadmap for NAS Voice switches. Voice switches in air traffic facilities enable controllers to select among the different channels they need to communicate with one another, with traffic management and weather specialists, with emergency services, and with pilots.

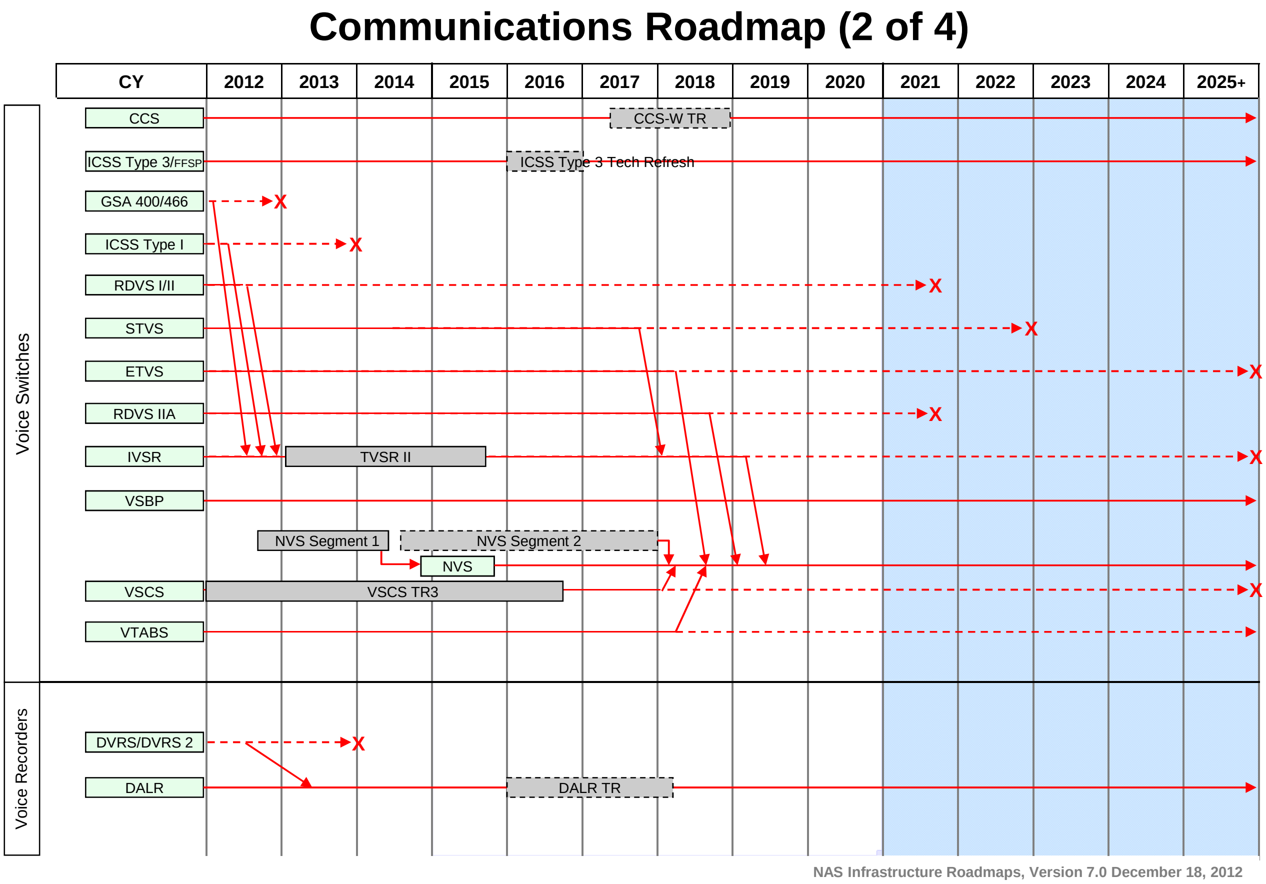

Figure 5-6 Voice Switches and Recorders Roadmap

The Command Center Conference Control Switch (CCS) installed at the facility in Warrenton, Virginia allows the specialists at the Air Traffic Control System Command Center (ATCSCC) to stay in contact with air traffic control facilities and external users of the NAS. They can coordinate with centers, TRACONs, and users to decide how best to implement traffic management initiatives and when to use severe weather avoidance programs. A technology refresh is planned to begin in 2017.

The voice switches shown below the CCS are used in terminal and flight service facilities. Voice switches enable air traffic controllers to select lines to communicate with pilots as well as other air traffic control facilities. They are:

- Integrated Communication Switching System (ICSS) Type 1 and 3 – The ICSS Type 3 will remain in operation and receive a planned technology refresh;
- GSA 400/466 – A voice switch developed by Litton/Amecom purchased through a national program/contract;
- The Terminal Voice Switch Replacement (TVSR) II program, funded through BLI 2B08, replaces terminal voice switches with Interim Voice Switch Replacement (IVSR) at the rate of about 5 per year, and installs new voice switches in newly constructed airport traffic control towers. TVSR II also refurbishes approximately 2 voice switches per year. The switches are:
    - Rapid Deployment Voice Switch (RDVS) I, II and IIA;
    - Small Tower Voice Switch (STVS);
    - Enhanced Terminal Voice Switch (ETVS);
    - IVSR; and
    - Voice Switch By Pass (VSBP) – is a backup voice switch that terminal controllers can use to stay in communication with pilots if there is a failure in the primary voice switch installed in their facility.

The FAA has awarded the contract for a two segment procurement of the NAS Voice System (NVS). The first segment will develop prototype switches for testing to determine operational suitability. The second segment will be for the procurement of switches to replace existing switches in FAA facilities. The NVS program will include voice switches, air/ground (A/G) radio control equipment, and the associated transmission services. NVS will provide flexible networking for voice switch-to-voice switch connectivity as well as for voice switch to A/G radio connectivity. This architecture will facilitate meeting NextGen requirements for ATC workload sharing, unmanned aircraft system (UAS) operations, virtual tower operations, and business continuity. NVS will replace ARTCC, ATCT and TRACON voice switches and is funded through BLI 2B13.

The Voice Switching and Communications System (VSCS) is the voice switch used in ARTCCs. The FAA is upgrading VSCS with a technology refresh to replace components that have a high failure rate. The VSCS Training and Backup Switch (VTABS) will maintain critical air-to-ground and ground-to-ground communications if the main communications system becomes inoperable as a result of a power outage, a catastrophic system failure, or during system maintenance or upgrade activities. VSCS is funded through BLI 2A09.

The Digital Audio Legal Recorder (DALR) is the voice recorder that is replacing Digital Voice Recorder Systems (DVRS). DALR is also installed in newly constructed airport traffic control towers. These voice recorders provide a legally accepted recording capability for conversations between air traffic controllers, pilots, and ground-based air traffic facilities in all ATC domains and is used in the investigation of accidents and incidents and routine evaluation of ATC operations. DALR is funded through BLI 2B19.

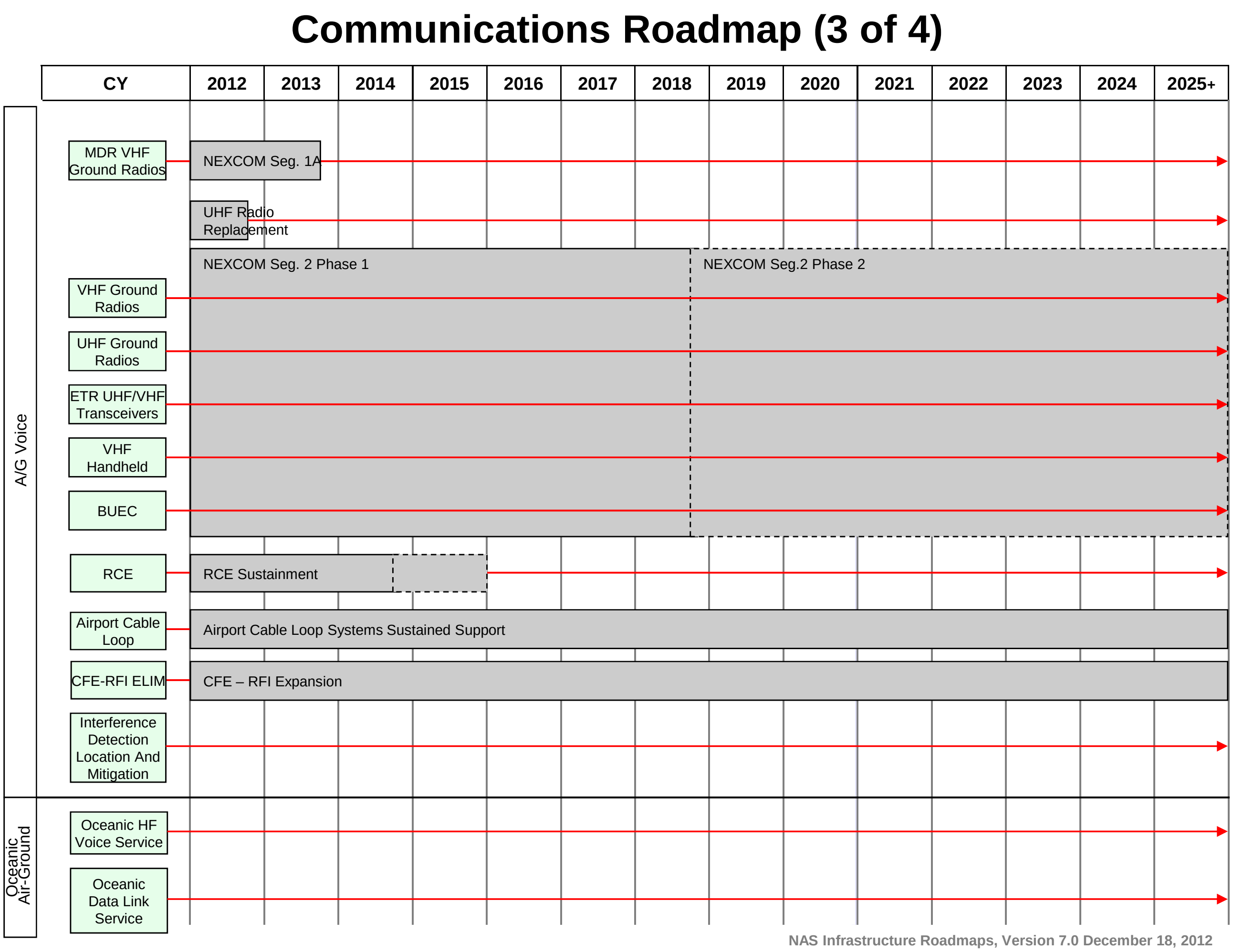

Figure 5-7 Air to Ground Voice and Oceanic Communications Roadmap

The third communications roadmap (figure 5-7) shows the replacement programs for the radios used for air-ground communications and some of the supporting services to sustain NAS operations.

The Next Generation Air/Ground Communications (NEXCOM) program is upgrading Very High Frequency (VHF) radios used by civil aviation and Ultra High Frequency (UHF) radios used by military aircraft. NEXCOM Segment 1A replaced the radios used for high and ultrahigh en route sectors. Segment 2 will replace the radios that terminal facilities use in a combined contract for both VHF and UHF radios. It will also upgrade emergency backup radios (ETR) used if the primary radios are not working. NEXCOM is funded through BLI 2A11. The Back Up Emergency Communication (BUEC) program replaced the radios installed at remote sites that back up the primary radios that controllers use.

The Radio Control Equipment (RCE) program is ongoing, and it modernizes the electronic equipment that allows controllers to control the radios they use at remote sites. RCE is funded through BLI 2A07.

The Airport Cable Loop program replaces the communications cables that control and report the condition of equipment necessary for airport operations such as the Airport Surveillance Radar. FAA is replacing copper wires with fiber optics and adding dual path operations so that a break in the cable does not stop the flow of information. The Airport Cable Loop program is funded through BLI 2E04.

The Air-to-Ground (A/G) Communications Infrastructure expansion program enhances operational efficiency and effectiveness by establishing, replacing and upgrading radio equipment. The program is funded through BLI 2A07.

The Radio Frequency Interference (RFI) and Interference Detection, Location and Mitigation (IDLM) programs investigate occurrences of non-FAA transmitters interfering with FAA radios and navigation systems, locate the source, and either shut it down or adjust its operations so it no longer interferes with FAA controlled frequencies. The RFI and IDLM programs are funded through 2A07.

The last two items on the roadmap are communications systems used for oceanic air traffic control. The first one is the high frequency (HF) radio. HF radio allows the FAA to stay in touch with aircraft that are several thousand miles from shore. HF radio is supplemented by Oceanic Satellite Data Link Services used by newer better equipped aircraft, and this system relies on communications satellites to transfer messages to and from aircraft flying over the oceans.

Communications Roadmap (4 of 4)

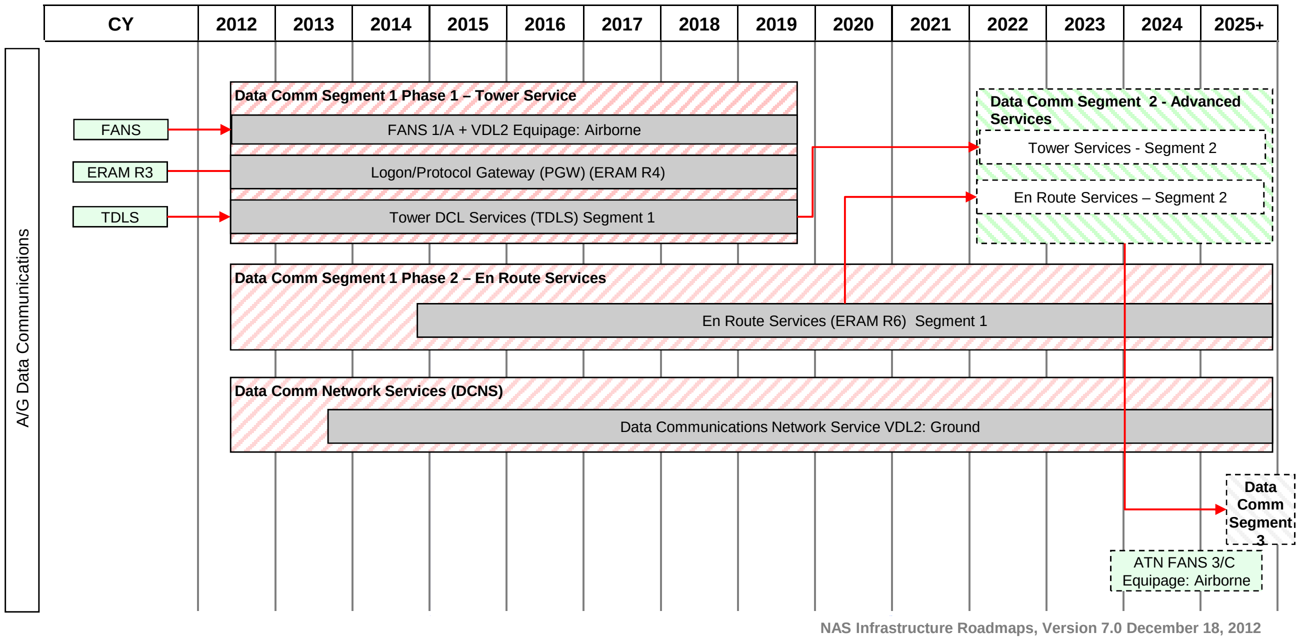

Figure 5-8 Air to Ground Data Communications Roadmap

The fourth communications roadmap (figure 5-8) shows the planned transition to data communications services for routine communications from controllers to pilots that can be data linked from en route and terminal ATC automation system.

Data Comm Segment 1 Phase 1 will provide service for three existing communication connections. Future Air Navigation System (FANS), a generic term for capabilities mainly used for overwater operations, will take advantage of already installed datalink capability. Aircraft that are FANS equipped will experience more sophisticated data link connections with ATC facilities as new systems evolve during the roadmap timeframe. The Logon/Protocol Gateway (PGW)(ERAM R4) upgrade will enable Data Comm to send information directly to pilots. A log-on protocol began development in 2012 to assure security of transmissions to pilots. The Terminal Data Link System (TDLS) is currently used to transmit departure clearances (DCL) and other information to aircraft preparing to depart the airport. It is being upgraded and modernized for the transition to Data Comm Segment 1.

Data Comm Segment 1 Phase 2 will provide en route services to pilots. More sophisticated applications will be developed through the entire period to 2025. Data Comm Network Services will establish the ground infrastructure necessary to support communication between aircraft and FAA facilities. Data Comm programs are funded through BLI 1A05.

Figure 5-9 shows the future capital investments for replacing communications systems and improving and modernizing communications channels. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Communication Functional Area	**$216.4**	**$260.9**	**$275.7**	**$322.1**	**$331.4**
1A05	Data Communication in support of Next Generation Air Transportation System (NextGen)*	$115.5	$149.5	$177.4	$225.6	$230.0
2A07	Air/Ground Communications Infrastructure	$5.5	$3.0	$3.2	$3.2	$3.2
2A09	Voice Switching Control System (VSCS)	$20.0	$9.8	$9.9	$11.3	$11.2
2A11	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$20.3	$40.0	$42.0	$50.0	$50.0
2B08	Terminal Voice Switch Replacement (TVSR)	$5.0	$0.0	$0.0	$0.0	$0.0
2B13	National Airspace System Voice System (NVS)*	$16.0	$30.2	$15.1	$15.0	$15.0
2B19	Voice Recorder Replacement Program (VRRP)	$6.2	$0.0	$0.0	$0.0	$0.0
2E04	Airport Cable Loop Systems – Sustained Support	$5.0	$5.0	$5.0	$5.0	$10.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$11.0	$11.4	$11.1	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-9 Funding amounts in the Communications Functional Area

5.3 Surveillance Roadmaps

To provide separation services to aircraft, air traffic controllers must have an accurate display of all aircraft under their control. Controller displays use a variety of inputs, including radar and transponder information, to show the location of aircraft. Surveillance data is provided by the following technologies: Primary radar – The radar beam is bounced off the aircraft and reflected back to the radar receiver; Secondary radar – A reply is generated by the aircraft transponder back to the radar in response to a secondary radar signal; Multilateration – Multiple ground sensors receive aircraft electronic signals and triangulate this information to determine aircraft position; and ADS-B – The aircraft determines its location using GPS or other navigation equipment and broadcasts that information to an ADS-B ground station. Position data is relayed to automation systems which process the data and send it to the displays.

En route facilities use the Air Route Surveillance Radar (ARSR), and terminal facilities use Airport Surveillance Radar (ASR) as primary radars. The ARSR and ASR radars are primary because they do not require a cooperative transmission from an aircraft to detect and track its location. These facilities normally use secondary radars called the Air Traffic Control Beacon Interrogators (ATCBI) and Mode Select (Mode S) for traffic separation. Secondary radar sends a signal to aircraft equipped with a transponder. The transponder sends a reply, which can be processed to determine the aircraft call sign, altitude, speed, and its position. Using ATCBI or Mode S enhances the controller’s ability to separate traffic because flight and altitude information supplement the position display for each aircraft.

The FAA uses several systems for tracking aircraft on or near the airport surface. The ASDE-3 is a primary radar system that provides a display of aircraft and ground vehicles in the airport operating areas (runways and taxiways). This helps controllers manage aircraft on the ground and warn them of potential runway collisions. The ASDE-X merges primary and secondary radar, multilateration and ADS-B information to improve detection of aircraft and provides a clear display of the positions of aircraft and vehicles on or near taxiways and runways. A third system which uses multilateration is the Airport Surface Surveillance Capability (ASSC), and it will replace nine of the ASDE-3 radars.

Surveillance systems are broken down into two different roadmaps:

1. Roadmap 1 (figure 2-10) - En Route and Terminal Surveillance
2. Roadmap 2 (figure 2-11) - Surface, Approach and Cross Domain Surveillance

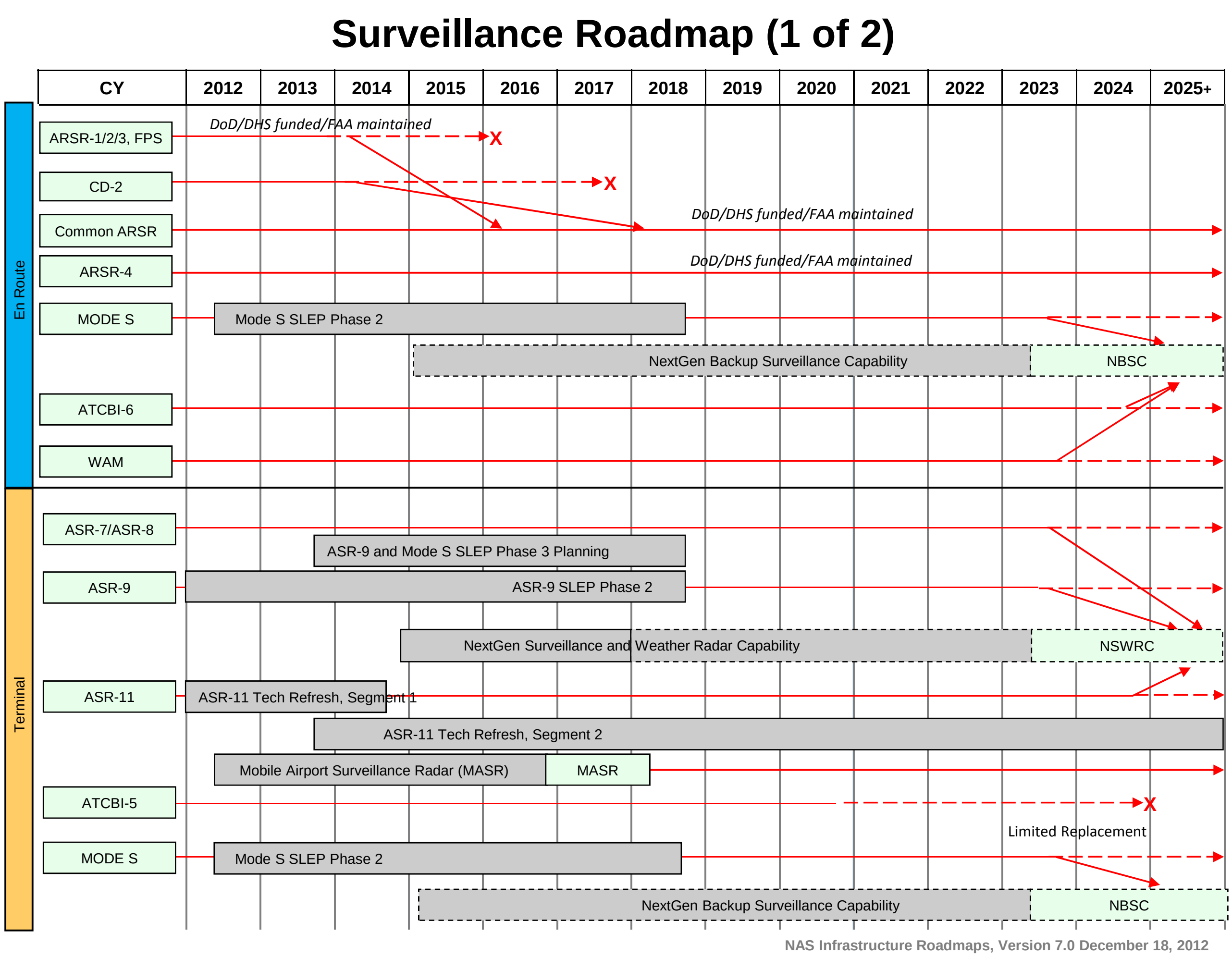

Figure 5-10 En Route and Terminal Surveillance Roadmap

Figure 5-10, the major systems shown in the en route block are the various ARSR models, the fixed position surveillance (FPS) system, Common Digitizer (CD-2), the Air Traffic Control Beacon Interrogator (ATCBI), and the Mode S.

The ARSR has a range exceeding 200 miles, and it provides aircraft location information to the en route centers. It is a “skin-paint” radar (does not require cooperation from the detected aircraft) that transmits radio frequency pulses and processes the reflected energy to determine aircraft range based on the total time for the signal to reach and return from the target, and the direction from the radar based on the antenna position. Existing long range radars are being converted to the Common Air Route Surveillance Radar configuration. The Department of Defense will fund FAA maintenance of the ARSR through 2025 due to aviation security concerns. ARSR infrastructure upgrades are funded through BLI 2A08.

The ATCBI and the more advanced Mode S transmit an electronic signal to aircraft, which triggers a transponder. An ATCBI triggers all transponders within its beam, while the Mode S is able to address each aircraft within its beam separately. Analysis of a Backup Surveillance Capability has been ongoing with a decision scheduled for 2017. ATCBI technology refresh and Mode S service live extension programs are funded through 2A19 and 2B16 respectively.

The Wide Area Multilateration (WAM) system uses electronic transmissions from an aircraft and multilateration technology to detect aircraft position in areas where the radar signal may be unavailable or blocked by mountainous terrain. A WAM system deployed in the Colorado mountains is funded through BLI 2A17.

Figure 5-10, there are four models of terminal radars currently in use. The Airport Surveillance Radar Model 11 (ASR-11) is the newest and has replaced radars that were not replaced by the ASR-9 program. The ASR-9 will have a Service Life Extension Programs (SLEP) to update and modernize its components, and the FAA will decide in 2017 whether to replace existing ASR 7-8-9 systems with new systems providing NextGen Surveillance and Weather Radar Capability (NSWRC). Current planning calls for keeping terminal primary radar systems as a backup to the other technologies to address safety, security, and weather detection requirements. ASR-9 service life extension and ASR-11 technology refresh programs are funded through BLI 2B10 and 2B11 respectively. Development of NSWRC is funded through BLI 1A01J.

The Mobile Airport Surveillance Radar (MASR) is a terminal surveillance radar that can be moved from site to site to support radar relocations, temporary planned outages of an existing radar for installation of upgrades and emergency operations when existing systems are damaged. MASR is funded through BLI 2B11.

Surveillance Roadmap (2 of 2)

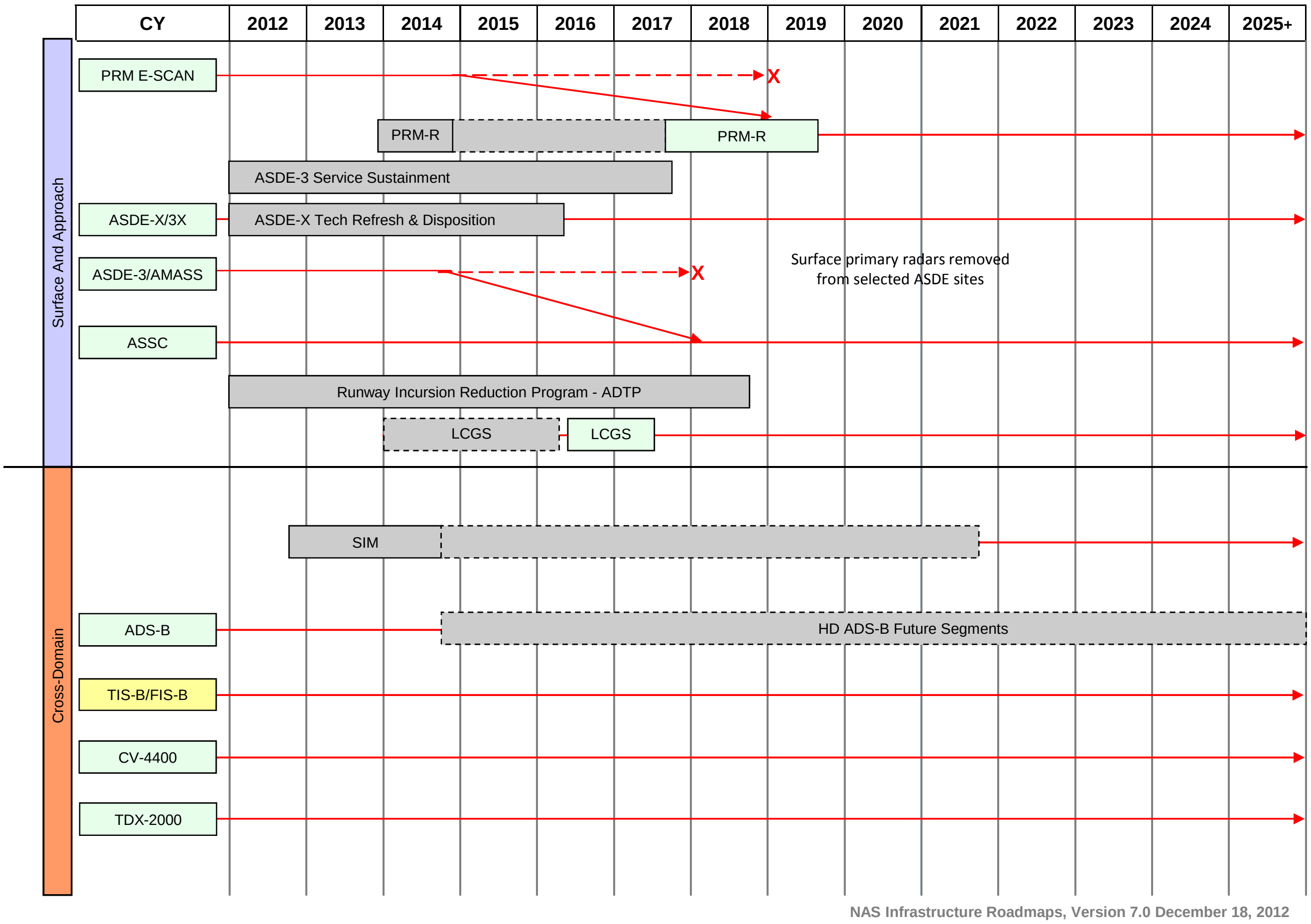

Figure 5-11 Surface, Approach and Cross Domain Surveillance Roadmap

The second Surveillance roadmap (figure 5-11) shows the systems used to track aircraft and vehicles on the airport surface and aircraft within the upper area called Surface and Approach. The ADS-B system shown in the lower area called Coss-Domain also is used on the airport surface and approach areas.

The Precision Runway Monitor (PRM) can be used to allow simultaneous approaches to closely spaced parallel runways. It is a secondary rapid-update radar that provides the precision that controllers need to ensure that two aircraft flying side-by-side maintain safe clearance between them while approaching closely spaced runways. The electronic scan (E-SCAN) version achieves the rapid update by moving the beam electronically rather than relying on a back-to-back turning antenna. The PRM-R refers to a program which is exploring alternatives that would keep the PRM systems at San Francisco and Atlanta operational. Both systems are facing obsolescence issues and increased maintenance costs. PRM-R is funded through BLI 2B20.

Controllers currently use two systems to maintain aircraft separation on the airport surface. Some airports have ASDE-3/AMASS, which uses radar and a display in the tower to depict the location of aircraft on or approaching the taxiways and runways. These displays help controllers determine aircraft location when weather or darkness makes it difficult to see the airport surface. The ASDE-X uses several technologies to perform the same function, and 18 of the 35 ASDE-X sites use an existing ASDE-3 radar. Seven ASDE 3 sites have been replaced by ASDE-X, and the Airport Surface Surveillance Capability (ASSC) program will replace nine of the ASDE-3 radar systems. The ASSC will use multilateration and ADS-B aircraft information to display aircraft location for the airport tower controllers. The ASDE-X system will have a technology refresh to update some of its components. The technology refresh program is funded through BLI 2B01. The ASSC program is funded through BLI 2A13.

The Runway Incursion Reduction Program (RIRP) is evaluating other technologies that could be used to track aircraft surface and approach movements. FAA is still evaluating the Low Cost Ground Surveillance System (LCGS) to determine whether it would be beneficial to install it at lower activity airports. LCGS is funded through BLI 1A01A.

Over the next 2 years, the FAA will be evaluating whether to install Surveillance Interface Modernization (SIM) equipment at terminal and en route radar locations. SIM will modernize the interfaces between FAA radars and automation systems, which will improve surveillance processing performance, reduce life cycle costs, and enable efficient distribution of radar data in the NAS. SIM is funded through BLI 2B17.

The ADS-B line will support a planned shift toward that technology for providing surveillance data to controllers. Nationwide implementation of ADS-B will enable a more frequent transmission of location and other flight information from the aircraft to air traffic control facilities. ADS-B has a faster update rate (1 second versus 5 seconds for a radar), and unlike radar technology, the accuracy remains constant regardless of the distance from the aircraft to the receiving site. The Traffic Information Service (TIS-B) broadcasts information on the location of nearby aircraft, and the Flight Information Service (FIS-B) broadcasts weather and airspace information to aircraft that are equipped with the capability to receive it. Implementation of ADS-B, TIS-B and FIS-B are funded through BLI 2A13.

The CV-4400 is a legacy system that allows use of terminal radar information for en route automation systems, e.g., using terminal radar to fill gaps in en route radar coverage at selected en route centers. The TDX-2000 is also a legacy system that digitizes the output of legacy analog radars (for example, ASR-8) for use by more modern digital automation systems, such as STARS.

Figure 5-12 shows the future capital investments associated with upgrading the surveillance units. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Surveillance Functional Area	**$353.1**	**$309.4**	**$227.1**	**$220.8**	**$211.6**
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.9	$5.9	$0.0	$0.0	$0.0
2A13	Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation*	$282.1	$246.3	$188.4	$189.6	$174.9
2A17	Colorado ADS-B Wide Area Multilateration (WAM) Cost Share*	$3.4	$0.0	$0.0	$0.0	$0.0
2A19	ATC Beacon Interrogator (ATCBI) - Technology Refresh	$1.0	$0.0	$0.0	$0.0	$0.0
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$12.1	$13.4	$10.5	$0.0	$0.0
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$10.9	$13.6	$3.8	$3.5	$1.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance Radar (MASR)	$19.4	$21.1	$10.1	$6.7	$4.4
2B16	Mode S Service Life Extension Program (SLEP)	$7.3	$8.1	$11.3	$14.0	$23.8
2B17	Surveillance Interface Modernization (SIM)	$6.0	$0.0	$0.0	$0.0	$0.0
2B20	Precision Runway Monitor Replacement (PRMR) – Multilateration Technology Upgrade	$5.0	$1.0	$3.0	$7.0	$7.5

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-12 Funding amounts in the Surveillance Functional Area

5.4 Navigation Roadmaps

There are two major types of navigational aids: those used for en route navigation, and those used for precision approach and landing guidance. The en route aids have traditionally been radio transmitters that provide pilots direction and/or distance from their location. The ground-based system commonly used for en route navigation is the Very High Frequency Omnidirectional Range with Distance Measuring Equipment (VOR with DME). There are more than 1,000 VORs spread across the United States. They enable pilots to determine an accurate position and also define the Victor and Jet airways, which are published routes based on straight lines from VOR to VOR.

As NextGen is implemented and more aircraft are equipped, the Global Positioning System (GPS) satellite navigation system will be more widely used for en route navigation. Using GPS will support more direct routing because pilots will be able to program and fly routes defined by geographic coordinates rather than flying from VOR to VOR.

Precision landing guidance systems and associated equipment support low-visibility operations by providing radio signals and approach lights to help pilots land safely in limited visibility. The current most widely used precision landing aids are Instrument Landing Systems (ILS) that guide pilots to runway ends using a pair of radio beams – one for lateral guidance and the other for vertical guidance - to define the approach glidepath - so that pilots can follow it to the runway using cockpit instrumentation. There are more than 1,200 ILSs installed in the United States. They are essential to airlines for maintaining schedule reliability during adverse weather conditions. Augmented GPS satellite signals also provide precision landing guidance. The

Space Based Augmentation System (SBAS) is the FAA's Wide Area Augmentation System (WAAS) that uses a network of 38 ground monitors to calculate corrections to the GPS signals and broadcast those corrections from telecommunications satellites. WAAS-equipped aircraft can use the information to fly a precision approach to a runway in low-visibility conditions. There are currently more than 3,100 WAAS precision approach procedures referred to as Localizer Performance with Vertical Guidance (LPV) that use GPS augmented by WAAS for both horizontal and vertical guidance.

Navigational aid implementation is broken down into two different roadmaps:

1. Roadmap 1 (figure 5-13) - Precision Approach, Surface Navigation and Safety and Enhancements
2. Roadmap 2 (figure 5-14) - Approach and Runway Lights and En Route, Terminal and Non-Precision Approach

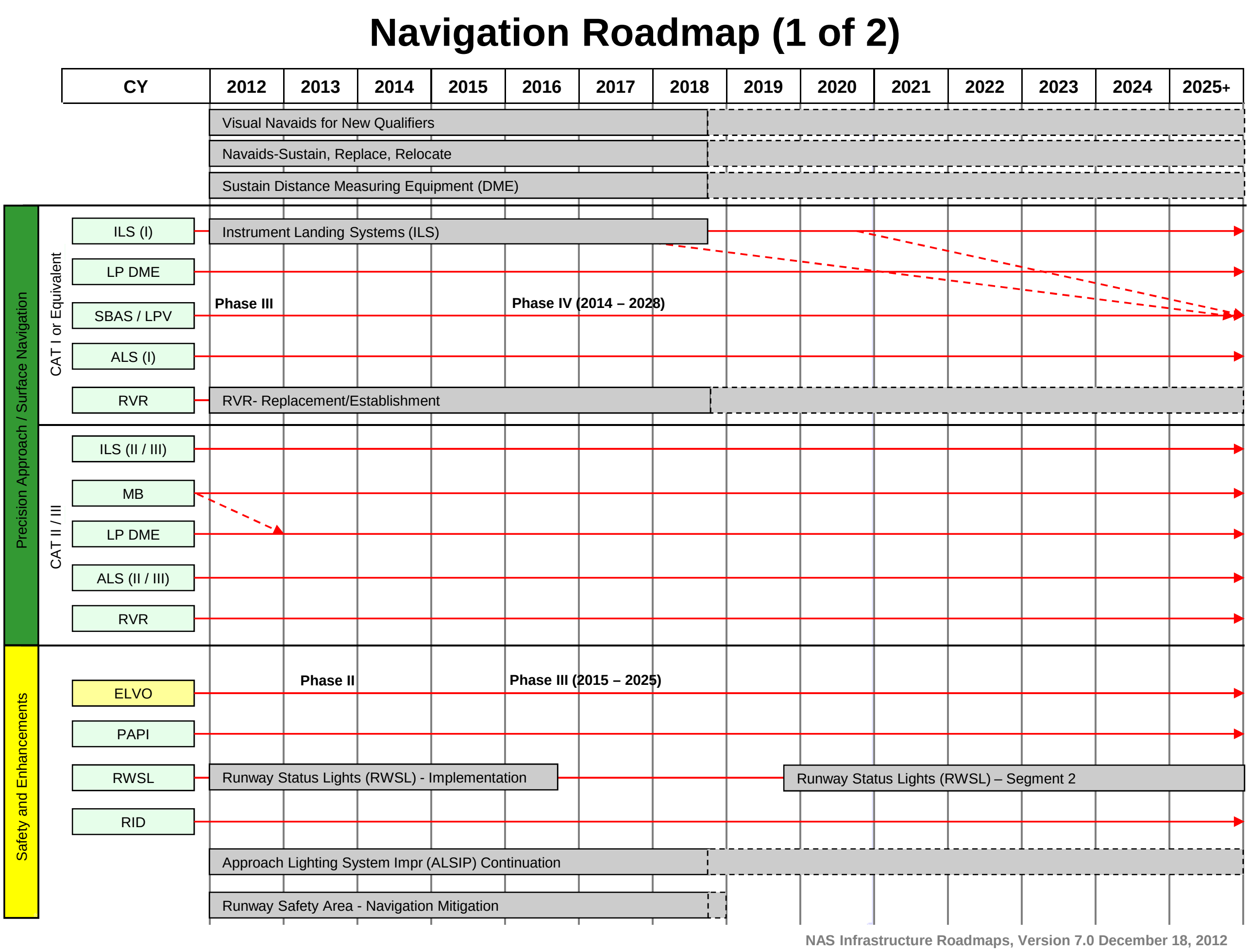

Figure 5-13 Precision Approach, Surface Navigation and Safety and Enhancements Roadmap

At the top of the roadmap (figure 5-13) are 3 programs that support the continued operation of existing systems. Visual navaids assist pilots in staying on the proper glide path. The navaids sustain program updates, replaces and augments the existing inventory of navigational aids. The Distance Measuring Equipment (DME) program both renovates and increases the number of installed DMEs. Visusal Navaids, navigation aids and DMEs are funded through BLIs 2D06, 2D07 and 2D09.

There are three categories of precision approach. Category I is the most common. It guides the pilot to the runway end, but it requires that the pilot be able to see the runway when the aircraft is no less than 200 feet above the field elevation, and the horizontal visibility is one-half mile or more. The Category II and III approaches allow aircraft to descend to lower minimums (i.e., less vertical and horizontal visibility is required). Currently, ILS is the primary system used for precision approaches. Category II and III ILS have higher redundancy and reliability levels that reduce the risk of equipment failures and allow lower minimums. An alternative for precision approach guidance is the SBAS LPV. As this alternative comes into broader use, the FAA can consider decommissioning ILS. The FAA plans to make an initial decision in 2018 and 2020 on the drawdown of Category I ILS. ILSs are funded through BLI 2D02.

The Low Power DME (LPDME) is being installed to support advanced procedures requiring performance based navigation equipage and allow specially trained pilots to minimize approach paths and, as discussed below, to replace marker beacons. LPDMEs are funded through BLI 2D06.

In both Category I and II/III sections of the roadmap, the Approach Light System (ALS) and the Runway Visual Range (RVR) systems are shown. The ALS helps the pilot see the end of the runway and transition from instrument to visual flight for landing before reaching runway minimums. The RVR informs the tower of the measured visibility so that controllers can inform the pilot whether the runway visibility is above or below minimums. In the Category II section the existing MB (Marker Beacon) installations are being evaluated to determine how many can be replaced by LP DMEs. The FAA is also testing use of light-emitting diodes (LED) to replace the incandescent lamps currently in use in ALS to reduce both maintenance and operating costs. The approach lights and visibility sensors will need to be sustained and remain in operation for precision approach guidance regardless of any decision on decommissioning ILSs. ALSs, RVRs and other approaching lighting systems are funded through BLI 2D04 and 2D09.

The Safety and Enhancements section of the roadmap shows several systems designed to assist pilots to operate safely in low visibility conditions. They are:

- Enhanced Low Visibility Operations (ELVO) – allows pilots to land with lower limited visibility conditions than standard procedures. Additional RVRs to support this capability is funded through BLI 2D04;
- Precision Approach Path Indicator (PAPI) – allows pilots to determine visually that they are on the proper glideslope for landing funded through BLI 2D10;
- Runway Status Lights (RWSL) – are designed to give pilots a stop signal if it is dangerous to enter or cross a runway, funded through BLI 2B12;
- Runway Incursion Devices (RID) – are various pieces of equipment to warn aircraft and other vehicles of potential runway incursions;
- Airport Lighting System Improvement Program (ALSIP) – a response to the National Transportation Safety Board recommendation to replace steel airport light supports with

frangible structures to minimize damage to aircraft that descend below the glidepath, funded through BLI 2D05; and

- Runway Safety Area (RSA) – a program to replace structures in the safety area surrounding a runway with low-impact supports to minimize damage to aircraft that veer off the runway, funded through BLI 2D12.

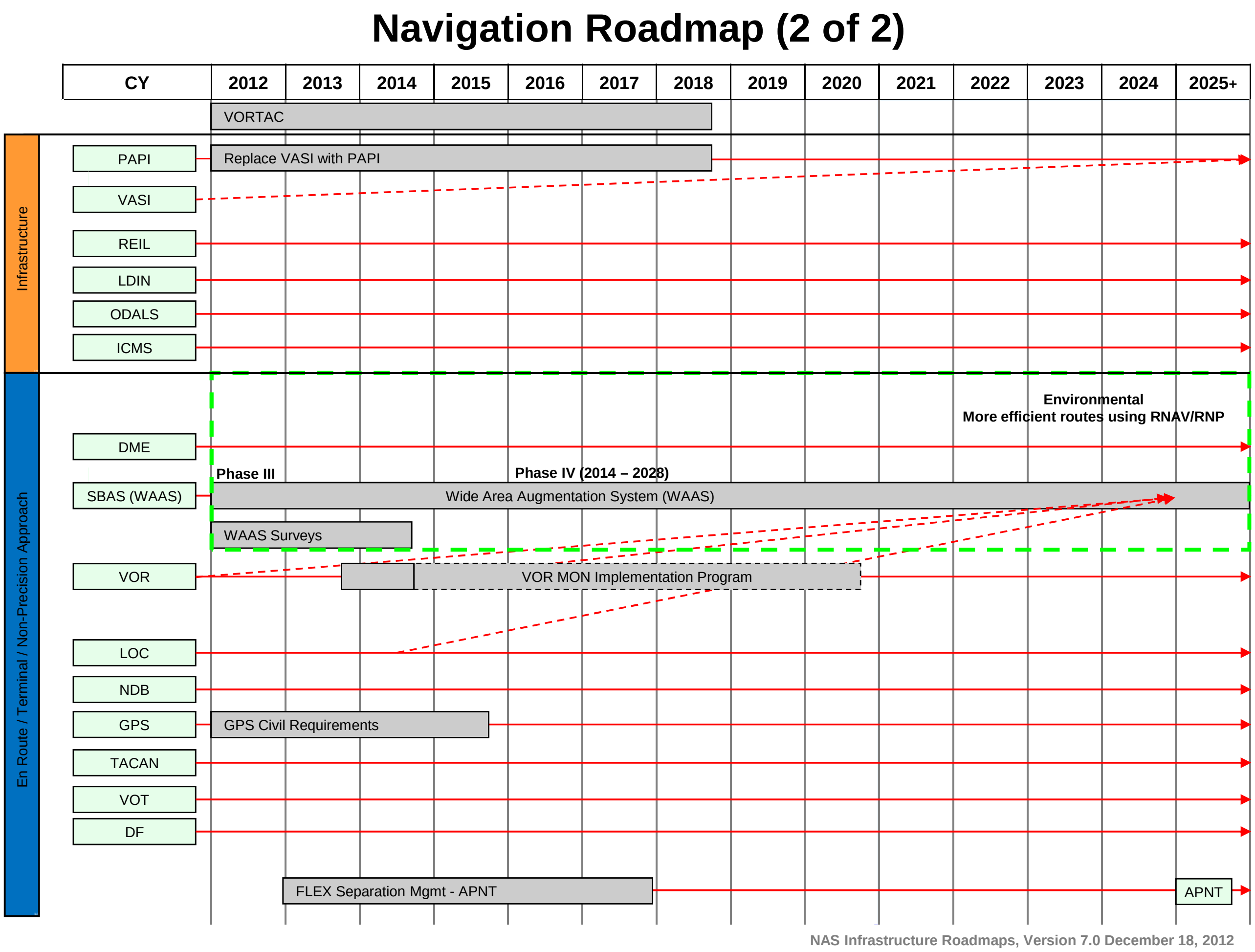

Figure 5-14 Approach and Runway Lights and En Route, Terminal and Non-Precision Approach Roadmap

The VORTAC program at the top of the roadmap shows that combined VOR and TACAN sites will be supported through 2018 and possibly longer if analysis shows a need to continue them. The VORTAC program is funded through BLI 2D01.

Precision Approach Path Indicator (PAPI) and the Vertical Approach Slope Indicator (VASI) will be continued until the PAPI replaces all of the current VASI systems, at a time well into the future. The PAPI system is funded through 2D10.

The Runway End Identification Lights (REIL) help pilots to visually align with the runway for both precision and non-precision approaches. The REIL will continue operating throughout the roadmap timeframe. The LDIN (Lead In Light System) and the ODALS (Omnidirectional Airport Lighting System) are installed at the end of runways to help pilots determine the active runway for landing. The Interlock Control and Monitoring System (ICMS) helps controllers rapidly activate and deactivate the navigational aids at an airport.

DME will support NextGen Nav Initiatives for both en route and terminal DME operations. The terminal DME will be installed beginning in the 2014 timeframe to support Area Navigation/Required Navigation Performance (RNAV/RNP) operations. NextGen Navigation Initiatives program is funded through BLI 1A12E.

Non-precision approaches provide guidance to pilots preparing to land on a runway when there is limited visibility; however they only provide lateral guidance, not vertical guidance. These approaches do not allow descent to the same minimum altitudes possible with a precision approach. VORs support many non-precision approaches; however, SBAS (WAAS) will support non-precision approach operations as the VOR population is reduced. The FAA has more than 5,000 GPS-WAAS non-precision approach procedures in place. The WAAS is funded through BLI 2D03.

The en route and terminal domains have traditionally relied on the system of VORs to define airways within the NAS. As GPS replaces the VOR as a navigation aid, FAA will decrease the number of VORs to a Minimum Operational Network (MON). The MON will serve as a backup for GPS and will be available for those aircraft that have not equipped with GPS navigation systems. The VOR technology refresh or replacement and the MON programs are funded through BLI 2D01.

The Localizer (LOC) is an ILS component that provides horizontal guidance to a runway end. When used as a stand-alone system without a Glideslope component, LOC supports non-precision approach operations; SBAS (WAAS) will begin to replace that functionality at airports where only localizers are installed.

The FAA will continue operating Non-Directional Beacons (NDB), because NDBs are still used at some remote areas, where it is not economically justified to install modern navigational equipment.

The Department of Defense operates GPS. There are typically 24 to 30 active satellites in orbit, and a navigation receiver can determine an aircraft's position by interpreting the data transmitted by the satellites in view of the aircraft's antenna. Two GPS upgrades are expected in future years. The next generation of satellites will have a second frequency (L5) for civilian safety-of-life use. An aircraft receiver that receives both the existing L1 signal and the new L5 signal can internally calculate corrections that enhance the accuracy of the position calculation and eliminate the errors caused by ionospheric distortion. The GPS III family of satellites will be upgraded with an additional civil signal (L1C) and increased transmitting power. The GPS Civil Requirements BLI 2D11 will fund the ground monitoring stations to measure the accuracy and reliability of the new civil frequencies.

The Tactical Navigation System (TACAN) is the military equivalent of VOR and DME systems installed jointly. TACAN is often collocated with VOR systems. The VOT (VOR Test Range) is used to check and calibrate VOR receivers in aircraft. The Direction Finder (DF) was used to help locate lost pilots, but it is being decommissioned because better technology is now available.

The Alternate Positioning Navigation and Timing System (APNT) is a program to determine the appropriate back up navigation system in case GPS service is disrupted. It is a NextGen initiative to ensure continuity of service if GPS is disrupted. The APNT program is funded through BLI 1A12F.

Figure 5-15 shows the future capital investments for navigation systems. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Navigation Functional Area	**$238.6**	**$223.7**	**$197.8**	**$143.9**	**$135.0**
2B12	Runway Status Lights (RWSL)	$35.3	$26.2	$20.6	$0.0	$0.0
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$8.3	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) – Establish	$7.0	$7.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$109.0	$105.0	$105.7	$97.9	$100.9
2D04	Runway Visual Range (RVR) & Enhanced Low Visibility Operations (ELVO)	$6.0	$6.0	$6.0	$6.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$4.0	$3.0	$3.0	$3.0	$3.0
2D07	Visual Navaids - Establish/Expand	$2.5	$2.0	$2.0	$2.0	$2.0
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$3.0	$3.0	$3.0	$3.0	$6.0
2D10	VASI Replacement – Replace with Precision Approach Path Indicator	$2.5	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$20.0	$20.0	$0.0	$0.0	$0.0
2D12	Runway Safety Areas – Navigation Mitigation	$38.0	$41.0	$40.0	$14.5	$1.6

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-15 Funding amounts in the Navigation Functional Area

5.5 Weather Roadmaps

Timely and accurate weather observations and forecasts are essential to aviation safety and for making the best use of aviation capacity. They will be even more important when NextGen direct routing becomes routine. Pilots need to know the direction and speed of winds aloft so that they can take advantage of tailwinds and minimize the effect of headwinds. They also need to know if there will be obstructions to visibility that restrict landings at their destination airport, and whether the runway is wet or dry and how that will affect braking action. Traffic flow managers and pilots use weather observations and forecasts to determine when they need to plan alternative routes to avoid severe weather. Pilots must avoid thunderstorms with hail and heavy rain, turbulence, and icing because they can damage the aircraft and potentially injure passengers. The FAA has a lead role in collecting and distributing aviation weather data – particularly hazardous weather. The FAA distributes weather hazard information from its own systems and uses both the FAA and National Weather Service (NWS) computer forecast models based on data available from FAA and NWS sensors to develop forecasts for use by air traffic control facilities, pilots, airline operations centers, and other aviation-related facilities.

The FAA employs two categories of weather systems: weather sensors and weather processing/dissemination/display systems. Weather sensors include weather radars and surface observation systems that measure atmospheric parameters, such as surface temperature, prevailing wind speed and direction, relative humidity, and cloud bases and tops, as well as wind shear and microbursts. These weather sensors provide real-time information to air traffic facilities and to centralized weather-forecasting models. Weather processing/dissemination/display systems organize and process the sensor's observed data. Data from multiple sensors feed forecast models whose output can be disseminated and integrated in national and local processing and display systems to interpret broad weather trends affecting aviation operations. This information can then be sent to air traffic controllers, traffic flow managers, dispatchers, and pilots.

Weather system implementation is broken down into two different roadmaps:

1. Roadmap 1 (figure 5-16) - Weather Sensors
2. Roadmap 2 (figure 5-17) - Weather Dissemination, Processing, and Display

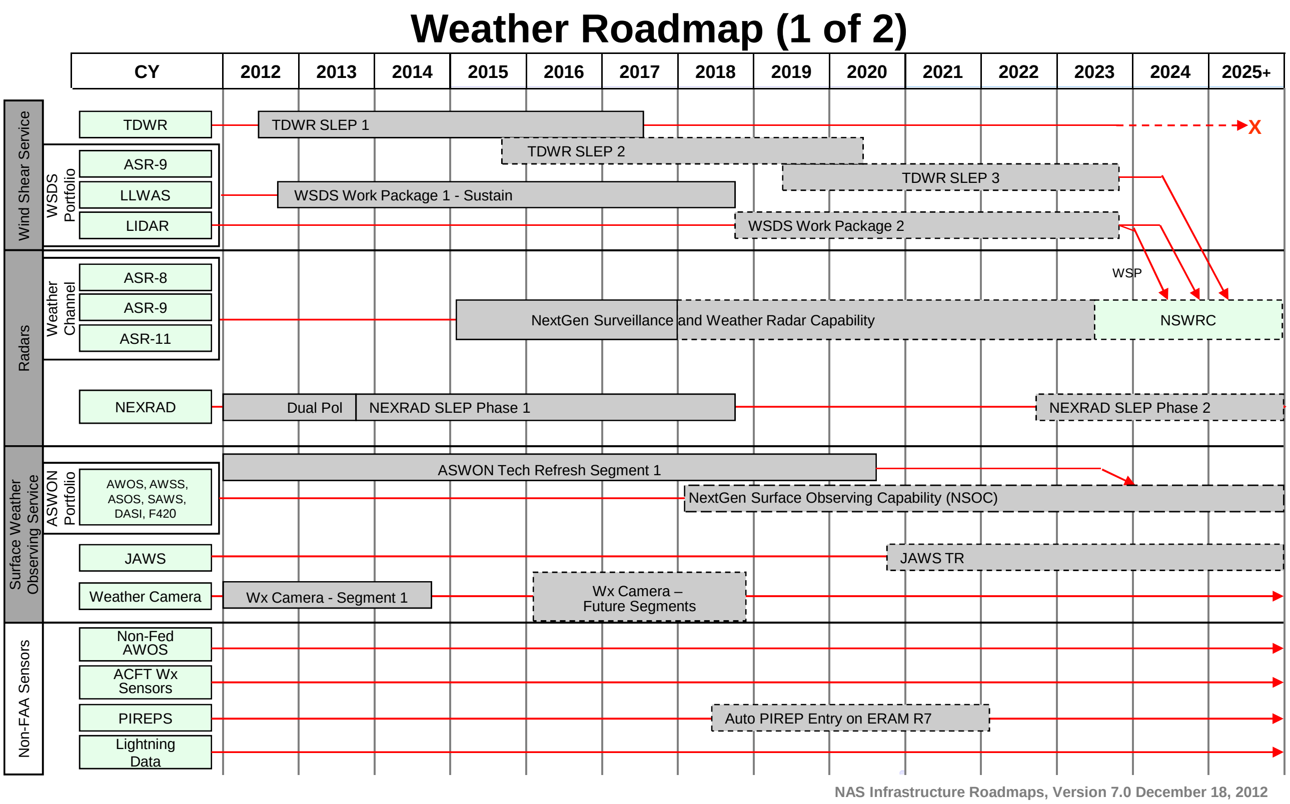

Figure 5-16   Weather Sensors Roadmap

Figure 5-16 shows the current and planned status of weather sensors. The Terminal Doppler Weather Radar (TDWR) is installed at 46 airports and detects windshear and microbursts so controllers can warn pilots of these hazards as they approach the runways and begin landing procedures. TDWR is the most sophisticated wind shear detection system. Using Doppler technology, the radars can detect the rapid changes in wind speed and direction that indicate existence of wind shear hazards for an aircraft approaching or departing a runway. TDWR service life extension program is funded through BLI 2B02.

The Wind Shear Detection Services Portfolio includes: the Airport Surveillance Radar – Weather System Processor (ASR-WSP); the Low Level Wind Shear Alerting System (LLWAS); and the Light Detection and Ranging (LIDAR) system. ASR-9 airport surveillance radars, wind sensors and lasers are used to detect wind shear conditions near the runways and approach areas of airport. Airports with significant wind shear risk that have a lower volume of air traffic are served by the ASR-WSP, a lower cost alternative to TDWR, which processes the six-channel weather from the two dimensional Doppler search radar signals of the ASR-9 to detect wind shear and approximate the output of the TDWR. The Wind Shear Detection Portfolio is funded through BLI 2A14.

LLWAS supplements these radar systems, and it consists of wind sensors located at 6 to 29 points around the runway thresholds to measure surface wind direction and velocity. The LLWAS computer systems compare the wind velocity and direction detected by these sensors at different locations to determine whether wind shear events are occurring at or near the runways. The sensors can only measure surface winds and do not detect wind shear in the approach or departure paths as a radar would. LLWAS both serves airports that do not have a TDWR or WSP, and at several locations, the system supplements the weather radars with point-specific wind measurements to verify the presence and location of wind shear.

The LIDAR (Light Detection and Ranging) system uses lasers to detect dry microbursts and gust fronts that radar systems such as TDWR may not detect. Evaluation of LIDAR is underway at airports located in dry high plains or mountain environments, where wind shear is not always accompanied by sufficient precipitation for the TDWR to detect with 90 percent reliability.

The ASR-8/9/11 Weather Channel and the Next Generation Weather Radar (NEXRAD) detect precipitation, wind, and thunderstorms that affect aircraft in flight. Replacing the weather information that the ASR-8/9 radars generate will be necessary if these radars do not remain in operation. The FAA is evaluating the potential to combine these functions into a NextGen Surveillance and Weather Radar Capability (NSWRC) if the business case shows that solution to be viable. Development of NSWRC is funded through BLI 1A01J.

Development of the currently operating NEXRAD occurred under a joint program of the Department of Commerce National Weather Service, Department of Defense, and FAA. These systems are Doppler weather radars that detect and produce over 100 different long-range and high-altitude weather observations and products, including areas of precipitation, winds, thunderstorms, turbulence, and icing. The NEXRAD radars are essential for forecasting future weather. In the short term, upgrades such as Dual Polarization (Dual Pol) and software improvements are being funded. Dual Pol is an important addition to NEXRAD that improves detection of in-flight icing and is expected to improve the forecasting of areas where in-flight icing will occur. A cooperative program with the partner agencies will upgrade the NEXRAD radars with a Service Life Extension Program (SLEP) to modernize and renovate the existing system of radars. The NEXRAD SLEP program is funded through 2A04.

The Automated Surface Weather Observation Network (ASWON) Portfolio includes several surface sensors (AWOS/ASOS/AWSS/SAWS/DASI/F-420) that measure weather parameters on the surface and report conditions to air traffic facilities and pilots. The data they collect is important to pilots and dispatchers as they prepare and file flight plans, and it is vital for weather forecasting. The Automated Surface Observing Systems (ASOS) and other variants — such as the Automated Weather Observing System (AWOS); the Automated Weather Sensor Systems (AWSS); and the Stand Alone Weather Sensing (SAWS) system — have up to 14 sensors that measure surface weather data, including temperature, barometric pressure, humidity, type and amount of precipitation, and cloud bases and amount of sky cover. The Digital Altimeter Setting Indicator (DASI) shows tower controllers the current barometric pressure so they can inform pilots of the proper setting so the aircraft's altimeter will read the correct runway elevation at touchdown. The F-420 is an indicator that shows the wind direction and velocity on the runways. These systems feed data directly to air traffic control facilities and support automated broadcast of weather information to pilots. They also provide regular updates for the forecast models that predict future weather conditions including adverse weather. These systems will remain in operation until a decision is made to implement the NextGen Surface Observing Capability. The ASWON Portfolio is funded through BLI 2C01.

The Juneau Airport Weather System (JAWS) is unique to the Juneau, Alaska area. It provides wind hazard information from mountain-peak wind sensors located around Juneau to the Flight Service Station and Alaska Airlines to improve the safety of aircraft arriving at and departing the airport.

The Weather Camera program installs cameras along flight routes in Alaska so pilots can have a visual picture of the weather they might encounter as they file their flight plans for a specific route. Flights can be cancelled if the cameras show poor weather along the planned route. The Weather Camera program is funded through 2C04.

The non-FAA sensors shown at the bottom of the roadmap are valuable sources of weather information that improve FAA's overall knowledge of weather conditions. Some states and smaller airports operate AWOS for weather observations. Inputs from these systems are valuable additions to the data from FAA sensors. Aircraft weather sensors can provide humidity, wind speed and atmospheric pressure readings that are helpful in forecasting weather conditions. Pilot Reports (PIREPS) are invaluable because they are real time reports on the weather along major flight routes. Lightning Data provides air traffic facilities important information about the location and intensity of thunderstorms.

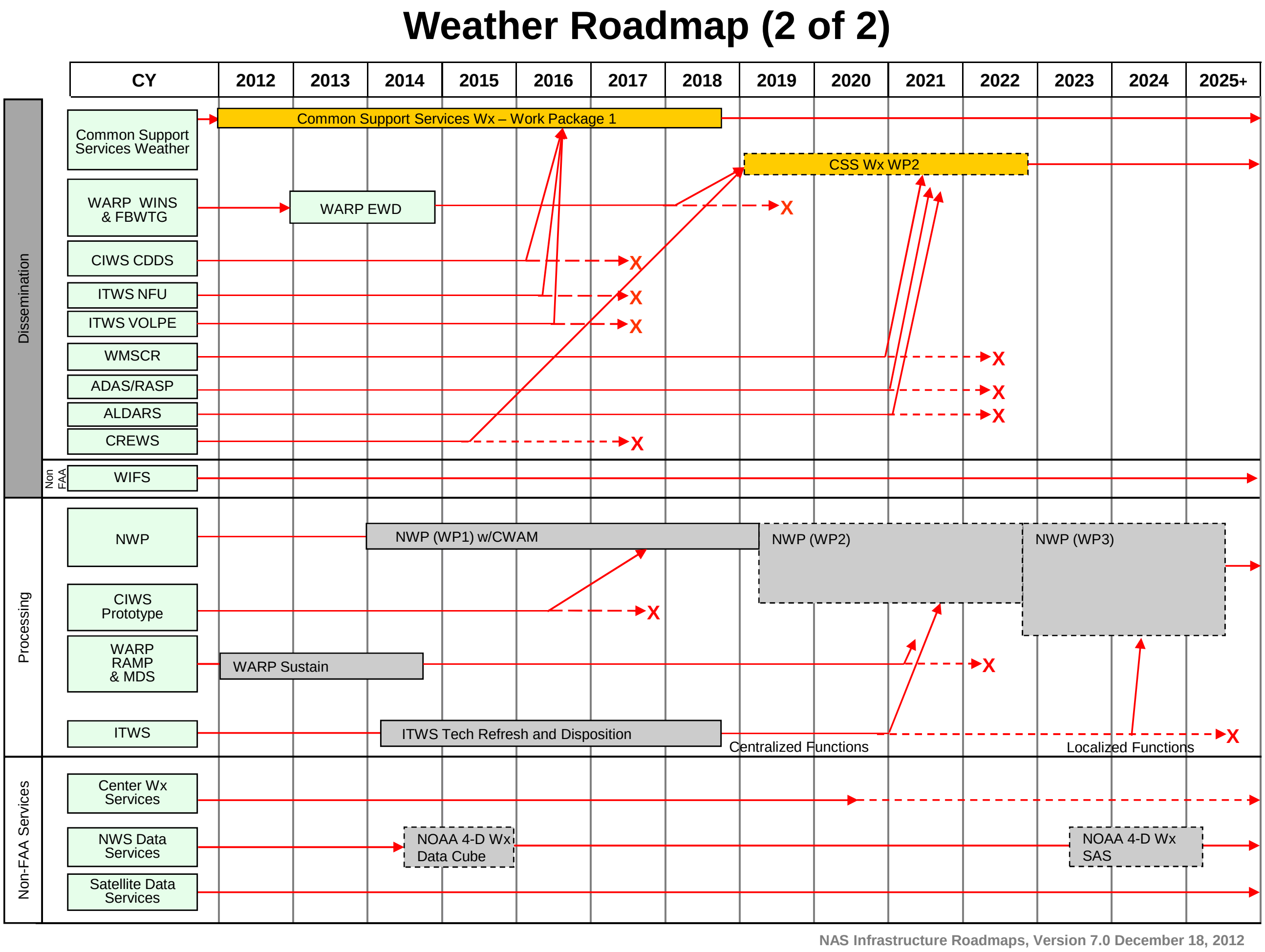

Figure 5-17 Weather Dissemination, Processing, and Display Roadmap

Figure 5-17 shows that NextGen systems will consolidate large volumes of weather observations and forecast information for processing, display, and dissemination. Weather forecasts are integrated into decision support system algorithms to produce the more sophisticated forecasts of how weather will impact NAS operations. Common Support Services – Weather (CSS - Wx) which is supported by the SWIM program will be the source for weather information and provide access to all users throughout the NAS. The CCS-Wx program is funded through BLI 2A12C.

Currently, the Weather and Radar Processor Weather Information Network Server (WARP WINS) processes and stores data from multiple NEXRAD radars for en route control facilities to use. WARP compiles information from a number of sources for interpretation by the Center Weather Service Unit forecasting stations. WARP also provides NEXRAD precipitation intensity data to controllers' displays. The WARP FBWTG (FAA Bulk Weather Communications Gateway) provides National Weather service data to the center weather service units to aid in their forecast of weather conditions in the center's airspace. The roadmap shows that WARP will be upgraded with an Enhanced WINS distribution (WARP EWD) before the

WARP functions are incorporated in CSS – Wx. The WARP upgrade program is funded through BLI 2A15.

The Corridor Integrated Weather System (CIWS) gathers weather information along the busiest air traffic corridors to help air traffic specialists select the most efficient routes when they must divert traffic to avoid severe weather conditions. The CIWS Data Distribution System (CDDS) program enabled the existing CIWS system to distribute data to external NAS users so traffic management participants have the same information for daily route planning.

The Integrated Terminal Weather System (ITWS) consolidates weather information from automated sensors and surrounding radars (TDWR and NEXRAD) to provide real-time weather information for terminal control facilities. The system also projects movement of thunderstorms and gust fronts up to 20 minutes into the future. ITWS has been installed at 23 airports. Tower and Terminal Radar Approach Control (TRACON) controllers use the information to make more precise estimates of when runways should be closed and subsequently reopened. They also use the information to plan for a switch in terminal arrival patterns to avoid inefficient maneuvering to accommodate a runway change as aircraft approach an airport. The ITWS will have two enhancements. The National Weather Service Filter Unit (ITWS NFU) will send data collected by FAA to the National Weather Service to use for weather forecasting. The ITWS Volpe will web enable the ITWS weather data for external users.

ITWS will receive technology refresh in the near term, and we will incorporate its weather inputs and processing power into the NextGen Weather Processor by 2018. ITWS is funded through BLI 2B21.

The FAA-operated Weather Message Switching Center Replacement (WMSCR) is a network with distribution nodes in Salt Lake City and Atlanta that collects and distributes nationwide weather information. The FAA will migrate WMSCR functionality into the SWIM Common Support Services for weather information distribution.

The Automated Weather Observation System Data Acquisition System/Regional ADAS Service Processor (ADAS/RASP) is a communications link that transmits AWOS/ASOS/AWSS data to air traffic facilities. ADAS also correlates lightning groundstroke information to AWOS/ASOS/AWSS data to better determine the location of nearby thunderstorm activity.

The Automated Lightning Detection and Reporting System (ALDARS) will become part of the NextGen weather processor after 2018 and its information will be consolidated with other weather inputs.

The Center/TRACON Remote Weather System (CREWS) collects data to help center and terminal facility controllers coordinate the flows of air traffic into busy terminal facilities.

World Area Forecast System (WAFS) Internet File Service (WIFS) is a commercial service that provides the information to support global flight operations.

The NextGen Weather Processor (NWP) will incorporate the functionality of the existing Weather and Radar Processing (WARP) system; implement the CIWS functionality (0-2 hour convective weather forecast) and develop a 0-6 hour forecast for the TFM system. The NWP program will enhance the display of weather information by using new algorithms to portray icing conditions, turbulence, and other hazards and ITWS capabilities. Further upgrades of weather-predicting algorithms will also be added to include Wind Shear/Microburst and Wake Vortex Detection and prediction advisories. The WARP RAMP (Radar and mosaic Processor) and MDS (Meteorological Data Server) components which process weather data will remain in service until their functions are incorporated in NWP. The NWP program is funded through BLI 2A20.

The NOAA 4-D Weather Cube is a distributed "virtual" database that will receive weather data directly from sensors and other sources and, either automatically or by request, send data to FAA facilities and users so that observations and forecasts can be more widely and consistently distributed via network-enabled communications. The 4-D Weather Cube will be hosted by the National Weather Service, and FAA will access it as the Single Authoritative Weather Source for all users of the NAS. The Single Authoritative Source (4-D Wx SAS) ensures that the most accurate and consistent data will be distributed to users so that they can make decisions based on correct and coherent weather information. Decision support tools will use this weather information to assist users in understanding weather constraints and taking actions to reduce risk for aviation operations. Integration of the 4-D Weather Cube into the NAS is funded through the CSS-Wx program in BLI 2A12C.

The non-FAA services provide data from the National Weather Service (NWS) ground and satellite sensors to FAA for use by the NWS meteorologist who interpret and forecast weather at the FAA en route centers.

Figure 5-18 shows the future capital investments for weather sensors and weather dissemination and processing systems. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Weather Functional Area	**$46.4**	**$67.3**	**$57.1**	**$61.2**	**$70.4**
2A04	Next Generation Weather Radar (NEXRAD)	$4.1	$7.1	$6.5	$6.3	$5.5
2A15	Weather and Radar Processor (WARP)	$0.7	$0.0	$0.0	$0.0	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) – Provide	$3.6	$0.0	$0.0	$0.0	$0.0
2B21	Integrated Terminal Weather System (ITWS)	$1.3	$4.4	$5.4	$5.0	$3.8
2A14	Windshear Detection Service (WDS)	$2.0	$4.3	$5.2	$4.5	$1.0
2A20	Next Generation Weather Processor (NWP)*	$23.5	$43.3	$30.8	$32.3	$46.6
2C01	Aviation Surface Weather Observation System	$10.0	$8.0	$8.0	$10.0	$10.0
2C04	Weather Camera Program	$1.2	$0.2	$1.1	$3.2	$3.5

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-18 Funding amounts in the Weather Functional Area

5.6 Facilities

The Air Traffic Organization maintains and operates thousands of staffed and unstaffed operational facilities that we must regularly upgrade and modernize. The largest facilities are the 21 en route centers, that house hundreds of employees and the equipment they use to control aircraft flying in the en route airspace. The other operational facilities with significant staffing are the more than 500 towers and 167 TRACON facilities that control arrival and departure traffic to and from airports.

There are more than 16,000 unstaffed facilities—many in very remote locations—sheltering communications, navigation, surveillance equipment and weather sensors. Much of this equipment is housed in buildings that have exceeded service live and need renovation. Many have deteriorating steel towers and foundations. Some newer unstaffed buildings and structures frequently need renovation because they are in remote and/or hazardous locations near the ocean or on mountaintops. Replacing roofing, electric power generators, heating/cooling, and structural and security components of these structures is essential to successful operation of the NAS. Modernization of unstaffed facilities is funded through BLI 2E02.

The William J. Hughes Technical Center (WJHTC) in Atlantic City, NJ, and the Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, OK, each have many buildings. Each year, these complexes receive funds to both sustain and replace infrastructure, and to improve and modernize buildings to support training, logistics, research, and management functions. The MMAC operates under a lease from the Oklahoma City Airport Trust, and funds are requested to pay the annual lease costs. The MMAC also receives infrastructure funding for building renovation and updated infrastructure. The WJHTC supports research programs to determine the feasibility of NextGen concepts, and it also supports the testing of new equipment that will be installed in the NAS. The FAA has requested funding for 2014 and beyond to upgrade buildings and supporting infrastructure, such as roads. Annual funding is provided to reconfigure the research laboratories to accommodate acceptance testing for new equipment and to test modifications to existing equipment. The WJHTC is funded through BLI 1A02, 1A03 and 1A04. The MMAC is funded through BLI 3B01 and 4A04.

The Terminal Air Traffic Control Facilities – Replace program includes funding for replacement of exiting airport traffic control towers (ATCT) and TRACON facilities. Projects are funded in five segments and are scheduled based on Agency's priorities. A project typically spans a period of 5-10 years from inception to completion depending on the size of the project. Each segment of a project is fully funded in the year requested but it may take more than one year to complete that segment and costs for that segment may exceed the original estimate. Funding is allocated to the segments based on Agency priorities while maintaining the overall 5 year funding estimates for the program. ATCT/TRACON replace program is funded through BLI 2B06.

The Terminal Air Traffic Control Facilities – Modernize program replaces specific exterior or interior components of existing towers, such as elevators, heating ventilation and cooling equipment, roofs, or other infrastructure that the FAA must upgrade to keep towers functioning. ATCT/TRACON modernization program is funded through BLI 2B07.

The FAA upgrades and improves Air Route Traffic Control Center (ARTCC) facilities by replacing heating and cooling systems, upgrading electrical power distribution systems, and providing other facility needs to meet mission requirements. ARTCC modernization program is funded through BLI 2A05.

Figure 5-19 shows the future capital investments for facilities programs for the air traffic control system. Funding amounts are in Millions of Dollars.

BLI Number	Program Name	FY 2014 Budget	FY 2015	FY 2016	FY 2017	FY 2018
	Facilities Functional Area	**$472.4**	**$516.9**	**$575.8**	**$594.3**	**$604.2**
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$12.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$6.0	$8.1	$9.2	$10.3	$10.0
1A13	Next Generation Air Transportation System (NextGen) – System Networked Facilities*	$9.0	$9.0	$10.8	$11.0	$12.0
1A14	Next Generation Air Transportation System (NextGen) – Future Facilities* **	$10.0	$24.7	$61.0	$67.0	$30.0
2A05	ARTCC Building Improvements/Plant Improvements	$53.0	$53.0	$61.0	$63.0	$63.5
2B06	Terminal Air Traffic Control Facilities - Replace	$72.0	$100.0	$100.0	$110.0	$110.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$53.2	$52.7	$52.7	$53.1	$53.1
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$29.0
2C03	Alaska Flight Service Facility Modernization (AFSFM)	$2.9	$2.9	$2.0	$2.0	$2.0
2E01	Fuel Storage Tank Replacement and Monitoring	$8.7	$6.8	$14.0	$14.0	$16.0
2E02	Unstaffed Infrastructure Sustainment	$33.0	$33.0	$33.3	$34.4	$44.4
2E03	Aircraft Related Equipment Program	$10.4	$9.0	$11.4	$9.0	$9.0
2E06	Facilities Decommissioning	$6.5	$5.0	$6.0	$6.0	$10.0
2E07	Electrical Power Systems – Sustain/Support	$85.0	$100.0	$100.0	$100.0	$125.0
2E08	FAA Employee Housing and Life Safety Shelter System Service	$2.5	$0.0	$0.0	$0.0	$0.0
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A03	Logistics Support Systems and Facilities (LSSF)	$10.0	$1.0	$1.5	$1.1	$1.4
3A05	Facility Security Risk Management	$15.0	$15.1	$15.0	$15.1	$15.1
3A12	National Test Equipment Program	$3.0	$2.0	$4.0	$4.0	$4.0
3A13	Mobile Assets Management Program	$3.0	$4.0	$2.0	$2.0	$3.0
3B01	Aeronautical Center Infrastructure Modernization	$12.3	$13.2	$14.1	$14.0	$14.0
4A04	Mike Monroney Aeronautical Center Leases	$17.9	$18.4	$18.8	$19.3	$19.7

* Titles with asterix represent NextGen BLIs

** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

Figure 5-19 Funding amounts in the Facilities Functional Area

6 Conclusion

The capital investment plan shows FAA's commitment to balancing the needs of maintaining legacy facilities and equipment, enhancing redundancy to ensure safety, and investing in the future capabilities of NextGen. Operational improvements that rely on capital investment often take several years after the appropriation of funding to be routinely used, because the complex equipment necessary to support changes needed for operational improvements takes time to develop, build, install, test and then train controllers in its use.

FAA has taken positive steps in implementing NextGen capabilities. The delivery of ADS-B services throughout much the United States is already providing safety and efficiency benefits to operators in, for example, the Gulf of Mexico. The ability to share airport surface information with the airline operators using SWIM has improved the FAA and carriers joint ability to plan for surface operations at congested airports, especially in inclement weather where there are large surface delays and operationally complexity. The expansion of the Time Based Flow Management Capability to more airports and across greater distance assure that the airport capacity is fully utilized with minimum delay cost for the users. The focus on providing a Metroplex approach to the addition of RNP procedures for terminal approach paths coupled with ongoing development of advanced decision tools show both the viability and commitment to the delivery of NextGen concepts. These successes demonstrate that efficiency can be improved with more advanced equipment and procedures. As time progresses, the use of delivery of enhanced procedures coupled with advanced tools will grow and NextGen goals will continue to be met.

In addition to future capacity, efficiency and environmental demand considerations, equipment, facilities and IT systems suffer from normal obsolescence. The computer systems and other technology that FAA uses for air traffic control have an estimated life of 10 to 20 years. Regardless of whether there is growth or decline in air travel, FAA will have to upgrade or replace several system components in the next 5 years. FAA is and will continue to be committed to modernizing the existing air traffic control system and supporting its infrastructure.

7 Appendices

The CIP contains five appendices.

Appendix A

- Lists FAA strategic goals, outcomes, and performance metrics.
- Associates CIP programs with strategic outcomes and performance metrics.

Appendix B

- Provides CIP program descriptions and the alignment of programs to strategic goals.
- Describes the programs contribution to meeting the performance metric.
- Lists performance output goals for FY 2014–2018.
- Shows system implementation schedules.

Appendix C

- Provides funding amounts from FY 2014 through FY 2018 by Budget Line Item (BLI). Funding amounts are in Millions of Dollars.

Appendix D

- Response to GAO Report 08-42 - Identifies major programs with cost and schedule changes from the original baseline and explains the causes of those changes.

Appendix E

- Defines acronyms and abbreviations.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix A

Fiscal Years 2014 – 2018

APPENDIX A

GOAL MATRIX

The Capital Investment Plan (CIP) programs have been aligned to the goals, outcomes, and performance metrics in the Federal Aviation Administration (FAA) Strategic Plan, Destination 2025, and the Department of Transportation's (DOT) strategic plan. Many FAA programs will contribute to more than one goal, outcome, or performance metric; however the program linkages in the CIP (Appendix A and B) are aligned to a single goal, outcome, and performance metric where a program's contribution is most significant. Only CIP programs with Fiscal Year (FY) 2014-2018 funding are included in Appendix A, B, and C.

The FAA's Strategic Plan has five Goals and the table below shows how they support DOT Goals.

FAA Strategic Goals	DOT Strategic Goals
1) *Next Level of Safety*	*Safety*
2) *Workplace of Choice*	*Organizational Excellence*
3) *Delivering Aviation Access through Innovation*	*State of Good Repair* *Economic Competitiveness* *Livable Communities*
4) *Sustaining our Future*	*Environmental Sustainability*
5) *Improved Global Performance through Collaboration*	*Economic Competiveness*

Each FAA Goal has Outcomes, Strategies and Performance Metrics identified in Destination 2025. Each program in the CIP is aligned with one Goal, Outcome and Performance Metric. Each Goal has several Outcomes that support the Goal and each Outcome may have one or more Performance Metric identified that will be used to measure accomplishment of the outcome and goal.

Since Destination 2025 is a long term strategic view, metrics are not focused on near term operational needs such as cost savings. Therefore, some metrics have been incorporated from other sources to account for the contribution of programs that support these near term operational needs. These metrics and their source are identified in the tables.

Programs are shown under their respective performance metric and each has the following information, FY 2014 Budget Line Item (BLI), CIP number, and CIP Program/ Project Name. BLI numbers with an X (i.e., 1A09X) are used to designate programs/projects that are not in the FY 2014 President's Budget. These Programs/projects are new starts or future programs not currently in the President's budget but with planned funding within the FY 15-18 timeframe and will report future year planned activities based on planned funding.

For clarification, the following definitions generally describe the elements of the FAA Strategic Plan and can be used to relate the outcomes and performance metrics to the CIP programs.

STRATEGIC GOAL

A general statement of the broad agency purpose in carrying out its mission, such as: "By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide."

OUTCOME

A statement of the desired improvement which will contribute to the overall goal, such as: "No accident-related fatalities on commercial service aircraft in the U.S."

PERFORMANCE METRIC

A quantifiable metric of the improvement in a goal area that sets a target for specific improvements in outcomes that affect FAA customers, such as: “Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over a 9-year period (2010-2018). No more than 6.2 in 2018.”

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1. Strategic Goal: Next Level of Safety

By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide.

- **Outcome 1:** No accident-related fatalities occur on commercial service aircraft in the U.S.

  – **Performance Metric 1:** Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in 2018.

FY 2014 BLI	CIP #	CIP Name
1A01G	A28.01-01	Traffic Alert & Collision Avoidance System (TCAS)
1A07G	G07M.02-01	NextGen – Safety, Security, Environment – System Development – Systems Safety Management Transformation
2A14	W05.03-01	Wind Shear Detection Services – Work Package 1
2B19B	C23.01-01	Voice Recorder Replacement Program – New Requirements Safety & Audit
2D05	N04.03-00	Visual Navaids – ALSIP Continuation
2D07	N04.01-00	Visual Navaids – Visual Navaids for New Qualifiers
2D12	N17.01-01	Runway Safety Area – Navigation Mitigation
2E03B	M12.01-03	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technology Refresh
2E03X	M12.01-04	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Additional Technology Refresh Projects
3A02	A17.01-02	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 2
3A02X	A17.01-03	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 3
3A07	A25.02-01	System Approach for Safety Oversight (SASO) – Phase 2a
3A07X	A25.02-02	System Approach for Safety Oversight (SASO) – Phase 2b
3A08	A26.01-01	Aviation Safety Knowledge Management Environment (ASKME) – Segment 2
3A10	M53.01-01	Aerospace Medical Equipment Needs (AMEN) – Technology Refresh Phase 1
3A10X	M53.01-02	Aerospace Medical Equipment Needs (AMEN) – Technology Refresh Phase 2
3A11	G07A.02-01	NextGen – Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS)
3A14	A35.01-01	Aerospace Medicine Safety Information System (AMSIS) – Segment 1
4A09	G05A.02-05	CATM – Flight & State Data Management – AIM Segment 2
4A09X	G05A.02-06	CATM – Flight & State Data Management – AIM Segment 3

- **Outcome 2:** Aviation risk is reduced through all phases of flight (gate-to-gate).

  – **Performance Metric 1:** Maintain the rate of serious runway incursions at or below 0.395 events per million operations.

FY 2014 BLI	CIP #	CIP Name
1A01A	S09.02-00	Runway Incursion Reduction Program (RIRP) – ATDP
2B01A	S09.01-01	ASDE-X –Technology Refresh & Disposition
2B01B	S01.05-01	Airport Surface Movement Detection – ASDE-3 Service Sustainment
2B12	S11.01-02	Runway Status Lights (RWSL) – Implementation

  – **Performance Metric 2:** Ensure no cyber security event significantly degrades or disables a mission critical FAA system.

FY 2014 BLI	CIP #	CIP Name
3A06A	M31.00-00	Information Systems Security
3A06B	M31.04-01	Federal Identity Credential and Access Management (FICAM)
3A09	F30.01-01	Data Center Consolidation Initiative

  – **Performance Metric 3:** Reduce risks in flight by limiting the rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) losses of standard separation within the National Airspace System.

FY 2014 BLI	CIP #	CIP Name
1A01I	M08.32-03	Operational Analysis and Reporting System (OARS)

  – **Performance Metric 4:** Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent. (FAA Business Planning Metric)

FY 2014 BLI	CIP #	CIP Name
1A16X	G07A.01-01	NextGen – Security Integrated Tool Set (SITS)
1A16X	G07A.01-02	NextGen – Security Integrated Tool Set (SITS) – Work Package 1
3A04	C18.00-00	Command & Control Communications (C3)

- **Outcome 3:** There is a reduction in the general aviation fatal accident rate.

  – **Performance Metric 1:** Reduce the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.

FY 2014 BLI	CIP #	CIP Name
2C0C	A34.01-01	Future Flight Service Program (FFSP)
2C04	M08.31-01	Weather Camera Program – Segment 1
2C04X	M08.31-02	Weather Camera Program – Future Segments
2D03A	N12.01-00	Wide Area Augmentation System (WAAS)
2D03B	N12.01-06	Wide Area Augmentation System (WAAS) – Surveys

- **Outcome 4:** There are no fatal accidents on certificated airports.

  – **Performance Metric 1:** Implement 40 percent of mitigating strategies for the top 5 airport risk areas.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 5:** There are no fatalities resulting from commercial space launches.

  – **Performance Metric 1:** No fatalities, serious injuries, or significant property damage to the uninvolved public during licensed or permitted space launch and reentry activities.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

2. Strategic Goal: Workplace of Choice

We will create a workplace of choice marked by integrity, fairness, diversity, accountability, safety and innovation. Our workforce will have the skills, abilities, and support systems required to achieve and sustain NextGen.

- **Outcome 1:** FAA has the right people with the right skills in the right position at the right time to achieve our goals.

  - **Performance Metric 1:** Achieve a 90% success rate in the areas of financial management and human resources management: Receive annual Unqualified Audits with no material weaknesses; Maintain the competitive status of all FAA employees within the federal personnel system; Improve the "effective leadership" index score on the OPM Employee Viewpoint survey by 8 percent; Improve the "talent management" index score on the OPM Employee viewpoint survey by 8 percent.

FY 2014 BLI	CIP #	CIP Name
2D11	N12.03-01	GPS Civil Requirements

- **Outcome 2:** FAA is widely recognized as a workplace of choice.

  - **Performance Metric 1:** The FAA is rated in the top 25 percent of places to work in the federal government by employees.

FY 2014 BLI	CIP #	CIP Name
2B09	F13.03-00	NAS Facilities OSHA & Environmental Standards Compliance
2E08	F20.01-01	FAA Employee Housing and Life Safety Shelter System Services

- **Outcome 3:** FAA workforce reflects the diversity of the nation.

  - **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** FAA provides the safest and most secure facilities in which our employees and equipment operate.

  - **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

3. Strategic Goal: Delivering Aviation Access though Innovation

Enhance the flying experience of the traveling public and other users by improved access to and increased capacity of the nation's aviation system. Ensure airport and airspace capacity are more efficient, predictable, cost effective and matched to public needs.

- **Outcome 1:** System capacity and user demands are matched to ensure reliable, predictable and cost-effective air navigation and airport services.

  – **Performance Metric 1:** Optimize airspace and Performance Based navigation (PBN) procedures to improve efficiency an average of 10 percent across core airports by 2018.

FY 2014 BLI	CIP #	CIP Name
1A15A	G05N.01-01	NextGen – Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)
2D01B	N06.01-01	VORTAC – Minimum Operating Network Implementation Program

  – **Performance Metric 2:** Achieve a 5 percent reduction in average taxi-time at Core airports, identified by the Future Airport Capacity Task 3 (FACT 3) for surface traffic management.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

  – **Performance Metric 3:** Improve flight predictability by reducing variances in flying time between core airports based on a 2012 baseline.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

  – **Performance Metric 4:** Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016. (DOT Strategic Metric)

FY 2014 BLI	CIP #	CIP Name
1A01B	M08.28-00	System Capacity, Planning, and Improvements – ATDP
1A01C	M08.29-00	Operations Concept Validation and Infrastructure Evolution – ATDP
1A01D	M08.28-04	Major Airspace Redesign – ATDP
1A01E	M46.01-01	Strategy and Evaluation – ATDP
1A05	G01C.01-05	NextGen – Data Communications – Segment 1 Phase 1
1A05	G01C.01-06	NextGen – Data Communications – Segment 1 Phase 2
1A05X	G01C.01-08	NextGen – Data Communications – ATN Gateway
1A06	G08M.01-01	NextGen – Demonstrations and Infrastructure Development
1A07A	G01M.02-01	NextGen – System Development – ATC/Tech Ops Human Factors
1A07B	G01M.02-02	NextGen – System Development – New ATM Requirements
1A07C	G01M.02-03	NextGen – System Development – Ops Concept Validation Modeling
1A07E	G06M.02-02	NextGen – System Development – Wake Turbulence Re-Categorization
1A07H	G03M.04-01	NextGen – Networked Facilities – System Development – Staffed NextGen Towers
1A08A	G01A.01-01	NextGen – TBO – Separation Management – Modern Procedures

FY 2014 BLI	CIP #	CIP Name
1A08B	G01A.02-02	NextGen – TBO – Trajectory Management – Oceanic Tactical Trajectory Management
1A08X	G01A.02-03	NextGen – TBO – Trajectory Management – Conflict Advisories
1A08X	G01S.02-01	NextGen – TBO – ADS-B In Applications – Pre-Implementation Activities
1A09A	G04W.03-01	NextGen – RWI – Weather Forecast Improvements
1A09B	G04W.02-01	NextGen – RWI – Weather Observation Improvements
1A10A	G02A.01-01	NextGen – HD – Trajectory Management – Surface Tactical Flow
1A10B	G02A.01-06	NextGen – HD – Trajectory Management – Time Based Flow Management (TBFM) Work Package 3
1A10X	G02A.01-02	NextGen – HD – Trajectory Management – Surface Conformance Monitor
1A10X	G02A.01-08	NextGen – HD – Trajectory Management – Time Based Flow Management (TBFM) Work Package 4
1A11A	G05A.01-01	NextGen – CATM – Flow Control Management – Strategic Flow Management Integration
1A11B	G05A.01-02	NextGen – CATM – Flow Control Management – Strategic Flow Management Enhancement
1A11C	G05A.02-01	NextGen – CATM – Flight & State Data Management – Common Status & Structure Data
1A11D	G05A.02-02	NextGen – CATM – Flight & State Data Management – Advanced Methods
1A11E	G05A.02-03	NextGen – CATM – Flight & State Data Management – Flight Object
1A11F	G05A.02-04	NextGen – CATM – Flight & State Data Management – Concept Dev for Integrated NAS Design and Procedure Planning
1A11G	G05M.02-01	NextGen – CATM – Collaborative Information Management (CIM)
1A11H	G05M.03-01	NextGen – CATM – System Development – Information Management
1A11X	G05A.04-01	NextGen – CATM – Capacity Management – Dynamic Airspace
1A12A	G06A.01-01	NextGen – FLEX – Separation Management – Wake Turbulence Mitigation for Departures (WTMD)
1A12B	G06A.01-02	NextGen – FLEX – Separation Management – Wake Turbulence Mitigation for Arrivals (WTMA)
1A12C	G06N.01-01	NextGen – FLEX – Separation Management – Approaches, Ground Based Augmentation System
1A12D	G06N.01-02	NextGen – FLEX – Separation Management – Closely Spaced Parallel Runway Operations
1A12E	G06N.01-03	NextGen – FLEX – Separation Management – Approaches, NextGen Navigation Initiatives
1A12X	G06A.02-01	NextGen – FLEX – Surface/Tower/Terminal Systems Engineering
1A14	G03F.01-01	NextGen – Networked Facilities – Future Facilities – Segment 1, Project 1
2A01	A01.10-01	En Route Automation Modernization (ERAM)
2A02	G01A.01-04	NextGen – TBO – Separation Management – En Route Automation Modernization (ERAM) D-Position Upgrade and System Enhancements
2A12C	G05C.01-06	NextGen – CATM – System Wide Info Management (SWIM) – Common Support Services Weather (CSS-Wx)
2A17	G08M.03-01	NextGen – Colorado Wide Area Multilateration (WAM)
2A18	G02A.01-03	NextGen – HD – Trajectory Management – Time Based Flow Management (TBFM) Work Package 2
2A18X	G02A.01-07	NextGen – HD – Trajectory Management – Time Based Flow Management (TBFM) Technology Refresh
2B04A	A04.07-01	Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 1

FY 2014 BLI	CIP #	CIP Name
2B04B	A04.07-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 2
2B13	G03C.01-01	NextGen – Networked Facilities – NAS Voice System – Segment 1
2B18	G06A.03-01	NextGen – FLEX – Terminal Flight Data Manager (TFDM)
2D02	N03.01-00	Instrument Landing Systems (ILS)
2D04B	N08.03-01	Enhanced Low Visibility Operations (ELVO)
2D06	N09.00-00	Sustain Distance Measuring Equipment (DME)

– **Performance Metric 5:** Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016. (DOT Strategic Metric)

FY 2014 BLI	CIP #	CIP Name
2A06	A05.01-12	TFM-Infrastructure– Technology Refresh
2A06	A05.01-13	TFM Infrastructure – Field/Remote Site Technology Refresh
2A10	A10.03-00	Advanced Technologies and Oceanic Procedures (ATOP)
2A13A	G02S.01-01	NextGen – Automatic Dependent Surveillance – Broadcast (ADS-B) – NAS Wide Implementation – Segments 1 and 2
2A13B	G02S.03-02	NextGen – ADS-B NAS Wide Implementation – Additional Service Volumes Gulf Expansion
2A13C	G02S.03-03	NextGen – ADS-B NAS Wide Implementation – Additional Applications ADS-B IN, In Trail Procedures
2A13X	G02S.03-01	NextGen – ADS-B NAS Wide Implementation – Baseline Services and Applications
2A13X	G02S.01-02	NextGen – ADS-B NAS Wide Implementation – Future Segments
2A16	G05A.05-01	NextGen – Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2
2A16	G05A.05-02	NextGen – Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3
2A16X	G05A.05-03	NextGen – Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4
2D10	N04.02-00	Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI)
4A08	M03.02-00	CIP Systems Engineering & Technical Assistance – MITRE

- **Outcome 2:** System capacity, performance and predictability are maintained during adverse weather.

– **Performance Metric 1:** Improve throughput at core airports during adverse weather by 14 percent by 2018.

FY 2014 BLI	CIP #	CIP Name
2A20	G04W.03-02	NextGen – Weather Forecast Improvements – NextGen Weather Processor (NWP)
2A20X	G04W.03-03	NextGen – Weather Forecast Improvements – NextGen Weather Processor (NWP) Future Segments

- **Outcome 3:** Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.

  – **Performance Metric 1:** Increase throughput at core airports by 12 percent to reduce delays by 27 percent using a 2009 operations baseline.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

  – **Performance Metric 2:** Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016. (DOT Strategic Metric)

FY 2014 BLI	CIP #	CIP Name
1A12F	G06N.01-06	NextGen – Separation Management – Alternative Positioning Navigation and Timing (APNT)
2A03	A01.12-02	En Route Communication Gateway (ECG) – Technology Refresh
2A04	W02.02-02	NEXRAD – Service Life Extension Program (SLEP) Phase 1
2A05	F06.01-00	ARTCC Plant Modernization/Expansion – ARTCC Modernization
2A07	C04.01-01	Radio Control Equipment (RCE) – Sustainment
2A07	C06.01-00	Communications Facilities Enhancement – Expansion
2A07	C06.03-01	Communications Facilities Enhancement – RFI Elimination – Technology Refresh
2A08	S04.02-03	LRR Improvements – Infrastructure Upgrades/Sustain
2A09	C01.02-04	Voice Switching and Control System (VSCS) – Technology Refresh – Phase 3
2A11	C21.02-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 2 – Phase 1 of 2
2A15	W04.03-01	Weather and Radar Processor (WARP) Sustain
2A19	S02.03-03	ATC Beacon Interrogator (ATCBI) Model 6 – Technology Refresh
2B02	W03.03-01 W03.03-02	Terminal Doppler Weather Radar – Service Life Extension Program (SLEP) – Phase 1 and Phase 2
2B03A	A04.01-01	Standard Terminal Automation Replacement System – Technology Refresh (TAMR Phase 1)
2B03B	A04.01-04	STARS – FTI Upgrade
2B05	A01.11-01	Flight Data Input/Output (FDIO) Replacement
2B06	F01.02-00	ATCT/TRACON Replacement
2B07	F01.01-00	ATCT/TRACON Modernization
2B08	C05.02-00	Voice Switches – Terminal Voice Switch Replacement (TVSR) II
2B10	S03.01-09	Terminal Radar (ASR) Program – ASR-9 SLEP, Phase 2
2B11C	S03.02-06	Terminal Radar (ASR) Program – ASR-11 – Mobile Airport Surveillance Radar (MASR)
2B14	A03.05-01	Integrated Display System (IDS) – Replacement
2B14X	A03.05-02	Integrated Display Systems (IDS) – Replacement – Technology Refresh
2B15A	M07.05-01	Automated Maintenance Management System (AMMS)
2B15X	M07.04-02	Remote Monitoring and Logging System (RMLS) – Technology Refresh
2B16A	S03.01-08	Terminal Radar (ASR) Program – MODE S SLEP – Phase 2
2B16B	S03.01-11	Terminal Radar (ASR) Program – ASR-9 and Mode S SLEP – Phase 3 Planning
2B17	S13.01-01	Surveillance Interface Modernization (SIM)

FY 2014 BLI	CIP #	CIP Name
2B19A	C23.01-00	Next Generation Recorders – Voice Recorder Replacement Program (VRRP)
2B20	S08.01-02	Precision Runway Monitor (PRM) – Replacement (PRMR)
2B21	W07.01-02	ITWS – Technology Refresh & Disposition
2C01	W01.03-01	Aviation Surface Weather Observation Network (ASWON) – Technology Refresh
2C03	F05.04-02	Alaska Flight Service Facility Modernization (AFSFM)
2D01A	N06.00-00	Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC)
2D04A	N08.02-00	Runway Visual Range (RVR) – Replacement/Establishment
2D09	N04.04-00	Navaids – Sustain, Replace, Relocate
2E01	F13.01-00	Fuel Storage Tanks
2E02	F12.00-00	FAA Buildings & Equipment Sustain Support – Unstaffed Infrastructure Sustainment
2E03A	M12.00-00	Aircraft Related Equipment (ARE) Program
2E04	F10.00-00	Airport Cable Loop Systems Sustained Support
2E05	C17.02-01	Alaskan Satellite Telecommunication Infrastructure (ASTI)
2E07	F11.01-01	Power Systems Sustained Support (PS3)
3A03	M21.04-01	Logistics Center Support System (LCSS) – Segment 2
3A03X	M21.04-02	Logistics Center Support System (LCSS) – Technology Refresh
3A05	F24.01-02	Facility and Infrastructure Security Program – Two
3A12	M17.01-01	National Test Equipment Program
3A13	F31.01-01	Mobile Assets Management Program

– **Performance Metric 3:** Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings. (FAA Business Planning Metric)

FY 2014 BLI	CIP #	CIP Name
1A01H	M08.46-01	Unified Contracting System
1A01J	S14.01-01	Next Generation Surveillance and Weather Radar Capability (NSWRC)
1A01X	F13.04-02	Energy Management and Compliance – ATDP
1A02 / 1A03	F14.00-00	System Support Laboratory Sustained Support
1A04	F16.00-00	William J. Hughes Technical Center Building and Plan Support
1A13A	G03M.02-01	NextGen – System Networked Facilities – Networked Facilities – Integration, Development and Operations Analysis Capability
1A13B	G03M.03-01	NextGen – System Networked Facilities – Networked Facilities – Test Bed Demonstration
1A15B	G05N.01-02	NextGen – Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – NAVLean
2A12A	G05C.01-01	NextGen – System-Wide Information Management (SWIM) – Segment 1
2A12B	G05C.01-04	NextGen – System Wide Information Management (SWIM) – Segment 2A
2A12X	G05C.01-07	NextGen – System Wide Info Management (SWIM) – Common Support Services Aeronautical Information Management (AIM)
2A12X	G05C.01-08	NextGen – System-Wide Information Management (SWIM) – Segment 2B
2B11A	S03.02-04	Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 1

FY 2014 BLI	CIP #	CIP Name
2B11B	S03.02-05	Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 2
2D08	A14.02-02	Instrument Flight Procedures Automation (IFPA) – Technology Refresh, Segment 1
2D08X	A14.02-03	Instrument Flight Procedures Automation (IFPA) – Technology Refresh, Segment 2
2E06	F26.01-01	Decommissioning
3A01	F13.02-00	Environmental Cleanup / HAZMAT
3B01	F18.00-00	Aeronautical Center Infrastructure Modernization
3B02	M10.00-00	Distance Learning
4A01A	M03.03-01	CIP Systems Engineering & Development Support – SE2020
4A01B	M08.01-00	Provide ANF/ATC Support (Quick Response)
4A02	M08.06-00	Program Support Leases
4A03	M05.00-00	NAS Regional/Center Logistics Support Services
4A04	F19.00-00	Aeronautical Center Lease
4A05A	M22.00-00	NAS Integration Support Contract (NISC)
4A05B	M03.01-02	Configuration Management Automation (CMA)
4A06	M02.00-00	Technical Support Services Contract (TSSC)

- **Outcome 4:** NextGen capabilities are fully implemented and utilized based on U.S. aviation community system needs.

  - **Performance Metric 1:** Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.

FY 2014 BLI	CIP #	CIP Name
1A01F	M47.01-01	Dynamic Capital Planning
4A07	M08.14-00	Resource Tracking Program (RTP)

- **Outcome 5:** Safety, funding, airport infrastructure and environmental issues are advanced and leveraged by full utilization of NextGen capabilities.

  - **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 6:** The general aviation airport system supports the full range of functions for remote populations and emergency response capabilities.

  - **Performance Metric 1:** Ensure Localizer Performance with Vertical (LPV) or Localizer Performance (LP) procedures are available at 5,218 runways in the NAS by 2018.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

4. Strategic Goal: Sustaining Our Future

To develop and operate an aviation system that reduces aviation's environmental and energy impacts to a level that does not constrain growth and is a model for sustainability.

- **Outcome 1:** U.S. aviation sector is a model for sustainable growth.
  - **Performance Metric 1:** One billion gallons of renewable jet fuel is used by aviation by 2018.
  - **Performance Metric 2:** A replacement fuel for leaded aviation gasoline is available by 2018 that is usable by most general aviation aircraft.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support these Metrics.

  - **Performance Metric 3:** Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.

FY 2014 BLI	CIP #	CIP Name
1A07D	G06M.02-01	NextGen – System Development – Environment & Energy - Environmental Management System & Noise/Emission Reduction
1A07F	G07M.02-02	NextGen –Safety, Security, Environment – System Development – Operational Assessments

- **Outcome 2:** Community noise concerns are not a significant constraint on growth.
  - **Performance Metric 1:** The U.S. population exposed to significant aircraft noise around airports has been reduced to less than 300,000 persons.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 3:** Aviation emissions do not contribute to significant adverse health impacts.
  - **Performance Metric 1:** Aviation emissions contribute 50 percent less to significant health impacts and are on a trajectory for carbon neutral growth using a 2005 baseline.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** Aviation's carbon footprint does not become a constraint to growth.
  - **Performance Metric 1**: None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 5:** Aviation operations have no significant adverse effect on water and air quality.

  – **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 6:** Airports will be environmentally and economically sustainable.

  – **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

5. Strategic Goal: Improve Global Performance Through Collaboration

Achieve enhanced safety, efficiency, and sustainability of aviation around the world. Provide leadership in collaborative standard setting and creation of a seamless global aviation system.

- **Outcome 1:** Reduce aviation accidents and fatalities worldwide.
  - **Performance Metric 1:** World-wide fatal aviation accident rate declines 10 percent compared to 2010.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 2:** Achieve seamless operations integrating advanced technologies and capabilities through harmonized air navigation approaches.
  - **Performance Metric 1:** None.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 3:** Reduce aviation's environmental footprint internationally.
  - **Performance Metric 1:** States representing 85 percent of international activity are taking actions to contribute to ICAO's 2 percent global annual fuel efficiency improvement goal by 2018.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** Provide effective global air navigation capacity.
  - **Performance Metric 1:** 40 percent of all commercial aircraft from the top 25 aviation states are using fully interoperable NextGen technologies and capabilities by 2018.

FY 2014 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix B

Fiscal Years 2014 – 2018

APPENDIX B

DETAILED PROGRAM PLAN DATA

LINKING FAA CIP PROGRAMS TO GOALS

The Capital Investment Plan (CIP) programs support the goals, outcomes, and performance metrics in the Federal Aviation Administration's (FAA) and the Department of Transportation's (DOT) Strategic Plans. Programs are linked to a single goal, outcome and performance metric and the data provided in Appendix B describes how these programs contribute to the performance metric. For each program, performance output goals are identified for each of the 5 years of this CIP.

FORMAT

Appendix B is organized by Budget Line Items (BLI) consistent with FAA's fiscal year (FY) 2014 President's submission to Congress. Several CIP programs may be included in one BLI. In those cases when all of the CIP programs pertain to one specific purpose, they are grouped. However, when the CIP programs have different purposes, they are described with separate CIP entries.

BLI titles with an asterisk represent Next Generation Air Transportation System (NextGen) BLIs.

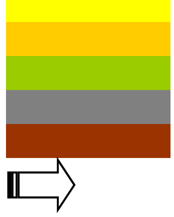
Programs in Appendix B contain a Program Description, Strategic Goal, Outcome and Performance Metric linkage and Relationship to Performance Metric description. FY 2014 through 2018 Performance Output Goals are reported for the years the program is funded. Where 'None' is reflected in the Performance Output Goals section, it denotes that no funding was allocated for that fiscal year. Performance Output Goals are written as a measurable / quantitative description of a planned accomplishment of specific deliverables or specific work product that will be provided during the year specified.

BLI numbers with an X (i.e., 1A09X) or program titles with X before the name (X, Data Communications – ATN Gateway, G01C.01-08) are used to designate programs that are not in the FY 2014 President's Budget but are planned for future years. Programs representing new starts or future programs not currently in the President's budget will report future year Performance Output Goals based on projected funding.

To show the total scope and schedule of baselined programs the write up may have milestones identified even though there may be no funding in that year. For those programs, the Performance Output Goals section will indicate milestones or planned accomplishments that are funded with prior year funding.

A System Implementation Schedule is provided for programs deploying systems or upgrades into the NAS. If appropriate, other information will be provided to indicate how long the system will be in operation or when a system is planned to be decommissioned. The schedule legend is as follows:

Upgrades
Development
Implementation
Operational
Decommissioning
Continued



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ACTIVITY 1: ENGINEERING, DEVELOPMENT, TEST, AND EVALUATION

1A01, ADVANCED TECHNOLOGY DEVELOPMENT AND PROTOTYPING (ATDP)

FY 2014 Request $33.5M

- A, Runway Incursion Reduction Program (RIRP) – ATDP, S09.02-00
- B, System Capacity, Planning and Improvements – ATDP, M08.28-00
- C, Operations Concept Validation and Infrastructure Evolution – ATDP, M08.29-00
- D, Major Airspace Redesign – ATDP, M08.28-04
- E, Strategy and Evaluation – ATDP, M46.01-01
- F, Dynamic Capital Planning, M47.01-01
- G, Traffic Alert and Collision Avoidance System (TCAS), A28.01-01
- H, Unified Contracting System (UCS), M08.46-01
- I, Operational Analysis and Reporting System (OARS), M08.32-03
- J, Next Generation Surveillance and Weather Radar Capability (NSWRC), S14.01-01
- X, Energy Management and Compliance – ATDP, F13.04-02

A, Runway Incursion Reduction Program (RIRP) – ATDP, S09.02-00

Program Description

The Runway Incursion Reduction Program (RIRP) will continue research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board recommendations and initiatives identified in Destination 2025, research emphasis will remain on technologies that provide for direct safety indications and alerts to pilots at large airports as well as those that can be applied cost effectively at small to medium airports. The program will test alternative airport surface detection technology and the application of these technologies for pilot, controller, and vehicle operator situational awareness tools. Current initiatives include Runway Status Lights (RWSL) technology enhancements such as Runway Intersection Lights (RIL) logic, Light Emitting Diode (LED) technology, Low Cost Ground Surveillance (LCGS) pilot sites, Runway Safety Assessment (RSA) studies, Final Approach Runway Occupancy Signal (FAROS) and Enhanced Final Approach Runway Occupancy Signal (eFAROS) for high density airports. When appropriate, investment analyses will be performed to support acquisition and implementation of selected solutions.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Maintain the rate of serious runway incursions at or below 0.395 events per million operations.*

Relationship to Performance Metric

The program is developing and testing technologies that aim to provide direct and preventive alerting to pilots and vehicle operators to reduce both the frequency and risk of runway incursions. Much of the program's research emphasis is based on studies that show that direct pilot and vehicle warning mechanisms are the best defense against the most serious runway conflicts. For example, initial operational evaluations of Runway Status Lights (RWSL) technology have yielded a reduction in runway incursions of up to 70% at the test runways. Other RIRP technology development initiatives will explore other technologies that further support the performance metric.

Program Plans FY 2014 – Performance Output Goals

- Develop annual technical and operational evaluation report of four LCGS pilot systems.
- Develop annual technical and operational evaluation report of existing RWSL prototype systems.
- Develop annual technical and operational evaluation report for RILs at Boston Logan International Airport (BOS).
- Complete the installation and produce operational evaluation report of a runway safety system for direct to pilot indications, using a low cost Surface Movement Radar as the surveillance sensor.
- Complete installation and implementation of eFAROS units at second prototype location and commence operational evaluation.
- Develop readiness report based on coordination of preliminary requirements document and cost benefit analysis documents required for eFAROS Investment Analysis Readiness Decision (IARD).
- Develop annual technical and operational evaluation report of eFAROS units at all prototype locations.
- Complete report on cockpit simulations at MITRE Center for Advanced Aviation System Development (CAASD) testing Human Factors (HF), safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete report on testing of safety logic enhancements to RI detection and prevention products.
- Publish initial report on field evaluation of alternative direct to pilot testing system at the FAA Tech Center.
- Complete initial requirements document for eFAROS.
- Publish the initial project plan and Resource Management Plan (RMP) for the utilization of fiber optics as a sensor to drive the activation of direct to pilot alerting safety logic.

Program Plans FY 2015 – Performance Output Goals

- Develop annual technical and operational evaluation report of existing RIRP prototype systems.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD human-in-the-loop (HITL) testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete report documenting candidate site selection for a system to test the utilization of fiber optics as a sensor to drive the activation of direct to pilot alerting safety logic.
- Publish annual report on field evaluation of alternative direct to pilot testing system at the FAA Tech Center.
- Publish the initial project plan and RMP for Surface Conformance Monitoring.
- Complete eFAROS Business Case Analysis Requirements (BCAR) Documentation.

Program Plans FY 2016 – Performance Output Goals

- Complete annual report of user and technical evaluation of RIRP test beds.
- Complete test plan for demonstration and testing of emerging direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete annual report documenting results of Surface Conformance Monitoring simulations/HITL's.
- Complete preliminary report on Digital-Lighting Application (surveillance integration).
- Complete report on integration of a system to test the utilization of fiber optics as a sensor to drive the activation of direct to pilot alerting safety logic.

Program Plans FY 2017 – Performance Output Goals

- Complete annual report of user and technical evaluation of RIRP test beds.
- Complete test report on safety logic enhancements to RI detection and prevention products or procedures.
- Complete annual report for development, demonstration and testing of a direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete annual report documenting results of Surface Conformance Monitoring simulations/HITL's.
- Complete report on results of initial shadow operations testing for the utilization of fiber optics as a sensor to drive the activation of direct to pilot alerting safety logic.
- Develop Digital-Lighting Application modeling and testing plan.

- Complete initial Digital-Traffic Application ConOps development.

Program Plans FY 2018 – Performance Output Goals
- Complete annual report of user and technical evaluation of RIRP test beds.
- Complete test report on safety logic enhancements to RI detection and prevention products or procedures.
- Complete annual report for development, demonstration and testing of a direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete annual report documenting results of using fiber optics as a sensor to drive the activation of direct to pilot alerting safety logic.
- Complete annual report documenting results of Surface Conformance Monitoring simulations/HITL's.
- Complete initial prototype of Digital-Lighting Application.
- Publish the initial project plan and RMP for Digital-Traffic Application.

B, System Capacity, Planning and Improvements – ATDP, M08.28-00

Program Description

The System Capacity, Planning, and Improvements program provides data and analyses on NAS operations to FAA executives and managers to help them identify deficiencies and develop proposals to improve NAS performance.

This work includes:
- Airport modeling and analysis using actual data collected from ATC systems in the field to determine the value of potential improvements in airspace or airfield modifications,
- Enhancements of the Performance Data Analysis and Reporting System (PDARS) which is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the Air Traffic Control (ATC) system and their environmental impacts. The PDARS also provides operational data to baseline the measurement and analysis of Next Generation Air Transportation System (NextGen) capability improvements such as the efforts to support Optimization of Airspace and Procedures in the Metroplex (OAPM),
- Development of new Agency level metrics to enhance management awareness of, and response to, system performance,
- Sponsoring operations research to evaluate concepts to improve future NAS performance in support of the Destination 2025 Science, Technology, Engineering and Math (STEM) strategic initiative, and,
- The benchmarking of ATO performance with other Air Navigation Service Providers (ANSP) to support joint projects done as part of ICAO, Civil Air Navigation Services Organization (CANSO) or Aerospace Transportation Advisory Group (ATAG) work plans. These efforts are performed to respond to inquiries on global flight efficiency performance targets for ATM or more general inquiries on the overall flight inefficiency that may be attributed to ATM.

This program also sponsors NAS performance and airport capacity studies that provide critical information for studies such as the FACT3. These studies were completed for submission in the 3rd quarter of FY 2012. The program provides a means for experts from the FAA, academia, and industry collaborate to analyze and develop recommendations for improving capacity and system efficiency, and reducing delays at specific airports. It has the added capability of using its performance measurement systems and operations research to quantify the efficiency of the NAS and form the basis of proposals for overall system improvements.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This program will facilitate the modeling, measurement and analysis of new runways, airfield improvements, air traffic procedures, and other technological implementations to improve airport capacity and system efficiency. Study Teams evaluate alternatives for increasing capacity at specific airports that are experiencing or are projected to experience significant flight delays. Capacity studies provide recommendations and solution sets for improving airspace and airport capacity. Capacity studies to improve operations at Newark Liberty International Airport (EWR), John F. Kennedy International Airport (JFK), San Francisco International Airport (SFO), and Seattle-Tacoma International Airport (SEA) were completed in FY2011/2012.

Program Plans FY 2014 – Performance Output Goals
- Complete PDARS connectivity with ASDE-X at up to 30 Core Airports as ASDE-X is available.
- Initiate PDARS connectivity to ERAM (10 sites).
- Develop a plan to complete connectivity to ADS-B.
- Complete Implementation Plan to Integrate Ocean 21 data into a full automated gate-to-gate analysis capability.
- Complete plan to expand PDARS analysis capabilities to evaluate NextGen technology demonstrations as they come on line.
- Incorporate noise profiling technology via the Aviation Environmental Design Tool (AEDT) module.
- Complete operations research report to support the Destination 2025 STEM strategic initiative.
- Prepare Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Complete PDARS analysis to evaluate and improve the flight predictability metric.
- Complete PDARS analysis to evaluate and improve the weather metric.
- Complete PDARS capability improvement evaluation.

Program Plans FY 2015 – Performance Output Goals
- Develop concept of operations to convert PDARS into a net centric system.
- Complete connectivity to ERAM to include remaining sites.
- Provide PDARS baseline data for before/after analysis of NextGen programs.
- Initiate integration of Ocean 21 data into a full automated gate-to-gate analysis capability.
- Complete noise profiling technology via the AEDT module.
- Complete operations research report to support the Destination 2025 STEM strategic initiative.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Complete PDARS modernization plan.

Program Plans FY 2016 – Performance Output Goals
- Complete integration of Ocean 21 data into a full automated gate-to-gate analysis capability.
- Complete design and initiate implementation of PDARS into a net centric system.
- Improve analysis of NexGen programs other NextGen technologies.
- Provide airport capacity modeling and annual service volume analysis report to support the Future Airport Capacity Task (FACT) report.
- Complete operations research report to support the Destination 2025 STEM strategic initiative.
- Prepare Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Prepare white paper on methodologies to standardize international measurement of system capacity, throughput, predictability and efficiency.
- Initiate PDARS modernization.

Program Plans FY 2017 – Performance Output Goals

- Complete implementation of PDARS into a net centric system.
- Complete FACT report with airport capacity modeling and annual service volume analysis.
- Initiate connectivity of PDARS to SWIM
- Complete operations research report to support the Destination 2025 STEM strategic initiative.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Conduct a workshop to examine development and coordination of international standardized measurement of system capacity, through put, predictability and efficiency.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.

Program Plans FY 2018 – Performance Output Goals

- Complete connectivity of PDARS to SWIM
- Complete operations research report to support the Destination 2025 STEM strategic initiative.
- Conduct a workshop to examine development and coordination of international standardized measurement of system capacity, through put, predictability and efficiency.
- Prepare Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Complete PDARS modernization.

C, Operations Concept Validation and Infrastructure Evolution – ATDP, M08.29-00

Program Description

Developing operational concepts is the first step in developing an Enterprise Architecture. This program develops and validates NAS level operational concepts that are key to the FAA's modernization programs and the NextGen. This program conducts the overall analysis and planning for NAS evolution by determining the required annual updates to the following NAS Enterprise Architecture products: Operational Improvements, Operational Sustainment and Operational Requirements. It executes research, engineering analysis, and evaluation in support of mission analysis and investment analysis. This program conducts shortfall analyses as part of service analysis and ensures the linkage of proposed solutions back to validated operational needs to support budget planning and investment decisions. This program develops and maintains detailed second level concepts that support validation and requirements development. This work ensures that the NAS level operational concept and sustainment activities are integrated and consistent with the overall NAS Enterprise Architecture. In addition, this project supports the development and sustainment of analytical and computer models used to assess and validate operational changes to the NAS.

This project contributes to the FAA's support for the RTCA, a non-profit association that develops standards based on manufacturers, government, and aviation operator inputs. RTCA also recommends operational improvements to increase the efficiency of air transportation.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Concept validation supports development, analysis, and simulation of new concepts to assess requirements and to evaluate the impact of the concept on system capacity, efficiency, safety and human performance. Evaluation criteria include the following:

- Impact/Improvement to Air Traffic Service Providers, airspace users, and automation that could increase capacity,

- Impact/Improvement on airspace structure which may increase productivity and hence capacity,
- Impact/Improvement on communication, navigation, and surveillance (CNS) requirements to support the FAA's goal of reducing cost, increasing capacity and efficiency and;
- Impact/Improvement on automation, display, and facility configuration elements to increase productivity and hence capacity.

Program Plans FY 2014 – Performance Output Goals
- Conduct analyses to support assessments of new air traffic control operational concepts.
- Develop common concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Produce reports on concept development and validation findings including 2nd-level concepts, fast-time analyses and human-in-the-loop real time studies.
- Develop operational, information and performance requirements.
- Develop and provide annual updates to the NAS Enterprise Level Operational Requirements to reflect the results of research and development conducted in 2013.
- Develop and provide annual updates to the NAS Enterprise Architecture for NAS level Operational Improvements and operational sustainment activities based on completed research and acquisition decisions made in 2013.

Program Plans FY 2015 – Performance Output Goals
- Conduct analyses to support assessments of new air traffic control operational concepts.
- Develop common concept development, validation, and measurement methodologies to support SESAR Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Produce reports on concept development and validation findings including 2nd-level concepts, fast-time analyses and human-in-the-loop real time studies.
- Develop operational, information and performance requirements.
- Develop and provide annual updates to the NAS Enterprise Level Operational Requirements to reflect the results of research and development conducted in 2014.
- Develop and provide annual updates to the NAS Enterprise Architecture for NAS level Operational Improvements and operational sustainment activities based on completed research and acquisition decisions made in 2014.

Program Plans FY 2016 – Performance Output Goals
- Conduct analyses to support assessments of new air traffic control operational concepts.
- Develop common concept development, validation, and measurement methodologies to support SESAR Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Produce reports on concept development and validation findings including 2nd-level concepts, fast-time analyses and human-in-the-loop real time studies.
- Develop operational, information and performance requirements.
- Develop and provide annual updates to the NAS Enterprise Level Operational Requirements to reflect the results of research and development conducted in 2015.
- Develop and provide annual updates to the NAS Enterprise Architecture for NAS level Operational Improvements and operational sustainment activities based on completed research and acquisition decisions made in 2015.

Program Plans FY 2017 – Performance Output Goals

- Conduct analyses to support assessments of new air traffic control operational concepts.
- Develop common concept development, validation, and measurement methodologies to support SESAR Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Produce reports on concept development and validation findings including 2nd-level concepts, fast-time analyses and human-in-the-loop real time studies.
- Develop operational, information and performance requirements
- Develop and provide annual updates to the NAS Enterprise Level Operational Requirements to reflect the results of research and development conducted in 2016.
- Develop and provide annual updates to the NAS Enterprise Architecture for NAS level Operational Improvements and operational sustainment activities based on completed research and acquisition decisions made in 2016.

Program Plans FY 2018 – Performance Output Goals

- Conduct analyses to support assessments of new air traffic control operational concepts.
- Develop common concept development, validation, and measurement methodologies to support SESAR Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Produce reports on concept development and validation findings including 2nd-level concepts, fast-time analyses and human-in-the-loop real time studies.
- Develop operational, information and performance requirements.
- Develop and provide annual updates to the NAS Enterprise Level Operational Requirements to reflect the results of research and development conducted in 2017.
- Develop and provide annual updates to the NAS Enterprise Architecture for NAS level Operational Improvements and operational sustainment activities based on completed research and acquisition decisions made in 2017.

D, Major Airspace Redesign – ATDP, M08.28-04

Program Description

The Major Airspace Redesign program (formerly known as the Airspace Management Program) supports increased efficiency and enhanced safety by funding changes in facilities necessary to accommodate airspace redesign. Implementation of an airspace redesign frequently results in changes to the number and span of control of operational positions or sectors, including changes to sector, area or facility boundaries. Transition to a new configuration resulting from airspace redesign requires changes in the supporting infrastructure. These infrastructure changes can include: radio frequencies, connecting a radio site to a control facility, position to position connectivity, surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to facility data and flight data processing; interfacility communication modifications; additional consoles and communication backup needs; and modifications to facility power and cabling. The program also supports the use of risk management and collaborative evaluation capabilities to identify requirements, opportunities and threats in the early stages of the design process.

Current projects include the:

- New York/New Jersey/Philadelphia Airspace Redesign: Encompasses a complete redesign of the airspace in the New York and Philadelphia metropolitan areas to accommodate growth while enhancing safety, reducing delay, and taking advantage of new technologies. Planned project implementation is scheduled for December 2016.
- Chicago Airspace Project: Includes airspace modifications in support of runway realignments at Chicago O'Hare International Airport. Planned project implementation is scheduled for October 2013.

- Las Vegas Airspace Optimization: Addresses operational problems in the Las Vegas metropolitan area by optimizing airspace without any airfield construction. Planned project implementation is scheduled by the end of FY 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Airspace Redesign will increase system efficiency by reducing limitations that the airspace places on the system. Congestion, complexity and limited departure points in the current airspace can result in restrictions, limiting airport throughput. Airspace redesign addresses large, complex, multi-facility changes impacting National Airspace System performance.

Program Plans FY 2014 – Performance Output Goals
- Implement Chicago Airspace Project final phase.
- Support infrastructure changes resulting from Las Vegas Optimization.
- Conduct engineering for airspace redesign implementation.

Program Plans FY 2015 – Performance Output Goals
- Conduct post- implementation evaluations.
- Conduct engineering for airspace redesign implementation.
- Support infrastructure changes resulting from airspace redesign.

Program Plans FY 2016 – Performance Output Goals
- Conduct post- implementation evaluations.
- Support infrastructure changes resulting from airspace redesign.

Program Plans FY 2017 – Performance Output Goals
- Implement NY/NJ/PHL Airspace Redesign.

Program Plans FY 2018 – Performance Output Goals
- Conduct post- implementation evaluations.
- Support infrastructure changes resulting from airspace redesign.
- Conduct engineering for airspace redesign implementation.

E, Strategy and Evaluation – ATDP, M46.01-01

Program Description

The Strategy and Evaluation Program develops and maintains mathematical models of the National Airspace System (NAS) which are used to help guide NextGen investments. FAA's modeling suite includes models of varying scope, from systems dynamics models of the entire air transportation system to detailed airport surface models.

Several of the existing models are obsolete and cannot support the analysis of advanced Air Traffic Management (ATM) concepts. The Strategy and Evaluation program will develop two new computer models to rectify these shortfalls. These models will aid organizations throughout the FAA with analyses of proposed new investments, trade-off studies, and analyses of the impacts of changes in operational conditions (e.g., weather, air carrier schedules, etc.) on NAS performance.

1. An Airport Capacity Model will be developed for use in analyzing new airport capacity-related projects. The proposed model will facilitate rapid analysis of airport improvements, the impact of air travel demand changes, and ATM technology insertions. The model will be used for runway capacity studies, investment analyses, NextGen analyses, and the evaluation of airport infrastructure changes. The model will provide a de facto standard for airport capacity analyses. A Beta version of this model, known as ADSIM+, has been delivered to the FAA.
2. A System-Wide NAS Model will be developed to replace the existing National Airspace System Performance Analysis Capability (NASPAC) model. A new system-wide model is required to analyze advanced ATM concepts and aid with NextGen program trade-off studies, investment analyses, and NAS performance analyses. The model is being developed in a "spiral" fashion, which adds enhancements to the initial model as they are completed. Components of the new model, now known as the System-Wide Analysis Capability (SWAC), are currently being used by FAA and contractors to support ongoing analyses.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

In order to achieve this and other capacity metrics, the FAA is undertaking a considerable investment in NextGen. NextGen is a wide-ranging transformation of the air transportation system. Numerous cost-benefit and engineering trade studies are required to support this massive undertaking. Previously, the FAA relied on a suite of outdated models for analyzing the impact of proposed changes to ATM procedures, equipment, and airport infrastructure, as well as anticipated changes in the quantity, composition, and distribution of air traffic. These legacy models were not capable of analyzing the new technologies and procedures of NextGen. New models will be used for evaluating proposed operational improvements such as optimized profile descents, oceanic en trail procedures, trajectory-based operations, surface traffic management, collaborative ATM, etc. New and improved models are needed to provide the analytical capabilities required to support these NAS improvements and help us realize our capacity objectives.

Program Plans FY 2014 – Performance Output Goals

- Delivery of new SWAC executable software incorporating a trajectory-based operations capability.
- Delivery of new SWAC executable software incorporating an Airline Operations Center (AOC) model.
- Delivery of new SWAC executable software incorporating an improved aircraft trajectory algorithm utilizing the full Eurocontrol Base of Aircraft Data (BADA) model and gross take-off weight estimation.
- Delivery of new SWAC executable software providing the ability to utilize advanced weather products, including the Center Integrated Weather System (CIWS) weather products and the M.I.T. Lincoln Laboratory En Route Convective Weather Avoidance Model.
- Delivery of new ADSIM+ executable software incorporating improvements to the Graphical User Interface (GUI) to improve usability as well as bug fixes.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

F, Dynamic Capital Planning, M47.01-01

Program Description

Dynamic Capital Planning supports FAA acquisition programs by: tracking NAS Plan schedules for all Capital Programs; determining and validating quantitative and qualitative economic value and internal benefits for capital programs; comparing financial performance to approved baselines for all major programs; tracking field implementation status of all NAS programs by site; and capitalizing NAS Plan installed equipment which includes final disposal of retired assets in financial statements.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation.*
- *FAA Outcome 4 – NextGen capabilities are fully implemented and utilized in how US aviation community system needs are met.*
- *FAA Performance Metric 1 – Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.*

Relationship to Performance Metric

Dynamic Capital Planning helps capital programs maintain baselines by providing program tracking and analysis which leads to better baseline investment decisions and early identification of programs that are not performing so corrective actions can be implemented

Program Plans FY 2014-2018 – Performance Output Goals

- Provide monthly Capitalization report.
- Provide monthly program baseline status report.

G, Traffic Alert and Collision Avoidance System (TCAS), A28.01-01

Program Description

The Traffic Alert and Collision Avoidance System (TCAS) warns pilots of collision risks with other aircraft. This program will be developing the next generation system to take advantage of future surveillance and separation capabilities and requirements. Aircraft flying in the NAS began equipping with the TCAS in 1990. There are currently two versions of TCAS: TCAS I is a low-cost version of the system that provides traffic advisories only. TCAS II is a more capable version that can provide resolution advisories (RAs) that tell the pilot the specific vertical maneuvers that are necessary to avoid potential midair collisions. TCAS II is required in U.S. airspace for all commercial aircraft with 30 or more seats and on all cargo aircraft with a maximum certified take-off weight greater than 33,000 lb.

The existing TCAS has been very effective in mitigating the risk of mid-air collisions. Safety studies indicate that TCAS II reduces risk of mid-air collisions by 75 – 95 percent in encounters with aircraft that are equipped with either a transponder (only) or TCAS II respectively. In order to achieve this high level of safety, however, the alerting criteria used by TCAS II often overlap with the horizontal and vertical separation associated with many safe and legal airspace procedures. TCAS II monitoring data from the U.S. indicate that as many as 90 percent of observed RAs are due to the interaction between TCAS II alerting criteria and normal ATC separation procedures (e.g., 500 feet Instrument Flight Rules (IFR)/ Visual Flight Rules (VFR) separation, visual parallel approach procedures, level-off with a high vertical rate 1,000 feet above/below IFR traffic, or VFR traffic pattern procedures). In order to achieve intended efficiencies in the future airspace, a reduction in collision avoidance alerting thresholds may be necessary in order to further reduce separation while minimizing “nuisance alerts”. Initial examination of NextGen procedures such as Closely Spaced Parallel Operations (CSPO) or use of three nautical mile en-route ATC separation indicate that existing TCAS performance is likely not sufficient to support these future airspace procedures. As a result, a new approach to airborne collision avoidance is necessary.

The FAA has been researching a new approach to airborne collision avoidance for the past several years – known as Airborne Collision Avoidance System X (ACAS X). This new approach takes advantage of recent advances in dynamic programming and other computer science techniques to generate alerts using an off-line optimization of resolution advisories (i.e., logic optimization is done on computer systems well before ACAS X is installed on the aircraft). This approach uses extensive actual aircraft data to generate a highly accurate dynamic model of aircraft behavior and sensor performance. Based on a desired performance outcome (i.e., predetermined cost function) and using advance computational techniques, this approach generates an optimized table of actions based on information regarding intruder state information.

Initial evaluations of this approach have been conducted using the same Monte Carlo safety simulation employed in recent TCAS v7.1 safety studies. These studies indicate that, compared to existing TCAS II, the new approach significantly reduces the probability of a Near Mid-Air Collision (NMAC) while also significantly reducing the number of alerts and RA reversals. In addition to enhanced alerting and safety, development of associated new surveillance logic also has the potential to dramatically reduce use of the 1030/1090 MHz spectrum. Initial research on improved ACAS surveillance logic indicates that a 40 percent reduction in spectrum use can be achieved and further reductions are likely.

This system can accommodate surveillance information in addition to Mode S surveillance and is designed to be compatible with legacy TCAS. This program will develop the Minimum Operational Performance Standards (MOPS) for RTCA approval which will be used by manufacturers to develop equipment for deployment in aircraft.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

This program is focused on correcting emerging safety issues related to collision avoidance systems carried in aircraft; it improves the TCAS system's ability to resolve near-midair encounters; and the pilot's ability to react correctly to TCAS instructions. An independent collision avoidance system for pilots becomes even more essential, when Automatic Dependent Surveillance-Broadcast (ADS-B)-based capabilities enter the NAS, new aircraft platforms are introduced into the NAS and more responsibility for aircraft separation is transferred to the flight deck.

Program Plans FY 2014 – Performance Output Goals

- Develop initial draft of ACAS X Minimum Operational Performance Standards (MOPS) within the Radio Technical Commission for Aeronautics (RTCA) Special Committee 147 (SC-147).

Program Plans FY 2015-2018 – Performance Output Goals

- None.

H, Unified Contracting System (UCS), M08.46-01

Program Description

The Unified Contracting System (UCS) Program will unify the management of FAA procurement processes under one system that improves efficiency, reduces costs, standardizes work products, and eliminates redundant and paper-based processes. UCS will be an electronic and secure internet-based purchase card system that incorporates a contract lifecycle management system to automate contract formulation and execution (planning, pre-award, award, administration/post-award, and close-out). UCS will use a sophisticated Graphical User Interface (GUI) based toolset, which will allow future acquisitions process changes to be implemented by the FAA, with minimal external support. This automated system will provide accurate and timely acquisition data, electronic storage and retrieval of contractual documents and data, and management information reports – such as workload distribution and the list and content of each contracting action through the lifecycle of the acquisition. UCS will be utilized at all FAA offices and organizations involved in procurement contracts for CIP Projects and other acquisitions.

UCS will be implemented in an iterative and modular approach. The modules will encompass some or all aspects of the following functionality:

- Automate manual procurement processes;
- Interface with the FAA's financial system, Oracle 12i, and;
- Replace the functionality used in FAA's current procurement funds obligation and commitment system (PRISM), to include:
  - Federal Procurement Data System Next Generation (FPDS-NG) interface – allows the upgraded system to send required procurement data to FPDS-NG, which is a congressionally required database established to collect historical and statistical information about the government's procurements to report how and where tax dollars are spent.

Specific functionality incorporated into the UCS program will include:

- Purchase Card Purchasing System (PCPS) – an automated process for purchase card usage Agency-wide;
- Pre-award Phase process automation (limited scope) – to support contract actions with pre-qualified small business vendors providing services, as part of the FAA's Electronic FAA Accelerated and Simplified Tasks (eFAST) Program;
- Transition from paper procurement documents and content management to electronic management (Electronic Document Management System (eDocS));
- Automated procurement processes (e.g., routing / approvals) for all contract types and all procurement phases (e.g., planning, pre-award, post-award /administration, and close-out);
- Management of contract funds obligation and commitment system – to process contract financial information and coordinate with the FAA's financial system (Requisition to Obligation (R_2O));
- Invoicing System – used for managing contractor submitted invoices;
- Statement of Work (SOW) creator / generator;
- Contract writing / contract clause generator; and
- Contractor labor rates engine / repository – a database for all contractor labor rates, allowing for improved accuracy in developing Independent Government Cost Estimate (IGCE) and contract rates negation.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

UCS will implement cost effective initiatives by consolidating the FAA's procurement process under one system that will reduce the time for issuing, maintaining and closing out contract actions and eliminating paper-based processes. UCS will normalize and streamline the procurement process by providing an integrated system that uses automated workflow processes, functions and standards, and electronic document management. UCS will enable users and management access to reporting on status, allocation of effort, task durations, and other user and management measurements. The Agency has over 300 procurement officers/specialists who process over 44,500 actions per year (based on FY 2011 calculations). By implementing UCS, the cycle time from receipt of Procurement Request (PR) to award will be improved, thus contributing to a 10% reduction in time to award major system contracts. Other program performance goals include: Increased productivity through standardized and automated processes; improved quality and accessibility to data by eliminating paper based processes; and improved cycle time through automation and standardization. UCS will eventually replace the legacy (costly) FAA procurement funds obligation and commitment system (PRISM).

Program Plans FY 2014 – Performance Output Goals
- Complete Critical Design Review (CDR) of UCS, December 2013.
- Complete Development Test & Evaluation (DT&E) for Contract Writing (ConWrite) module.
- Complete Development Test & Evaluation (DT&E) for Automated Procurement Process (APP) eFAST (Post-Award).

Program Plans FY 2015 – Performance Output Goals
- Complete Development Test & Evaluation (DT&E) Invoicing module.
- Complete Development Test & Evaluation (DT&E) for Automated Procurement Process (APP) Agency Wide (Pre-Award).
- Achieve IOC for official electronic contract filing system (eDocS) for new awards.

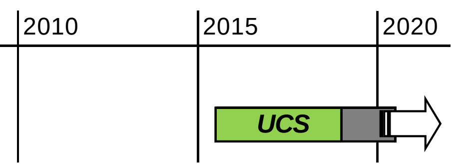
Program Plans FY 2016 – Performance Output Goals
- Achieve IOC for Requisition to Obligation (R_2O) module (PRISM Replacement).
- Achieve IOC for Automating Procurement Processes (APP) for Agency Wide (Pre-Award).

Program Plans FY 2017 – Performance Output Goals
- Achieve IOC for Statement of Work Generator (SOWGen) module.
- Achieve IOC for Automated Procurement Process (APP) Agency Wide (Post-Award).

Program Plans FY 2018 – Performance Output Goals
- Complete Development Test & Evaluation (DT&E) for Rates Engine module.
- Complete Legacy Document Conversion (UCS becomes the official contract/file system for all active awards). (APB milestone)

System Implementation Schedule

Unified Contracting System (UCS)
First IOC: October 2015 -- Last IOC: September 2018



I, Operational Analysis and Reporting System (OARS), M08.32-03

Program Description

The Air Traffic Organization's (ATO) Operational Analysis and Reporting System (OARS) (previously titled "Safety Analysis Tool") will provide a prognostic approach to identifying and managing NAS-wide safety trends and emerging risks before they result in accidents or incidents. This initiative will deliver a suite of analytical capabilities and user interfaces not currently available to achieve the next level of safety required to support the introduction of NextGen technologies, operational concepts, and procedures into the NAS and to enhance the ATO's Safety Management System (SMS).

In order to identify safety trends and emerging risks, the ATO collects and analyzes operational data to identify and classify potential hazards; it then uses the results of these analyses to make data-driven decisions on how to best mitigate any identified potentially unacceptable safety risks. The OARS will provide the ATO with near real time automated data sharing capability among legacy and future systems, databases, and tools utilized for safety risk analysis across the NAS. By facilitating automated data sharing, OARS will expedite access to a broad range of safety-related data integrated from multiple repositories; this will ultimately provide the end-user with quick and easy access to consistent, accurate and timely data and allow more efficient, comprehensive, and proactive analyses of risk in the NAS.

At its core, OARS will be a centralized platform for ATO data distribution, fusion from multiple locations, and warehousing. It will be an integrated suite of inter-connected databases and applications. OARS will be one system comprised of centralized hardware and software consisting of commercial off the shelf (COTS) items when possible. OARS will leverage the technology of existing FAA systems such as the System-Wide Information Management (SWIM) system and the FAA Telecommunications Infrastructure (FTI).

Functionally, OARS will: (1) Directly support the ATO's safety core business functions by integrating all ATO domains to identify, create, standardize, analyze, assess, and disseminate safety data throughout ATO and external organizations; and (2) Integrate with operational NAS systems to ensure that the information required to successfully implement the SMS is readily available, not only for component-level safety assessments, but also for an integrated system safety approach.

An investment analysis readiness decision (IARD) for this program is planned for June, 2013. The Final Investment Decision is planned in FY 2015.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Aviation risk is reduced through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 3 – Reduce risks in flight by limiting the rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) losses of standard separation within the National Airspace System.*

Relationship to Performance Metric

To achieve the next level of safety, the traditional methods of identifying operational errors after the fact are not enough. OARS will allow the FAA to identify the high risk events for all phases of flight. This data will be used to identify corrective action plans to mitigate high risk events in the NAS. This will allow the strategic management of financial, equipment, and personnel resources and the prioritization of efforts to obtain the maximum safety improvement in the most cost effective manner.

Program Plans FY 2014 – Performance Output Goals

- Achieve a JRC Initial Investment Decision.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

J, Next Generation Surveillance and Weather Radar Capability (NSWRC), S14.01-01

Program Description

The Next Generation Surveillance and Weather Radar Capability (NSWRC) will provide a cost-effective replacement for legacy primary terminal surveillance and weather radars. The FAA currently operates several models of Airport Surveillance Radars (ASR) and the Terminal Doppler Weather Radars (TDWR) for terminal aircraft surveillance and weather detection. The technology of the majority of these systems is over 20 years old and in some cases over 40 years old, and most of these systems have exceeded their service life. Ongoing technology refresh and Service Life Extension Programs (SLEPs) may keep these radars operating in the near-term; however, as the demands of the NAS increase it is becoming increasingly clear that the present radars will not be capable of delivering the required functionality in the future.

Shortfalls that will be addressed by the NSWRC include:

- Limited ability to detect and track Unmanned Aircraft Vehicles (UAV) and other non-cooperative aircraft,
- Reduced ability to detect and track aircraft and weather in the presence of ground clutter, such as wind farm interference,
- Insufficient temporal and spatial resolution of weather data to meet NextGen weather requirements,
- Inability to independently determine aircraft altitude for terminal surveillance,

- Increasing Operations and Maintenance (O&M) costs caused by more frequent mechanical failures across multiple radar types and models,
- Inability to collect weather data that falls into radar coverage gaps,
- Inability to effectively discriminate between different types of low speed airborne targets (aircraft, birds, balloons, hang gliders, etc.), and
- Inability to effectively discriminate between different types of precipitation (rain, ice, sleet, hail, etc.).

This program plans to acquire and deploy approximately 230 FAA operational radar systems with a 5-7 year development period and a 15 year deployment period that will be managed by establishing multi-segmented program baselines.

NSWRC is on track for Concept Requirements Definition Readiness (CRDR) by December 2012; Investment Analysis Readiness Decision (IARD) by December 30, 2014; Initial Investment Decision (IID) by 2016; and Final Investment Decision (FID) by 2017.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

Significant cost avoidance will be realized by NSWRC by assuming the mission of the 381 legacy radar systems and reducing the extensive overlapping coverage of those legacy radars. This could reduce the total number of radars needed for terminal surveillance from the current 381 to a predicted 320 systems. In addition, a common NSWRC platform will consolidate four separate life-cycle support infrastructure capabilities into one common second level engineering, depot and training capability reducing life-cycle support costs.

Program Plans FY 2014 – Performance Output Goals

- Develop of the following documents required for the IARD: Shortfall Analysis Report, Preliminary Requirements Document, Investment Analysis Plan, Preliminary Safety Assessment, Rough Order Magnitude Life Cycle Cost Estimate, Enterprise Architecture (EA) Products.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

X, Energy Management and Compliance – ATDP, F13.04-02

Program Description

The Energy Management and Compliance (EMC) Program will be a new capability that will centrally orchestrate cost-effective reductions of energy and water use at ATO facilities. This will be accomplished by coordinating policies, technical support, targeted infrastructure investments, and data analysis and reporting. By upgrading older facility infrastructure, such as mechanical and electrical systems, the EMC program will not only reduce operational costs to the ATO but also increase reliability of the NAS by reducing the likelihood of facility outages and disruptions. The EMC Program shall promote energy and water-use efficiency and the use of off-grid power and non-polluting energy sources for all activities and acquisitions.

The EMC Program will also contribute to FAA's progress toward meeting federal greening mandates, including:

- National Energy Conservation Policy Act,
- Energy Policy Act of 2005 (EPACT),

- Energy Independence and Security Act of 2007 (EISA),
- Executive Orders 13423 and 13514, and
- FY 2012 DOT/FAA Strategic Sustainability Performance Plan (SSPP) Goals 1, 2, and 4.

The strategy for the EMC Program is to address projects and initiatives that are cost-effective and provide the most benefits to the ATO. The EMC Program intends to focus on five specific capability areas:

1. **Improving monitoring of ATO energy performance** including engineering, designing, planning and testing a cost-effective approach for installing advanced electric meters to comply with the provisions of 42 U.S. Code Section 8253.
2. **Implementing energy and water efficiency projects** at targeted sites to improve ATO performance including infrastructure improvements with the greatest cost to benefit ratios and shortest payback periods.
3. **Increasing the number of high performance sustainable buildings** in ATO's portfolio by implementing targeted infrastructure improvements at selected large staffed facilities in compliance with Executive Order mandates.
4. **Improving building operating performance by designating trained ATO Energy Managers** for the highest energy-using ATO facilities to monitor energy and water consumption and develop cost-effective recommendations to reduce energy and water use.
5. **Benchmarking ATO performance and documenting progress** by completing 10 annual data call reports mandated by Executive Orders and Legislative statutes.

Final Investment Decision (FID) is expected in June 2013.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The EMC Program supports the FAA Strategic Goal of "Delivering Aviation Access through Innovation" by reducing the utility expenditures (energy and water) of NAS facilities. The EMC Program achieves this by providing technical expertise on energy and water management, implementing targeted infrastructure investments, training ATO personnel on optimizing facility performance, and tracking and reporting on energy and water usage. The EMC Program has the potential to reduce electrical costs annually by approximately 2.5% at facilities where advanced meters are installed, 12 - 13% at facilities where energy improvements are performed, and 14% at facilities where High Performance Sustainable Building (HPSB) upgrades are performed.

Program Plans FY 2014 – Performance Output Goals
- None.

Program Plans FY 2015 – Performance Output Goals
- Install 18 advanced electric meters at select EISA covered facilities.
- Complete the design for energy and water improvements at 12 EISA covered facilities.
- Complete the design for a High Performance Sustainable Building (HPSB) upgrade at two EISA covered facilities.
- Provide annual reports on progress against legislative and executive order mandates to the Department of Energy (DOE) and the Office of Management and Budget (OMB).

Program Plans FY 2016 – Performance Output Goals
- Install eight advanced electric meters at select EISA covered facilities.
- Install five advanced gas meters at select EISA covered facilities.

- Perform energy and water improvements at 12 EISA covered facilities.
- Perform HPSB upgrade at two EISA covered facilities.
- Complete the design for energy and water improvements at 12 EISA covered facilities.
- Complete the design for a HPSB upgrade at two EISA covered facilities.
- Provide annual reports on progress against legislative and executive order mandates to the Department of Energy (DOE) and the Office of Management and Budget (OMB).

Program Plans FY 2017 – Performance Output Goals
- Install 10 advanced electric meters at select EISA covered facilities.
- Perform energy and water improvements at 12 EISA covered facilities.
- Perform HPSB upgrade at two EISA covered facilities.
- Complete the design for energy and water improvements at 12 EISA covered facilities.
- Complete the design for a HPSB upgrade at two EISA covered facilities.
- Provide annual reports on progress against legislative and executive order mandates to the Department of Energy (DOE) and the Office of Management and Budget (OMB).

Program Plans FY 2018 – Performance Output Goals
- Install 10 advanced electric meters at select EISA covered facilities.
- Perform energy and water improvements at 12 EISA covered facilities.
- Perform HPSB upgrade at two EISA covered facilities.
- Complete the design for energy and water improvements at 12 EISA covered facilities.
- Complete the design for a HPSB upgrade at one EISA covered facilities.
- Provide annual reports on progress against legislative and executive order mandates to the Department of Energy (DOE) and the Office of Management and Budget (OMB).

1A02/1A03, NAS IMPROVEMENT OF SYSTEM SUPPORT LABORATORY

FY 2014 Request $1.0M
FY 2014 Request $12.0M

System Support Laboratory Sustained Support, F14.00-00

Program Description

The William J. Hughes Technical Center (WJHTC) System Support Laboratory line item sustains the facilities and supporting infrastructure necessary for research, development, test, and evaluation of NAS and NextGen systems. The WJHTC provides the FAA's centralized set of laboratories that are used to develop prototype systems and NextGen solutions that are tested and integrated into the NAS. Once systems become operational, the prototypes become part of the FAA's test bed and are used to support development and test necessary changes to the operational field sites over their lifecycle. It is necessary to sustain these laboratories systems in configurations and capabilities that match field sites that currently exist or are planned in the future. Testing and support facilities include:

- En Route System Support Facility;
- Terminal System Support Facility;
- Oceanic System Support Facility;
- NextGen Integration and Evaluation Capability;
- Integration and Interoperability Facilities;
- Traffic Management Systems,
- Weather Systems;
- Communications Systems;
- Radar Systems;
- Navigation and Tracking Systems;
- Target Generator Facility;

- Cockpit and Tower Simulation Facilities;
- Human Factors Laboratory; and
- Flying Laboratories, which are specially instrumented test aircraft.

Maintaining a centralized core of test beds reduces the overall cost to the FAA and increases efficiency in testing and preparing new systems for operational use.

The Improvement of the System Support Laboratory Program includes upgrading and enhancing electrical and electronic equipment to allow testing of new or modified systems and reconfiguration of laboratory space to support the removal of decommissioned systems and installation of new systems. It also procures unique equipment and systems that can interface and switch the various systems into multiple test and field support configurations. A centralized laboratory has the flexibility to test both individual systems and the interfaces between systems and avoids the cost of operating multiple test facilities for new equipment testing and support.

Laboratory Sustainment:
The FAA's centralized set of laboratories located at the WJHTC provide the infrastructure for research, development, testing, and field support to FAA's CIP programs. These laboratories provide around the clock operation support to En Route, Terminal, and other ATC facilities throughout the nation. It is necessary to sustain these laboratory systems in configurations and capabilities that match field sites that currently exist or are planned for the future. This activity provides for the ongoing sustainment of the WJHTC NAS and NextGen laboratories.

Laboratory Modernization:
The FAA's centralized set of laboratories located at the WJHTC provide the infrastructure for research, development, testing, and field support to FAA's CIP programs. It is necessary to upgrade and improve the supporting laboratory infrastructure and equipment to provide a laboratory platform capable of supporting FAA programs. This activity provides for the modernization of the laboratory infrastructure. The Laboratory Master Plan, developed in 2010, identified over 150 improvement areas. The Laboratory Services Division's Quality Management reevaluates the priority list of projects annually to validate needs and review emerging and/or urgent projects which may take priority over planned improvements. Additionally, some future improvement projects may be implemented sooner because an opportunity existed that would save the government money.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

This centralized testing facility serves as the FAA's research, development, testing and evaluation, and field support location. With centralization of these functions, each acquisition program need not establish and maintain separate laboratory facilities to support research, development, test, evaluation, and field support for their program. It also enables the FAA to evaluate concepts and programs that span more than one domain of the NAS and integrate NextGen solutions into the NAS. This reduces the overall cost to the FAA and helps critical acquisition programs maintain cost and schedule targets. This results in overall operational efficiency to the FAA.

Program Plans FY 2014 – Performance Output Goals
Laboratory Sustainment:
- Complete independent external surveillance audits of the Laboratory Services Group Quality Management procedures and processes.
- Complete 90% of quality objectives identified for accomplishment in FY 2014.
- Address 80% of the Opportunities for Improvement identified in the surveillance audits for FY 2014.

<u>Laboratory Modernization:</u>

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2014. Target projects are:
  - Upgrade Emergency Power Off System (EPO) and Clean Agent Fire Suppression.
  - Install Uninterrupted Power Supply (UPS) Monitoring System.

Program Plans FY 2015 – Performance Output Goals

<u>Laboratory Sustainment:</u>

- Complete independent external surveillance audits of the Laboratory Services Group Quality Management procedures and processes.
- Complete 90% of quality objectives identified for accomplishment in FY 2015.
- Address 80% of the Opportunities for Improvement identified in the surveillance audits for FY 2015.

<u>Laboratory Modernization:</u>

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2015. Target projects are:
  - Replace Laboratory Signage Replacements.

Program Plans FY 2016 – Performance Output Goals

<u>Laboratory Sustainment:</u>

- Complete independent external surveillance audits of the Laboratory Services Group Quality Management procedures and processes.
- Complete 90% of quality objectives identified for accomplishment in FY 2016.
- Address 80% of the Opportunities for Improvement identified in the surveillance audits for FY 2016.

<u>Laboratory Modernization:</u>

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2016. Modernization projects include ongoing panel board replacements, CAC replacements, raised floor upgrades and other infrastructure projects to be determined by laboratory system decommissioning and installations.

Program Plans FY 2017 – Performance Output Goals

<u>Laboratory Sustainment:</u>

- Complete independent external surveillance audits of the Laboratory Services Group Quality Management procedures and processes.
- Complete 90% of quality objectives identified for accomplishment in FY 2017.
- Address 80% of the Opportunities for Improvement identified in the surveillance audits for FY 2017.

<u>Laboratory Modernization:</u>

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2017. Modernization projects include ongoing panel board replacements, CAC replacements, raised floor upgrades and other infrastructure projects to be determined by laboratory system decommissioning and installations.

Program Plans FY 2018 – Performance Output Goals

<u>Laboratory Sustainment:</u>

- Complete independent external surveillance audits of the Laboratory Services Group Quality Management procedures and processes.
- Complete 90% of quality objectives identified for accomplishment in FY 2018.
- Address 80% of the Opportunities for Improvement identified in the surveillance audits for FY 2018.

<u>Laboratory Modernization:</u>

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2018. Modernization projects include ongoing panel board replacements, CAC replacements, raised floor upgrades and other infrastructure projects to be determined by laboratory system decommissioning and installations.

1A04, William J. Hughes Technical Center Infrastructure Sustainment
FY 2014 Request $6.0M

William J. Hughes Technical Center Building and Plant Support, F16.00-00

Program Description

The FAA William J. Hughes Technical Center (WJHTC) owns and operates about 1.58 million square feet of test and evaluation, research and development, and administrative facilities, plus numerous project test sites. The value of the buildings and infrastructure is about $190.1 million (FY 2003 figures). These facilities require an annual program of capital improvements and modernization. Example projects include: (1) replacing old heating, ventilation, and air-conditioning systems; (2) upgrading the electrical distribution systems; and (3) upgrading fire-suppression systems to current fire safety codes. The requested expenditure to sustain the WJHTC represents approximately 3.2 percent of the Center's FY 2003 value.

The WJHTC contracted with a private consultant to develop a 20 year facility master plan, which was completed in July of 2008. The master plan was developed based upon the consultant's consideration of life safety issues, code compliance issues, equipment age, life expectancy, replacement part availability, and general condition for each system. Replacement strategies and priorities were developed based upon Condition Codes and Importance Factors. The Condition Codes indicated the operability or need for replacement. The Importance Factors addressed the importance of each building and project to WJHTC's mission. Each of the FY 2014 projects (or Output Goals) has a Condition Code of Poor (most severe code) and an Importance Factor of Essential (most critical factor).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

Infrastructure Modernization at the WJHTC will control costs while delivering quality customer service by replacing old systems /equipment before serious problems occur. It will also reduce energy consumption, and cost, on a per-square-foot basis. This line item will update facilities and facility support systems to ensure that the laboratories and other facilities operate properly and can handle utility loads of the systems being tested. As the WJHTC plays a key role in developing and testing new equipment that will be used in the NAS, it is critical that the facilities operate efficiently. WJHTC effectiveness in testing and approving equipment can result in earlier system deployment thereby reducing costs for system implementation

Program Plans FY 2014 – Performance Output Goals
- Building 287 Roof Replacement and Mechanical Upgrades.
- Building 301 Fire Detection/Suppression/Annunciation System Upgrades (Phase 1).
- Design Building 316 Chiller Replacement (No. 1 of 2).
- Building 301 Roof Replacement.

Program Plans FY 2015 – Performance Output Goals
- Center Facility System Improvements (Year 3 of 20 year plan).
- Building 316 Roof Replacement.
- Design Building 315 Electrical Substation Replacements.
- Main Electrical Substation Upgrades (Switchgear Enclosure).
- Buildings 300 & 301 Fire Detection/Suppression/Annunciation System Upgrades (Phase 2).
- Building 316 Chiller Replacement (No. 1 of 2).

Program Plans FY 2016 – Performance Output Goals

- Center Facility System Improvements (Year 4 of 20 year plan).
- Building 316 Electrical Substation Replacements.
- Center-wide Building Automation System Expansion.
- Central Utilities Plant Chiller Replacement (No. 2 of 3).
- Design Primary Electrical Feeder Replacement to Buildings 315 and 316.
- Design Life Safety Improvements to Seven Facilities.

Program Plans FY 2017 – Performance Output Goals

- Center Facility System Improvements (Year 5 of 20 year plan).
- Buildings 211 and 303 Roof Replacements.
- Building 300 Mechanical Equipment Replacement.
- Creation of a Water Distribution Loop.
- Life Safety Improvements to Seven Facilities.

Program Plans FY 2018 – Performance Output Goals

- Center Facility System Improvements (Year 6 of 20 year plan).
- Building 300 Mechanical Equipment Replacement (Phase 3 of 3).
- Primary Electrical Feeder Replacement to Buildings 315 and 316.
- Building 316 Chiller Replacement (No. 2 of 2).
- Overhead Electrical Distribution System Refurbishment.
- Buildings 303 & 316 Chilled Water Systems Interconnection.
- Storm Water System Remediation.

1A05, DATA COMMUNICATION IN SUPPORT OF NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN)*

FY 2014 Request $115.5M

Data Communications – Segment 1 Phase 1, G01C.01-05 / Data Communications – Segment 1 Phase 2, G01C.01-06 / X, Data Communications – ATN Gateway, G01C.01-08

Program Description

The Data Communications program will provide data communications between air traffic control facilities and aircraft, and is the primary enabler for NextGen operational improvements. Data Communications will improve NAS operations by:

- Automating delivery of routine clearances to reduce controller workload and improve productivity,
- Allowing more effective use of NAS capacity and reducing flight delay because existing controller staffing will be able to handle increased traffic,
- Reducing operational errors associated with voice communications to enhance safety, and;
- Enabling many of the NextGen operational improvements that require negotiation or exchange of information that cannot be efficiently delivered via voice.

Initially, Departure Clearances (DCL) including revisions transmitted to the aircraft on the airport surface will enable full route clearances. DCL could provide the potential for use as a NextGen Best Equipped Best Served test case. Data Communications (Data Comm) will increase capacity and enable more strategic management of NAS resources.

The “Go Button”, which is a part of the initial En Route services, will automate the delivery of airborne reroutes, leverages Traffic Flow Management (TFM) for more direct reroutes reducing flight time and distance. It enables quicker recovery from bad weather or other Traffic Management Advisory situations.

Data Comm will be used with current traffic control strategies to reduce controller workload by automating repetitive exchanges. As controllers become more productive, the number of aircraft they can handle in their sector will grow without the need to assign additional resources. Data Comm benefits will be realized in Tower, Ground, En Route, and Terminal Radar Approach Control (TRACON) operations. The busiest positions, whether in en route feeder sectors in metro corridors, terminal approach sectors, or airport ground control at major airports, will see the most dramatic results.

These improvements to the NAS will be delivered by the Data Communications project in two segments. Segment 1 will deliver the initial set of data communications services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. This delivery will occur in multiple phases. Segment 2 will enable more advanced NextGen operations to include initial trajectory-based operations, which would not be possible using the existing voice systems.

Data Communications – Segment 1 Phase 1 (G01C.01-05):
Phase 1 provides initial tower service which introduces the basic log-on capability required to initiate all data communications in the NAS, and revised departure clearances (DCL) for Future Air Navigation Systems (FANS) equipped aircraft.

Steps for the Data Comm Phase 1 implementation are identified below:

- Tower Data Link Services (TDLS) hardware and software enhancements to enable Revised Departure Clearance (DCL) services.
- Software development of ERAM for aircraft log-on capability, allowing a direct connection from TDLS-to-ERAM-flight information. This software incorporates the flight plan correlation function, protocol gateway and security boundary development.
- Integration and test planning and lab development at the William J. Hughes Technical Center (WJHTC).
- Contract award for Data Comm Integrated Services (DCIS) to include:
  - Integration and engineering activities,
  - Developing a data communications network service (DCNS) which will provide the Air/Ground Communication link for Data Comm, and
  - Airplane avionics equipage initiative which will seed the market for equipage by providing incentives for airlines to equip 1,900 aircraft with FANS 1/A+ avionics.
- Trials for revised Departure Clearance service.
- Deploy revised Departure Clearance service.

Segment 1 Phase 1 received a Final Investment Decision in May 2012. The decision approved 41 initial tower sites with conditional approval of an additional 16 based on updated cost and operational data.

Data Communications – Segment 1 Phase 2 (G01C.01-06):
Phase 2 will deliver core En Route FANS services for Controller-Pilot Data Link Communication (CPDLC), which automates routine interactions between controllers and flight crews, including transfer of communications and initial check-in/out for aircraft flying into and out of sectors, direct-to-fix flight paths, altimeter settings, and flight crew reports as a supplement to voice communications.

Following a planned Final Investment Decision (FID) in FY 2015, the steps for implementation of Phase 2 are identified below:

- TDLS engineering and software enhancements to accommodate flight plan changes correlated in ERAM.
- Software enhancements to the protocol gateway to support the En Route core services of initial check-in and transfer of communications.
- ERAM software development for En Route Computer-Human Interface upgrades, lower level requirements completion and software development for design of En Route Controller Pilot Data Link Communications (CPDLC) applications.
- Integration and testing of core En Route services.
- Upgrade air/ground network for expanded En Route services.

Data Communications – ATN Gateway (G01C.01-08):
Initial Data Comm services will be delivered to Future Air Navigation Systems (FANS) 1/A+ compliant avionics and ground system. FANS 1/A+ is currently certified to fly in the NAS and many airlines have FANS 1/A+ equipped aircraft. At a future date, to be determined, the Data Comm program will implement an Aeronautical Telecommunications Network (ATN) compliant ground system to support ATN avionics. The addition of ATN will support the implementation of more advanced NextGen services such as advanced Trajectory Based Operations (TBO). However, before Data Comm can implement ATN to support advanced services RTCA Special Committee 214 (SC-214) must complete the standards. These standards are expected to be completed and coordinated in late 2013, with avionics manufacturers developing and certifying the avionics through the late 2010s.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The capacity and productivity of the NAS will be improved by data communications. Initially, Data Communications will be used in conjunction with the current traffic control strategies as well as planned strategies such as Traffic Flow Management (TFM) reroutes. Data Communications will increase controller efficiency by automating routine exchanges as well as enabling the initial phase of trajectory based operations. As controllers become more productive, sector capacity will grow without the need to assign additional resources. Data Communications benefits will be realized in en route, TRACON, and tower/ground operations. The busiest positions, whether in en route sectors, en route feeder sectors in metro corridors, terminal approach sectors, or airport clearance delivery and ground control positions in the Core airport towers will see the most dramatic benefits.

New services enabled by Data Communications will contribute even more dramatically to air traffic capacity. Advanced 4-dimensional trajectories will enable more strategic operations that can ensure the most efficient use of airspace resources, with greatly reduced ground management oversight. More predictable traffic flows will yield better on-time performance, and minimize service impact associated with weather-related system disruptions. Data Comm will enable a more rapid response during adverse weather conditions which will reduce the impact on operators. DCL will provide advantages to equipped users by reducing gate and taxi delays, by an average of 2.2 minutes if the clearance is delivered at the gate and an average 4.6 minutes if the clearance is delivered during taxi.

Program Plans FY 2014 – Performance Output Goals
Data Communications – Segment 1 Phase 1 (G01C.01-05):
- Complete development of the Operational Test Lab.
- Deliver ERAM R4 Initial Test Release (ITR). (APB Milestone)
- Deliver TDLS V12 Initial Test Release (ITR).
- Accept Data Comm Network Services (DCNS) FANS Tower Service at WJHTC.
- Complete Data Comm Integration Testing.

Data Communications – Segment 1 Phase 2 (G01C.01-06):
- Complete ERAM software Preliminary Design Review (PDR).

Data Communications – ATN Gateway (G01C.01-08):
- None.

Program Plans FY 2015 – Performance Output Goals
Data Communications – Segment 1 Phase 1 (G01C.01-05):
- Complete ERAM Systems Integration Release Follow-on Contract Integrated Baseline Review (IBR).
- Complete TDLS V12 Service Acceptance Release to the site.
- Complete ERAM R4 Service Acceptance Release to the site.

<u>Data Communications – Segment 1 Phase 2 (G01C.01-06):</u>
- Achieve Final Investment Decision (FID).
- Complete ERAM software Critical Design Review (CDR).

<u>Data Communications – ATN Gateway (G01C.01-08):</u>
- None.

Program Plans FY 2016 – Performance Output Goals

<u>Data Communications – Segment 1 Phase 1 (G01C.01-05):</u>
- Complete Operational Test & Evaluation (OT&E). (APB Milestone)
- First Site Initial Operational Capability (IOC). (APB Milestone)

<u>Data Communications – Segment 1 Phase 2 (G01C.01-06):</u>
- ERAM S1P2 final software drop delivered for vendor's integration and development testing.
- Begin vendor software integration and test (I&T).

<u>Data Communications – ATN Gateway (G01C.01-08):</u>
- None.

Program Plans FY 2017 – Performance Output Goals

<u>Data Communications – Segment 1 Phase 1 (G01C.01-05):</u>
- Data Comm In-Service Decision (ISD). (APB Milestone)
- Key Site Operational Readiness Decision (ORD). (APB Milestone)

<u>Data Communications – Segment 1 Phase 2 (G01C.01-06):</u>
- ERAM Initial Test Release to WJHTC.

<u>Data Communications – ATN Gateway (G01C.01-08):</u>
- Begin planning of ATN ground system.

Program Plans FY 2018 – Performance Output Goals

<u>Data Communications – Segment 1 Phase 1 (G01C.01-05):</u>
- Data Comm directives development and validation for Air Traffic and Tech Ops.

<u>Data Communications – Segment 1 Phase 2 (G01C.01-06):</u>
- Software release to the Air Route Traffic Control Centers (ARTCC).

<u>Data Communications – ATN Gateway (G01C.01-08):</u>
- Final Investment Decision for ATN ground system.

System Implementation Schedule

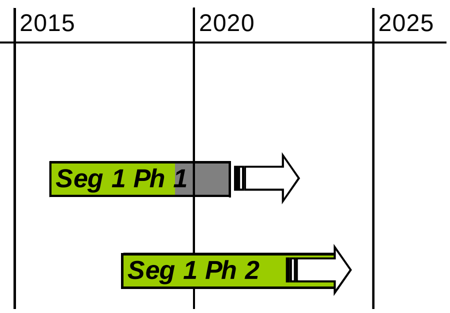
Data Communications in support of NextGen

Segment 1 Phase 1 Service – Tower Log-on for FANS 1/A+ with DCL

First site IOC: March 2016 -- Last site IOC: May 2019

Segment 1 Phase 2 Service – En Route core Services for FANS 1/A+

First site IOC: TBD -- Last site IOC: TBD



1A06, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – DEMONSTRATIONS AND INFRASTRUCTURE DEVELOPMENT*

FY 2014 Request $24.7M

Demonstrations and Infrastructure Development, G08M.01-01

Program Description

Demonstrations and Infrastructure Development provides practical application and analysis of proposed NextGen system improvements to validate the benefits of system improvements and to determine which research and development (R&D) initiatives might be accelerated. These demonstrations include collaboration with users, operators, and other partners, which is important early in the process. This allows for any needed changes, updates or alterations to be done before the capabilities are fully cemented. Furthermore, a wide variety of perspectives and ideas as well as partner commitment to the benefits can be obtained through early collaboration.

NextGen Demonstration and Infrastructure Development generally supports 4-5 projects a year. Demonstrations normally last about 24 – 30 months. When a demonstration project is completed, the results are assessed to determine whether to proceed, and the demonstrated capabilities will be included in solution sets for further engineering and maturation.

FAA's demonstration, development, and validation planning activities will include the following:

<u>Airborne Access to SWIM (AAtS):</u>
This demonstration will begin validation of the preliminary requirements for Airborne SWIM and show the capability for the FAA system and airborne aircraft to communicate non-safety critical information via an airborne network. This capability allows for the exchange of traffic management information and the ability to quickly communicate the information, improving system efficiency. Additionally, using this link, the flight crew could use this capability to communicate Estimated Time of Arrivals (ETAs), 4D Intent information, and negotiated reroutes back to the FAA system. The link can also be used to transmit updates of weather data and other non-safety critical information.

<u>Airbridge:</u>
The Airbridge demonstration being completed will provide an integrated decision support to the Airline Operation Center and ATC for an end-to-end management of transoceanic traffic between airspaces of different Air Navigation Service Providers (ANSPs). The demonstration will allocate track entry times based on the arrival time requirements, improving the overall predictability and efficiency of transatlantic flight. Also, the demonstration will investigate use of shared flight information between ANSPs to improve tactical flow into major coastal Metroplexes.

<u>Mini-Global:</u>
The Mini-Global demonstration will help to increase industry participation and further the use of the Flight Information Exchange Model (FIXM) standard. This demonstration provides a unique opportunity for government and industry collaboration amongst multiple countries. FIXM is a data interchange format for sharing information about flights throughout their lifecycle. The demonstration will show how ANSPs and flight operators across the globe can leverage the FIXM standard as a means of sharing common flight information elements. Mini-Global will promote international harmonization via data exchange with other international ANSPs, operators, and the aviation industry. It will assess the compatibility of partner ATM systems with respect to flight object standards and will identify both services and products meaningful to current and future operations.

<u>UAS Integration into NAS:</u>
This demonstration project will assess and evaluate capabilities for FAA and Operator ground systems to support operation of Unmanned Aircraft Systems (UAS) in the NAS. Capabilities to be investigated include information exchanges between operator and FAA systems, architectural alternatives for direct controller pilot communications using Voice over Internet Protocol (VoIP), and other FAA tools to support integration of UAS into controller airspace.

NextGen Infrastructure Development:
This activity will develop the Integrated Master Schedule (IMS) system infrastructure to integrate NextGen pre-implementation and implementation projects activities within the solutions set areas and portfolios.

4D Trajectory Demonstration:
This demonstration will evaluate the feasibility of advanced trajectory management in NextGen timeframes. It will report the capability and safety of current standards and recommendations for future standards, and the benefits of advanced trajectory management.

Paired Approach Demonstration:
This activity will demonstrate the ability to safely utilize ADS-B and Flight-deck-based Interval Management – Defined Interval (FIM-DI) when conducting simultaneous instrument approaches in all weather conditions on very closely spaced parallel runways. Benefits to be identified include efficiency, improved quality of service and reduced customer burden, and others.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

FY 2014-2018 demonstration activities are planned to show how to reduce air traffic delays due to more efficient metering and spacing, increased capacity of the airspace, more efficient traffic flow management, and integrated arrival/departure routes. Airborne Access to SWIM and Airborne Execution of Flow Strategies will identify key implementation issues, assist the FAA in developing its operational improvement plans to meet NextGen goals and objectives, and assist with implementing initiatives in FY 2014 and beyond.

Program Plans FY 2014 – Performance Output Goals
AAtS:
- Conduct an operational flight demonstration of bi-directional information exchange between the cockpit, airline operations center and air traffic control to enhance collaborative decision making in the NAS.
- Complete a Post-Demonstration Analysis & Final Report.

AirBridge:
- Conduct evaluation and prepare a report on use of shared flight information between ANSPs to improve tactical flow into major coastal Metroplexes.
- Develop demonstration procedures report for testing dynamic track entry time allocation and arrival manager sequencing.
- Develop requirements document for prototypes to support dynamic allocation of tracks.

Mini-Global Demonstration:
- Conduct a demonstration and prepare a report of Flight Object concepts validation, such as the Flight Information Exchange Model (FIXM) standard.
- Develop an evaluation strategies document for harmonizing Flight Object concepts.
- Complete a Post-Demonstration Analysis & Final Report for the Mini Global demonstration.

UAS Integration into NAS:
- Complete a demonstration and prepare report to assess feasibility and requirements for integration of UAS operations in the NAS including exchange of loss-link procedures using FIXM protocols.
- Develop a report evaluating NAS Voice System (NVS) capabilities in support of direct controller pilot communications in operational trials.
- Develop a report evaluating conflict probe and alert capabilities to support integration of UAS into Class A airspace.

NextGen Infrastructure Development:

- Develop reports on the management and integration of NextGen demonstrations, projects, and products in support of the NextGen Segment Implementation Plan.
- Maintain and enhance the Integrated Master Schedule (IMS) system to manage and store work associated with NextGen projects and demonstration and to provide additional functionality for tracking dependencies and cross-program integration.

4D Trajectory and Demonstration:

- Develop demonstration requirements and procedures.
- Development of demonstration scenarios for evaluation.

Paired Approach Demonstration:

- Develop demonstration requirements and procedures for evaluation.
- Develop scenarios for demonstration utilizing ADS-B and FIM-DI to conduct simultaneous instrument approaches in all weather conditions on very closely spaced parallel runways.

Program Plans FY 2015 – Performance Output Goals

AAtS:

- Conduct demonstration and prepare report for Integration & Testing of the two-way Airborne Access to SWIM information.

AirBridge

- Demonstrate and prepare report of dynamic track allocation and arrival manager sequencing.
- Provide updated requirements for Information Exchange Standard to support strategic oceanic operations.

Mini Global:

- Complete post demonstration analysis and final report.

NextGen Infrastructure Development:

- Develop reports on the management and integration of NextGen demonstrations projects, and products in support of the NextGen Segment Implementation Plan.

4D Trajectory and Demonstration:

- Conduct demonstration evaluation.
- Complete initial report and evaluation analysis report.

Paired Approach Demonstration

- Conduct demonstration evaluation.
- Complete initial report and evaluation analysis report.

Program Plans FY 2016-2018 – Performance Output Goals

AAtS:

- Conduct demonstration and prepare report for Integration & Testing of the two-way Airborne Access to SWIM information.

AirBridge:

- Prepare demonstration report and analysis for use of shared flight information between ANSPs to improve tactical flow into major coastal Metroplexes

4D Trajectory and Demonstration:

- Complete post demonstration analysis and final report for advanced trajectory management.

Prepared Approach Demonstration:

- Complete post demonstration analysis and final report.

1A07, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SYSTEM DEVELOPMENT*

FY 2014 Request $61.5M

- A, ATC/Technical Operations Human Factors, G01M.02-01
- B, New ATM Requirements, G01M.02-02
- C, Ops Concept Validation Modeling, G01M.02-03
- D, Environment & Energy – Environmental Management System & Noise/Emission Reduction, G06M.02-01
- E, Wake Turbulence Re-Categorization, G06M.02-02
- F, Safety, Security, Environment – System Development – Operational Assessments, G07M.02-02
- G, Safety, Security, Environment – System Development – Systems Safety Management Transformation, G07M.02-01
- H, Networked Facilities – System Development – Staffed NextGen Towers, G03M.04-01

A, ATC/Technical Operations Human Factors, G01M.02-01

Program Description

This program examines human factors for air traffic controllers and maintenance personnel relating to the implementation of NextGen procedures and technologies. A significant feature of this program is the annual review and updates of the Human System Integration (HSI) Roadmap to complement and reflect changes in the other roadmaps in the Enterprise Architecture. The HSI Roadmap will display the roles and responsibilities of the actors in the NAS (air traffic controllers, pilots, dispatchers, traffic managers, etc.), their interactions with NextGen technologies, and the required changes to personnel selection, training, and required research and development activities in the human factors area that are needed to realize the NextGen vision.

Research will examine the roles of controller and maintenance personnel to ensure safe operations at increased capacity levels and the way the roles would be best supported by allocation of functions between humans and automation. The success of new NextGen technologies hinges upon the actions of air traffic service providers using new decision support tools or automation to achieve the operational improvement. The effectiveness of each of these technologies is contingent upon the proper human engineering of the new capability. This human engineering is not just the visible interface, but the characteristics of the tool and how the tool is used in the context of the work.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Incorporation of human factors guidance and products into NAS systems will result in sufficient improvement in air traffic controller efficiency (e.g. greater number of aircraft handled) to meet the forecast traffic demand and effectiveness through automation and standardization of operations, procedures, and information. This program enables NextGen by defining the human factors guidance and requirements to support the changes to the interaction and integration of activities between pilots and controllers and between humans and automation required to implement NextGen.

Data showing the potential increase in controller efficiency is currently being generated for many of the operational improvements in the NextGen portfolio. For example, simulation data has shown the ability, when using Data Comm, to handle a 30% increase in traffic while maintaining the baseline workload level.

Program Plans FY 2014 – Performance Output Goals
- Update NextGen controller strategic job analysis and training needs documents.
- Prepare research report identifying causes and potential fixes to reduce non-conformance to Performance Based Navigation Required Area Navigation/Required Performance Navigation RNAV/RNP standards.
- Develop a human error/safety database for NextGen Capabilities.
- Publish the Human System Integration Roadmap.
- Develop Traffic Management Coordinator (TMC) dispatcher, controller, and pilot information requirements document.
- Develop NextGen human-automation interaction functional requirements and resolution guidance documents.

Program Plans FY 2015 – Performance Output Goals
- Develop technical report documenting simulations, findings and requirements to measure human performance when using NextGen tools in the airport environment.
- Develop technical report of demonstrations and analyses for advanced human machine interfaces for integrated air traffic workstations using the suite of NextGen operational improvements.

Program Plans FY 2016 – Performance Output Goals
- Develop technical report of simulations and findings for increased terminal domain operational efficiencies resulting from new human factors guidance.
- Develop technical report of human factor safety analyses and findings identifying unforeseen NextGen implementation issues.

Program Plans FY 2017 – Performance Output Goals
- Develop technical report of system capacity improvement model demonstrations and findings for specific improvements in controller efficiency.
- Update controller NextGen Strategic Job Analysis document.
- Update controller NextGen Strategic Training Needs Analysis document.

Program Plans FY 2018 – Performance Output Goals
- Develop implementation strategy for FY 2017 system capacity improvement models that integrate mitigations for previously identified human performance hazards.
- Develop Traffic Management Coordinator (TMC) information requirements for dynamic flow control corridors.
- Develop controller information requirements for dynamic airspace and dynamic flight trajectories.

B, New ATM Requirements, G01M.02-02

Program Description

The New ATM Requirements Program identifies new opportunities to improve the efficiency and effectiveness of air traffic management. It supports the NextGen goal of expanding capacity by developing decision support tools that improve the strategic management of operations in the NAS. New ATM requirements will explore the following areas for opportunities:

- <u>Traffic Collision Avoidance System (TCAS):</u> TCAS had extraordinary success in reducing the risk of mid-air collisions. NextGen airspace will have increased capacity due to decreased aircraft separation made possible by new technologies and new procedures, such as the increased use of RNAV/RNP routes and Closely Space Parallel Runways operations. As the use of more complex curved and other complex routes, it is critical that TCAS be made even more accurate and dependable to ensure continued pilot trust in the system. To accomplish this, the FAA is developing a new family of collision avoidance systems (ACAS X) based on requests from both the U.S. Commercial Aviation Safety Team (CAST) and the Association of European Airlines (AEA) to address the number of nuisance Resolution Advisories in US airspace and better support future operations. ACAS X takes advantage of advanced dynamic programming techniques to optimize system safety and alerting performance; it also incorporates a plug and play surveillance capability to enable use of active surveillance, ADS-B (ARC Recommendation) and other potential surveillance sources required for Unmanned Aircraft System (UAS) collision avoidance.

- New Radar Requirements (Surveillance and Weather): – is a concept maturity and technology development initiative in support of the NextGen Surveillance and Weather Radar Capability. The objective of this effort is to identify viable solution implementation alternatives that could provide for FAA's weather and surveillance radar needs. It will include identifying the technical challenges, evaluating cost models, developing technology approaches and proposed solutions, and concept demonstration through modeling and prototyping. The overall project includes four major areas: Multifunction Phased-Array Antenna Maturation, Engineering Studies – Technology Assessment, Multifunction Radar Backend Definition, and Concept and Requirements Definition. The outcome of this body of work will result in an initial Antenna and Radar Backend specification. The information gained through this effort will support an FAA investment analysis readiness decision (IARD) in Calendar Year (CY) 2014 and will provide the government a greater capability of defining specific requirements for a potential joint radar acquisition.

- Trajectory Modeling: Trajectory-based operations require multi-domain interaction with aircraft trajectories in the far-term future. As a step towards that end, trajectory operations (TOps) have been subdivided to focus on the NextGen midterm. The TOps activity requires a common view of the use of Communications, Navigation and Surveillance (CNS) components that support TOps in the midterm. The Trajectory modeling project will develop NAS-wide trajectory-related requirements for automation systems. The project focuses on defining concept of use alternatives for trajectory, what trajectory information should be exchanged, the types and quality of trajectory prediction required, an integrated solution to achieve trajectory interoperability across multiple domains in the mid-term NAS and defining a strategy for global trajectory harmonization.

- Airborne System-Wide Information Management (SWIM): – will identify performance and bandwidth requirements for airborne internet capability to support the exchange of ATM information such as weather, aeronautical information and flight information to support Traffic Flow Management. The program will establish guidance that will enable third party vendors to develop systems and applications to support customer needs.

- Weather Transition: – ensures that weather concepts coming from aviation weather research are matured and technically developed under FAA guidelines to a level of appropriate readiness for operational use in the NAS. Weather Transition will manage appropriate activities to include the creation, testing and evaluation of prototypes and operational demonstrations for the purpose of defining and refining an appropriate operational use concept.

- Cloud Computing: This project will evaluate current and future NAS systems for potential applicability to the cloud environment or data center consolidation. As part of this evaluation, current assumptions for system availability and mission criticality will be validated to ensure feasibility for future architectures to provide service.

- Automation Convergence: This project will evaluate the feasibility for the use of common plug and play display standards for ATM systems as a step in the transition path towards automation convergence. Current ATM systems use different methods and coordinates to display information to the user, this effort will evaluate alternatives for a common plug and play display. Evaluation of the current performance requirements for displays will be conducted and a prototype will be developed for suitability testing with the operational team.

- Synchronization of Air/Ground Procedures: In an effort to reduce the strain on the limited-capacity storage on the aircraft Flight Management System, this project will evaluate methods for the ground systems to communicate procedures with the aircraft. This will reduce the need to load the FMS with variations of the same procedure for different flight conditions. This will also allow air traffic to provide tactical capacity management methods with automation, such as extending the down-wind portion of the approach, increasing predictability and efficiency.

- Advanced Air Ground Communications: In partnership with international partners, this project will evaluate advanced communications standards such as L-band Digital Aeronautical Communication System (LDACS) or Satellite-based communication for operational usage. This project will also evaluate advanced communications to support new capabilities such as Push-to-Talk in remote areas and the capability for these links to alleviate spectrum congestion issues.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The analysis and demonstration projects support the development of operational improvements that will increase the number of arrivals and departures at major airports.

Program Plans FY 2014 – Performance Output Goals

TCAS:

- Develop Traffic Collision Avoidance System & Automatic Dependent Surveillance-Broadcast Compatibility and Future Requirements document.
- Develop Future Collision Avoidance System (CAS) Logic Development / Future Surveillance Requirements document.
- Develop CAS Logic Assessment / Avionics Model (Future Surveillance Assessment) / TCAS-ADS-B Compatibility engineering study.

New Radar Requirements (Surveillance and Weather):

- Develop AMS artifacts for Investment Analysis Readiness Decision (IARD) for the NextGen Surveillance & Weather Radar Capability.
- Complete update to the Multi-function Phased Array Radar (MPAR) Concept of Operations.
- Develop MPAR demonstration strategy.

Trajectory Modeling:

- Finalize documentation of data elements needed to support trajectory modeling.
- Develop standard of use document for different classes of trajectories.

Airborne SWIM:

- Conduct validation of the information requirements for Airborne Access to SWIM (AAtS) which will study the feasibility and benefit of providing operational, weather and regulatory data to pilots in flight, using Class I and II Electronic Flight Bags receiving data via a commercial data provider.
- Develop operational requirements for AAtS (2-way).
- Conduct functional analysis and allocation for AAtS (2-way).
- Develop cost estimates for AAtS (2-way).

Weather Transition:

- Develop Requirements Allocation/Validation document with the National Weather Service (NWS).
- Conduct Weather Concept Demonstration and prepare report of Evaluation of Demonstration.
- Conduct assessment of mature research for transition to NWS.

Cloud Computing:

- Develop engineering study evaluating NAS systems for potential assignment to cloud environment /data center rather than local environment.
- Update technical assumptions documentation based on safety and mission criticality, and ability of current architecture to provide service in a point-to-point environment.

Automation Convergence:
- Develop engineering study identifying potential systems/displays for convergence including plug and play displays requirements, common Human Machine Interface implementation requirements.
- Develop engineering study which analyzes gaps in common display coordinates among current and future automation systems.

Program Plans FY 2015 – Performance Output Goals
New Radar Requirements (Surveillance and Weather):
- Develop high level requirements document for MPAR.
- Complete update of the MPAR Risk Assessment Plan.
- Complete update to MPAR Cost Model.

Airborne SWIM:
- Develop architecture artifacts for AAtS (2-way).
- Develop investment documentation for AAtS (2-way).
- Develop implementation plan for AAtS (2-way).

Weather Transition:
- Develop engineering study translating weather state information into impacts on individual aircraft / flights / trajectories.
- Develop algorithms for integrating weather into decision support tools using translated weather products.
- Validate weather information requirements document as part of integrated controller tools.
- Conduct assessment of mature research for transition to NWS.

Cloud Computing:
- Develop architectural alternatives and transition strategy document for NAS Systems identified as potentially suitable for long-term cloud computing infrastructures.

Automation Convergence:
- Identify alternative approaches document for common plug and play display.
- Develop common display definitions transition strategy document.

Synchronization of Air/Ground Procedures:
- Develop document for two-way communications procedures between FMS and ground systems.
- Develop FMS database reduction strategies document.

Advanced Air/Ground Communications:
- Complete documentation of the development and test of L-Band communications standards with international community.
- Complete documentation of the development of Satellite-based Push-to-Talk communications standards with international community.

Program Plans FY 2016 – Performance Output Goals
Weather Transition:
- Evaluate algorithms for integrating weather into decision support tools using translated weather products.
- Conduct assessment of mature research for transition to NWS.

Automation Convergence:
- Laboratory prototype development to evaluate feasibility to meet display performance requirements

Synchronization of Air/Ground Procedures:
- Develop validation plan for air/ground procedure synchronization.
- Develop documentation of air/ground procedures standards with user community.

Advanced Air/Ground Communications;
- Development of Test Plan of Satellite-based Push-to-Talk communications standards with international community.

Program Plans FY 2017 – Performance Output Goals
Weather Transition:
- Conduct assessment of mature research for transition to NWS.

Synchronization of Air/Ground Procedures:
- Conduct trials to validate air/ground procedure synchronization.

Automation Convergence:
- Develop common display formats for ATM systems (common coordinates and polygon definitions).

Advanced Air/Ground Communications:
- Conduct tests of Satellite-based Push-to-Talk communications standards with international community.

Program Plans FY 2018 – Performance Output Goals

Weather Transition:
- Conduct assessment of mature research for transition to NWS.

Automation Convergence:
- Develop Common - Human Machine Interface methodologies documentation.

C, Ops Concept Validation Modeling, G01M.02-03

Program Description

The Operations Concept Validation Modeling Program develops and validates future gate-to-gate (flight planning through arrival) operational concepts that will increase capacity and improve efficiency and throughput. Special emphasis is placed on researching changes in roles and responsibilities between the FAA and airspace users (e.g., pilots and airlines), as well as the human interaction with automation systems.

The Operations Concept Validation Modeling Program will identify procedures to decrease workload and increase reliance on automation for routine tasking, in order to increase efficiency of the NAS. The program works toward developing operational methods to expand capacity by addressing future growth in demand and reducing transit times.

Products developed by this program include concepts of operations; reports documenting findings of fast-time and real-time concept validation studies; operational requirements associated with validated concepts; shortfall and benefits analysis; and safety assessments.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The goal is to improve airport capacity, validate that the proposed benefits for new operational concepts can be achieved, and understand the human factors implications of these new concepts.

Program Plans FY 2014 – Performance Output Goals
- Conduct concept validation studies and document findings in a concept validation report for end to end and lower level operational concepts for implementation in 2020 and beyond.
- Develop operational requirements and other documents required for technical transfer for validated concepts for implementation in 2017-2019 and beyond.
- Develop research papers on reducing risk/uncertainties of NextGen Mid Term Operational Concepts.
- Document procedures to decrease workload / increase reliance on automation for routine tasking, to increase efficiency of the NAS.
- Develop operational methods document to address future growth in demand and reduce transit time.

Program Plans FY 2015 – Performance Output Goals
- Conduct concept validation studies and document findings in a concept validation report for end to end and lower level operational concepts for implementation in 2021 and beyond.
- Develop operational requirements and other documents required for technical transfer for validated concepts for implementation in 2018-2020 and beyond.
- Develop research papers on reducing risk/uncertainties of NextGen Mid Term Operational Concepts.
- Document procedures to decrease workload / increase reliance on automation for routine tasking, to increase efficiency of the NAS.
- Develop operational methods document to address future growth in demand and reduce transit time.

Program Plans FY 2016 – Performance Output Goals
- Conduct concept validation studies and document findings in a concept validation report for end to end and lower level operational concepts for implementation in 2022 and beyond.
- Develop operational requirements and other documents required for technical transfer for validated concepts for implementation in 2019-2021 and beyond.
- Develop research papers on reducing risk/uncertainties of NextGen Mid Term Operational Concepts.
- Document procedures to decrease workload / increase reliance on automation for routine tasking, to increase efficiency of the NAS.
- Develop operational methods document to address future growth in demand and reduce transit time.

Program Plans FY 2017 – Performance Output Goals
- Conduct concept validation studies and document findings in a concept validation report for end to end and lower level operational concepts for implementation in 2023 and beyond.
- Develop operational requirements and other documents required for technical transfer for validated concepts for implementation in 2020-2022 and beyond.
- Develop research papers on reducing risk/uncertainties of NextGen Mid Term Operational Concepts.
- Document procedures to decrease workload / increase reliance on automation for routine tasking, to increase efficiency of the NAS.
- Develop operational methods document to address future growth in demand and reduce transit time.

Program Plans FY 2018 – Performance Output Goals
- Conduct concept validation studies and document findings in a concept validation report for end to end and lower level operational concepts for implementation in 2024 and beyond.
- Develop operational requirements and other documents required for technical transfer for validated concepts for implementation in 2021-2023 and beyond.
- Develop research papers on reducing risk/uncertainties of NextGen Mid Term Operational Concepts.
- Document procedures to decrease workload / increase reliance on automation for routine tasking, to increase efficiency of the NAS.
- Develop operational methods document to address future growth in demand and reduce transit time.

D, Environment & Energy – Environmental Management System & Noise/Emission Reduction, G06M.02-01

Program Description

The environmental and energy development efforts under this program will lead to assessments of NextGen solutions to reduce emissions, fuel burn, and noise. This effort will focus on explorations, demonstrations, and development of methods to integrate environmental impact mitigation and energy efficiency options within the NextGen infrastructure. It will also explore ways to adapt the NAS infrastructure to fully exploit the benefits of these environmental mitigation and energy efficiency options.

Environmental impacts from aviation growth could restrict capacity growth and prevent full realization of mobility envisioned by NextGen. NextGen environmental goals are to reduce system wide aviation environmental impacts in absolute terms notwithstanding the growth of aviation. The NextGen Five Pillar Environmental Approach contains several options to mitigate environmental impacts of aviation: operational procedures; aircraft and engine technologies; alternative fuels, Air Traffic Management improvements and efficiencies, environmental policies and standards; and improved tools for environmental analysis. These all enable an increase in capacity while reducing environmental impacts.

There are two environmental projects under this program.

Environment and Energy – Environmental Management System:
Solutions to achieve NextGen environmental goals must consider the effect of aviation noise and emissions on human health and welfare. The Environmental Management System (EMS) provides a framework to manage, mitigate and verify progress towards achieving the environmental goals. The EMS will employ well-developed and demonstrated environmental impacts metrics. The EMS approach will allow for the systematic examination of advanced options for noise, fuel burn, and emissions reduction to support sustainable growth in demand and mobility. Approaches will be developed and analyses conducted to track progress towards meeting emissions, noise and fuel burn efficiency goals.

Environment and Energy – Advanced Noise and Emission Reduction:
Implementation of advanced aircraft (both engine and airframe) technologies, and improved environmental and energy efficient operational procedures are keys to reductions in significant environmental impacts while improving system energy efficiency. Policy options, environmental standards and market based measures also provide mitigation that will help meet environmental and energy efficiency goals. This program will focus on assessing the impacts of mitigation actions and provide guidance on potential adaptations needed in order to maximize benefits from the mitigation actions. This program interfaces with the CLEEN (Continuous Lower Energy, Emissions and Noise) technologies program being pursued under the NextGen Environment and Energy Research and Development program.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 4 – Sustaining our Future.*
- *FAA Outcome 1 – US aviation Sector is a model for sustainable growth.*
- *FAA Performance Metric 3 – Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.*

Relationship to Performance Metrics

This program supports the FAA Destination 2025 goal for Sustaining Our Future with an outcome of the US aviation sector being a model for sustainable growth. Progress and success of this program will be measured against the performance metric to improve NAS-wide energy efficiency by at least 2% per year. This program supports accelerated maturation of CLEEN aircraft technologies through testing, demonstration and assessment. In addition, it focuses on exploration of energy efficient and environmentally favorable operational procedures. Both of these advances lead to improved energy efficiency which will be managed and tracked via the Environmental Management System. This program accelerates securing qualification of commercial alternative fuels through testing and demonstration as well as analysis of aviation environmental standards on NAS-wide operational environmental performance.

Program Plans FY 2014 – Performance Output Goals
Environmental Management System (EMS) Framework:
- Develop report on development and testing of the annual assessment & review process. This includes an evaluation of progress made towards meeting NextGen environmental goals with an assessment of knowledge gaps and technology needs.
- Establish Beta EMS website & collaboration portal that includes communication materials.
- Develop report on refinements to the program offices collaboration protocols and reward/recognition program.
- Draft initial approach to integrate National Environmental Policy Act (NEPA) considerations into existing FAA Acquisition Management System (AMS) guidance.

Advanced Noise and Emission Reduction:

- Develop report on tests and demonstrations of CLEEN Air Traffic Management (ATM)-related aircraft technologies.
- Develop report on NAS-wide assessments of environmental benefits of CLEEN aircraft technologies.
- Develop report on exploration, demonstrations and assessments of environmentally and energy efficient gate-to-gate operational procedures.
- Develop report on NAS-wide impacts of environmental standards for aircraft noise and emissions and other policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2015 – Performance Output Goals

Environmental Management System (EMS) Framework:

- Establish Beta operational version of NextGen EMS framework with stakeholder programs developed.
- Develop report on refinements in the stakeholder outreach programs, communication / collaboration protocols, and aviation environmental tools to improve NextGen EMS framework.
- Complete integration of NEPA considerations into existing FAA AMS guidance

Advanced Noise and Emissions Reduction:

- Update report on tests and demonstrations of CLEEN Phase II ATM-related aircraft technologies.
- Update report on NAS-wide assessments of environmental benefits of CLEEN Phase II aircraft technologies.
- Update report on exploration, demonstrations and assessments of environmentally and energy efficient gate-to-gate operational procedures.
- Update report on NAS-wide impacts of environmental standards for aircraft noise and emissions and policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2016 – Performance Output Goals

Environmental Management System (EMS) Framework:

- Develop report evaluating progress towards meeting NextGen environmental goals that identifies knowledge gaps and technology needs.
- Update report on refinements in the stakeholder outreach programs, communication / collaboration protocols, and aviation environmental tools to improve NextGen EMS framework.
- Develop report on targeted NEPA guidance to assist FAA program offices with planning and implementing NextGen capabilities.

Advanced Noise and Emission Reduction:

- Update report on tests and demonstrations of CLEEN Phase II ATM-related aircraft technologies.
- Update report on NAS-wide assessments of environmental benefits of CLEEN Phase II aircraft technologies.
- Update report on exploration, demonstrations and assessments of environmentally and energy efficient gate-to-gate operational procedures.
- Update report on NAS-wide impacts of environmental standards for aircraft noise and emissions and policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2017 – Performance Output Goals

Environmental Management System (EMS) Framework:

- Update report evaluating progress towards meeting NextGen environmental goals that identifies knowledge gaps and technology needs
- Update report on refinements in the stakeholder outreach programs, communication / collaboration protocols, and aviation environmental tools to improve NextGen EMS framework.
- Update report on targeted NEPA guidance to assist FAA program offices with planning and implementing NextGen capabilities.

Advanced Noise and Emission Reduction:

- Update report on tests and demonstrations of CLEEN Phase II ATM-related aircraft technologies.
- Update on NAS-wide assessments of environmental benefits of CLEEN Phase II aircraft technologies.
- Update report on exploration, demonstrations and assessments of environmentally and energy efficient gate-to-gate operational procedures.
- Update report on NAS-wide impacts of environmental standards for aircraft noise and emissions and policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2018 – Performance Output Goals

Environmental Management System (EMS) Framework:

- Update report evaluating progress towards meeting NextGen environmental goals that identifies knowledge gaps and technology needs.
- Update report on refinements in the stakeholder outreach programs, communication / collaboration protocols, and aviation environmental tools to improve NextGen EMS framework.
- Update report on targeted NEPA guidance to assist FAA program offices with planning and implementing NextGen capabilities.

Advanced Noise and Emission Reduction:

- Update report on tests and demonstrations of CLEEN Phase II ATM-related aircraft technologies.
- Update on NAS-wide assessments of environmental benefits of CLEEN Phase II aircraft technologies.
- Update report on exploration, demonstrations and assessments of environmentally and energy efficient gate-to-gate operational procedures.
- Update report on NAS-wide impacts of environmental standards for aircraft noise and emissions and policy measures to limit aircraft emissions and noise and increase fuel efficiency.

E, Wake Turbulence Re-Categorization, G06M.02-02

Program Description

Since the last full review of wake separation standards used by air traffic control, fleet mixes have changed dramatically, airport runway complexes have changed, and new aircraft designs (A-380, B787, B747-8, very light jets, unmanned aircraft systems) have been introduced into the NAS. The approximately 20 year old wake separation standards provide safe separation of aircraft from each other's wakes but they no longer provide the most capacity efficient spacing and sequencing of aircraft in terminal and en-route operations. This loss of efficient spacing has contributed to the gap between demand and NAS capacity.

The Wake Turbulence Re-Categorization program, in collaboration with EUROCONTROL, has developed new airport runway wake separation standards; and, based on that work, will develop tailored leader and follower aircraft static pair-wise wake mitigation separation standards for all aircraft. This will result in increased airport runway arrival and departure capacity, especially when the airport is experiencing weather or other conditions requiring it to operate with instrument landing procedures. By 2020, the final phase of the program will have developed the aircraft and ground based capabilities required to achieve the NextGen concept of safe, most capacity efficient pair-wise dynamic wake mitigation separations of aircraft which will adjust the required minimum aircraft wake mitigation separations based on the weather the aircraft are experiencing.

This program is part of a joint EUROCONTROL and FAA program that has reviewed the current required wake mitigation aircraft separations used in both the USA’s and Europe’s air traffic control processes and has determined the current standards can be safely modified to increase the operational capacity of airports and their surrounding airspace. Work to address the introduction of large aircraft into the NAS has occurred over the last several years to accommodate the A380, B747-8 and B787 aircraft and work will continues to address the introduction of other large aircraft into the NAS. This program builds on that joint work and is accomplishing a more general review to include regional jets, and is working towards potential procedural mitigations for Unmanned Aerial Vehicles (UAV’s), microjets, etc. The work is phased, and started with optimizing the present standards to reflect the change in fleet mix that has occurred over the last approximately 20 years. In 2010, the program provided a set of recommendations for international review that focused on changes to the present static standards. To accomplish this, the program used a data driven, relative risk safety analysis approach. That approach was complimented with enhanced analysis tools to link observed wake behavior to standards and provide additional confidence in the determined safety risk associated with potential new standards relative to existing standards. Use of the new standards in the United States began in Memphis International Airport in November 2012 and is expected to be introduced to other airports during FY 2013. In FY 2014, this project will develop a wake separation minimum matrix of approximately 100 aircraft type pairs (covering over 99% of all aircraft types operating in the world) for use by controllers and associated decision support tools in providing more capacity efficient static wake separations of aircraft flying into and out of our airports. Future work will encompass modeling and simulation to validate potential improved wake mitigation processes and standards and conduct high level analyses to link wake transport and demise characteristics to aircraft flight and surrounding weather parameters. The final phase of the program will develop aircraft and ground based capabilities required to achieve the NextGen concept of safe, efficient dynamic pair-wise wake mitigation separations of aircraft. Unlike the static separations which are constant at all times, the dynamic pair-wise separation capability will allow for the refinement of wake separation minima based on real-time weather factors, such as winds or atmospheric turbulence, to achieve the greatest airspace capacity to date while maintaining the high level of safety observed today.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This program is addressing one of the major constraints in implementing processes and procedures that will allow more aircraft flights into and out of airports and through congested air corridors. In the near term, it is rebalancing the wake turbulence separation standards to address today's mix of aircraft utilizing the nation's core airports. The Wake Turbulence Re-Categorization program is expected to yield additional arrival and departure slots for each of these airports which will directly increase the average daily airport arrival and departure capacity. The end goal of the project is to increase the core airports' hourly arrival rate, during instrument flight rules (IFR) operations, by as much as 7% to 10% - which equates to about 60 to 90 more arrivals/departures per day per airport. The 6 Category wake separation standards already developed by the project and projected to be fully available in the NAS in FY 2014 are expected to yield a 4 to 7% increase in core airport arrival rate capacity. The first operational use of the 6 Category standards is expected to occur in the first quarter of FY 2013 at the Memphis International Airport. The increased capacity is achieved by reduction in many of the in-trail separation distances of aircraft that are currently required. The proposed continued development of Leader/Follower Pair-Wise Static wake separations will allow, when implemented, an additional 4-7% increase in airport arrival capacity when the airport is operating using instrument flight rules procedures. It is projected that the Leader/Follower Pair-Wise Static wake separation standards will be implemented by the FAA in FY 2017.

Program Plans FY 2014 – Performance Output Goals

- Complete modifications to FAA Orders for Static 6 Category standards.
- Complete Leader/Follower Pair-Wise Static standards development.
- Complete development of a set of enhanced process and procedure modeling tools to evaluate proposed pair-wise dynamic aircraft wake hazard mitigation procedures.
- Complete the implementation plan for the Leader/Follower Pair-Wise Static tailored aircraft wake separation standards procedures and processes.

Program Plans FY 2015 – Performance Output Goals

- Complete a human-in-the-loop (HITL) simulation of the use of the Leader/Follower Pair-Wise Static wake separation procedures.
- Complete an updated benefit and safety assessments of the FAA developed Leader/Follower Pair-Wise Static wake separation standard procedures.
- Complete development of engineering requirements for modifying FAA ATC automation platforms to support the use of Leader/Follower Pair-Wise Static wake separation standards and the associated data fields in aircraft flight plans.

Program Plans FY 2016 – Performance Output Goals
- Complete the description of dynamic wake separation standards and the concept of how they would be applied by Air Navigation Service Providers (ANSPs).
- Deliver briefings to and conduct data gathering with the aviation community concerning the dynamic wake separation concept.
- Complete changes to FAA Orders for implementing Leader/Follower Pair-Wise Static wake separation standards.
- Complete a NAS Change Proposal (NCP) and associated Safety Risk Management Document for operational use of the Leader/Follower Pair-Wise Static wake separations.
- Complete software and adaptation changes for FAA automation platforms to enable them to support the use of the Leader/Follower Pair-Wise Static wake separation standards.

Program Plans FY 2017 – Performance Output Goals
- Complete development of Leader/Follower Pair-Wise Static wake separation standards for implementation.
- Complete analyses supporting the development of dynamic wake separation standards.

Program Plans FY 2018 – Performance Output Goals
- Complete design of dynamic wake separation standards.
- Develop process and procedures for the dynamic wake separation standards.

F, Safety, Security, Environment – System Development – Operational Assessments, G07M.02-02

Program Description

The Operational Assessment project will support NextGen implementation by performing analyses in three areas: Systems Analysis, Environmental Assessments, and NextGen Performance Snapshots.

NextGen is a complex set of technologies, processes, procedures, and policies, the execution of which is being managed by a large number of program offices from within the FAA. Each of these program offices will conduct detailed studies to support their specific activities, but, to coordinate these efforts, there must be an integrated assessment of the expected costs and benefits, and actual operational performance, of the connected activities included in these programs. Systems Analysis will prepare quantitative estimates of the anticipated operational benefits of the NextGen portfolio, through the "mid-term" and for the entire investment life-cycle; cost estimates for the overall NextGen portfolio, to include aircraft equipage costs; an integrated business case for NextGen, combining the costs and benefits to determine the return on investment (for society at large as well as individual stakeholder groups); and quantitative assessments of the operational impacts of fielded NextGen components as they become available.

Environmental Assessments will establish the environmental impacts of the current aviation system in order to quantify the change in these environmental measures from NextGen implementation. This will be done by using the environmental assessment capabilities within the Aviation Environment Design Tool (AEDT) and the Aviation Environment Portfolio Management Tool (APMT) and integrating environmental assessment capability with NAS design tools, simulation models and performance monitoring systems. Environmental assessment models will be used to estimate environmental effects and the related costs/benefits of NextGen initiatives.

The NextGen Performance Snapshots (NPS) website was created to provide post-implementation performance information at 21 Metroplexes, as well as at selected airports and airspace. It is a reporting tool designed to show whether progress has been made at specific locations after the implementation of NextGen programs. Performance measurement is based on key variables (i.e. capacity, efficiency, predictability, access, safety and environment). The website responds to the concerns of the GAO to increase transparency and to show how the goals of the FAA (Expressed in Destination 2025) are aligned with actions and commitments listed in the NextGen Implementation Plan. NPS will show how operational increments implemented at specific locations, and eventually across the NAS, have contributed to improvement in key NAS operational performance areas once they are deployed.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 4 – Sustaining our Future.*
- *FAA Outcome 1 – US aviation Sector is a model for sustainable growth.*
- *FAA Performance Metric 3 – Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.*

Relationship to Performance Metric

The program supports the transition to NextGen by providing comprehensive assessment of its environmental performance in terms of NAS-wide fuel efficiency improvement. By 2018, this program element will enhance assessment capability that will enable quantitative assessment of NAS-wide operational fuel efficiency. This assessment will provide guidance for adaptations and improvements in mitigation options needed towards achieving any shortfall in the performance metric. In addition, the program reports on ICAO performance metrics and serves to measure the impact of the implementation of improvements by NextGen Activities.

Program Plans FY 2014 – Performance Output Goals

- Release Aviation Environment Design Tool (AEDT) publicly with capability to perform airport to NAS level integrated fuel burn, noise and emissions analyses.
- Interface AEDT environmental assessment capabilities with NextGen NAS simulation models.
- Develop Aviation Environment Portfolio Management Tool (APMT) for domestic/ regional NAS-wide NextGen environmental performance optimization and impact analysis.
- Update document which analyzes and assesses NAS-wide environmental benefits of NextGen implementation.
- Update NextGen cost estimates, benefits estimates, and the overall NextGen business case.
- Publish an updated NextGen Business Case document.
- Evaluate the operational performance impacts of NextGen technologies and procedures, and publish an annual report.
- Complete additional upgrades and maintenance of the website for NextGen Performance Snapshots (NPS) to aid in the tracking and reporting of progress within NextGen.
- Update and maintain the NextGen Segment Implementation Plan to aid the planning and deployment of NextGen portfolio in the mid-term timeframe.

Program Plans FY 2015 – Performance Output Goals

- Update AEDT and APMT capabilities to quantify the change in environmental consequences and impacts as well as performance optimization from NextGen implementation from the local airport level to regional and NAS-wide evaluations.
- Integrate environmental assessment capabilities with NextGen NAS simulation models.
- Publish document assessing environmental performance of NextGen improvements.
- Update NextGen cost estimates, benefits estimates, and the overall NextGen business case.
- Publish an updated NextGen Business Case document.
- Evaluate the operational performance impacts of NextGen technologies and procedures, and publish an annual report.
- Develop document assessing data requirements for display on the web NPS.
- Maintain and update the NextGen Segment Implementation Plan to aid the planning and deployment of NextGen portfolio in the mid-term timeframe.

Program Plans FY 2016 – 2018 Performance Output Goals

- Update AEDT and APMT capabilities to quantify the change in environmental consequences and impacts as well as performance optimization from NextGen implementation from the local airport level to regional and NAS-wide evaluations.
- Integrate environmental assessment capabilities with NextGen NAS simulation models.
- Update document assessing environmental performance of NextGen improvements
- Enhance Safety Model to support NextGen Operational Assessments.
- Publish an updated NextGen Business Case document.

- Evaluate the operational performance impacts of NextGen technologies and procedures, and publish an annual report.
- Develop document collecting new NPS data information and NPS data sources for any new metrics based on information assessment.
- Maintain and update the NextGen Segment Implementation Plan to aid the planning and deployment of NextGen portfolio in the mid-term timeframe.

G, Safety, Security, Environment – System Development – Systems Safety Management Transformation, G07M.02-01

Program Description

This program conducts research to develop a comprehensive and proactive approach to aviation safety especially as it relates to the implementation of NextGen. This research enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand economic, implementation, operational and performance impacts (with respect to safety) of NextGen system alternatives. This project supports the development and implementation of integrated safety management systems across the air transportation system to ensure that the safety risk throughout the system is managed to an acceptable level. A demonstration will be conducted of a National Level System Safety Assessment working prototype that will proactively identify emerging risks as NextGen capabilities are defined and implemented. Mechanisms to define and support integrated risk-based approaches to safety and safety oversight will be prototyped to monitor operational safety and determine the safety implications of operational changes (primarily NextGen related) to the air transportation system. The activities included in the Systems Safety Management Transformation program include:

<u>Airport and Terminal Risk Baseline and Forecast:</u>
An Airport and Terminal area risk baseline will be periodically calculated and reported through the development, validation and implementation of software for surface operations and terminal areas at all 35 major airports. Using the airport and terminal area baseline, risk forecasts will be periodically calculated by the development, validation and implementation of software for surface operations and terminal areas at all 35 major airports.

<u>Integrated Safety Assessment Model Baseline and Forecast:</u>
Integrated system risk analysis baseline software programs and standardized baseline safety metrics for all aspects of the NAS will be developed, validated and implemented. Integrated Safety Assessment Forecast will develop, validate and implement system risk analysis forecasting software and a report on annual metrics and featuring the potential impact of NextGen initiatives on current and future safety baselines for all aspects of the NAS.

<u>Hazard Risk Tracking System:</u>
The tracking system will provide the capability for all FAA offices to provide integrated safety data into the baseline and to monitor safety baselines and forecasts.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9-year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. System safety management research provides a shared, proactive approach to identifying, assessing and mitigating risk making all stakeholders more effective in their approach to managing safety. Processes will be re-engineered, safety cultures will change and new technologies that prevent and mitigate incidents and accidents will be deployed within the air transportation system.

The Systems Safety Management Transformation program delivers prototype systems, functioning models, safety tools, information sharing environments and safety management analyses. Capabilities will be integrated using multiple data sources and shared across the aviation community through the deployment of local system safety risk baseline tools, risk prediction tools and integrated forecasts. Ultimately, NAS stakeholders will use the tools to identify precursors and contributing factors to accidents, allowing interventions to be developed and implemented before system safety issues manifest as accidents.

Program Plans FY 2014 – Performance Output Goals

Airport and Terminal Risk Baseline and Forecast:

- Develop standard platform software incorporating previously deployed surface and terminal area risk analysis capabilities.
- Produce an annual comparison of predicted versus actual events and precursor rates for severe accident scenarios.
- Provide a safety report on surface movement for facilities with Airport Surface Detection Equipment (ASDE-X) and other surveillance data.
- Deliver advisory group recommended analyses of operational safety assessments for NextGen concepts.
- Conduct an annual FAA-wide safety risk management coordination workshop including all Systems Safety Management Transformation stakeholders to discuss and critique methodologies, topics and results of recent activities.
- Conduct local surface and terminal area risk impact analyses for potential NextGen improvements with local risk forecast modeling assumptions adjusted to reflect the impact of NextGen improvements on throughput, delay and potential safety impacts.
- Deliver stakeholder-required analyses and reports for the advisory group using the integrated safety modeling capabilities. User requirements and feedback will be incorporated into changes in airport surface and terminal area risk baselines.

Integrated Safety Assessment Model Baseline and Forecast:

- Develop baseline event sequence diagrams and probabilistic risk-based calculations for 30 accident scenarios relevant to aviation safety, calibrated to US historical data, and accompanying fault tree analysis.
- Establish an Aviation Safety Information Analysis and Sharing (ASIAS) data interchange protocol and produce a report that provides a model-based risk assessment of an airport surface safety risk.
- Deliver a preliminary peer-review report featuring FAA/Eurocontrol data exchange on Integrated Safety Assessment Model (ISAM) and Single European Sky ATM Research (SESAR) Accident Incident Model (AIM) for system risk baselines.
- Deploy model-based risk calculation software in a secure web-based environment and produce a precursor data tracking requirements document.
- Deliver an annual NAS-wide risk impact assessment for NextGen implementation segments.
- Develop and conduct Human-In-The-Loop protocol for expert-judgment assessment of NextGen safety impacts and capture data into the ISAM model.

Hazard Risk Tracking System:

- Establish software access to the NextGen program office and other FAA safety and operational organizations so that they can provide integrated data collected via FAA-wide hazard tracking systems into the system risk baseline analysis.

Program Plans FY 2015 – Performance Output Goals

Airport and Terminal Risk Baseline and Forecast:

- Deliver trend analysis software for top 100 US airports risk estimates with data requirements for validation

Integrated Safety Assessment Model Baseline and Forecast:

- Develop baseline event sequence diagrams and probabilistic risk-based calculations for 30 accident scenarios relevant to aviation safety calibrated to US historical data as well as additional accident scenarios relevant to Unmanned Aerial Vehicle (UAV) activity.
- Deliver model-based risk calculation software deployed in web-based environment extended to include new vehicles (UAV).
- Produce precursor data tracking requirements document including data requirements for UAV modeling

Hazard Risk Tracking System:

- Improved Integration of Hazard Risk Management System tracking data with ISAM and local safety models.

Program Plans FY 2016 – Performance Output Goals
Airport and Terminal Risk Baseline and Forecast:
- Develop near real-time risk baseline function for commercial airports including real or model-based data for locations not served by ASDE-X.
- Implement system risk forecasting capability in a test-environment for all commercial NAS locations (top 35 airports and facility areas)

Integrated Safety Assessment Model Baseline and Forecast:
- Complete integration of NextGen and Single European Sky Air Traffic Management Research (SESAR) segments as relevant to domestic operations improved through metaware to support data exchange with analysis functions.
- Produce a precursor data tracking requirements document.
- Deliver annual NAS-wide risk impact assessment for NextGen implementation segments with a risk report and metric assessment using ISAM model and expert assessments.

Hazard Risk Tracking System:
- Initiate initial integrated Hazard Risk Tracking System capability.

Program Plans FY 2017 – Performance Output Goals
Airport and Terminal Risk Baseline and Forecast:
- Demonstrate near real time (15 minute interval) location specific risk baseline capability at three major airports.
- Demonstrate near real time (15 minute interval) location specific risk forecasts capability at three major airports.

Integrated Safety Assessment Model Risk Baseline and Forecast:
- Monthly NAS-wide risk metrics and reports (system baselines and operational impacts of NextGen changes).
- Monthly NAS-wide risk forecasts, trend modeling and reporting, evaluation of SESAR operational improvements as well as NextGen.

Hazard Risk Tracking System:
- Inclusion of hazards and operational requirements from an Airline Operational Control Center (AOC) is developed for hazard tracking and reporting.

Program Plans FY 2018 – Performance Output Goals
Airport and Terminal Risk Baseline and Forecast:
- Near real time location specific risk baseline capability (35 locations).
- Near real time location specific risk forecasts capability (35 locations).

Integrated Safety Assessment Model Risk Baseline and Forecast:
- Monthly NAS-wide risk metrics and report including system baselines and trends.
- Monthly NAS-wide risk forecasts, trend modeling and reporting.

Hazard Risk Tracking System:
- Inclusion of hazards and operational requirements from an AOC is developed for hazard tracking and reporting.

H, Networked Facilities – System Development – Staffed NextGen Towers, G03M.04-01

Program Description

The Staffed NextGen Tower (SNT) concept provides for a shift from using the out-the-window (OTW) view as the primary means for providing tower control services to using surface surveillance approved for operational use. With the expected increase in air traffic in the United States over the next several decades, there is a need for new, innovative ways to provide tower services. SNT is planned for high density airports as these airports are likely to have the surveillance infrastructure and most aircraft equipped with avionics that will support SNT operations.

In the near-term, this project will develop the necessary requirements, operational procedures, and supporting documentation. The application of SNT for small and medium airports (SNT-SMA) is under concept exploration and development. The development of both SNT and SNT-SMA is planned as part of this project. In addition, solutions for non-towered airports may also be examined.

In future years, operationally approved surface surveillance may be leveraged to provide contingency operations in case ATC services at a staffed terminal facility are interrupted for a limited time.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Air Traffic Control Tower (ATCT) operations are projected to increase and SNT will provide surface surveillance approved for operational use, future technologies, standards and procedures to accommodate the forecasted demand in airport services. SNTs will improve Instrument Flight Rules (IFR) throughput in low visibility and night conditions to be comparable with capacity in Visual Flight Rules (VFR), and SNTs will allow the FAA to cost effectively expand its service to meet capacity demand. SNT will also allow for delivering aviation services when a local air traffic control facility is experiencing a limited duration loss of service by allowing a contingency facility to provide those services. This will allow continued access to the airport instead of having to temporarily close the airport.

Program Plans FY 2014 – Performance Output Goals
- Develop preliminary operational procedure document in support of operationally approved surface surveillance.
- Complete update of requirement document for operationally approved surface surveillance.

Program Plans FY 2015 – Performance Output Goals
- Complete update to the operational procedure document for operationally approved surface surveillance.
- Prepare report on simulations and analyses of SNT for small and medium airports (SMT-SMA).
- Prepare concept validation document for contingency operations.
- Complete development of a SNT Requirements Document.
- Complete a Business Case Analysis Report.
- Complete updates to the Enterprise Architecture products and amendments.

Program Plans FY 2016 – Performance Output Goals
- Complete final documentation for operational procedure to support approval for operational use of surface surveillance.
- Develop initial concept of operations (CONOPS) document for SNT and validation of SNT.

Program Plans FY 2017 – Performance Output Goals
- Develop initial requirements document for SNT.
- Complete update of CONOPS for SNT.

Program Plans FY 2018 – Performance Output Goals
- Develop final requirements document for SNT.
- Complete updates to the SNT investment decision documentation.

1A08, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – TRAJECTORY BASED OPERATIONS (TBO)*

FY 2014 Request $18.0M

- A, Separation Management – Modern Procedures, G01A.01-01
- B, Trajectory Management – Oceanic Tactical Trajectory Management, G01A.02-02
- X, Trajectory Management – Conflict Advisories, G01A.02-03
- X, ADS-B In Applications – Pre-Implementation Activities, G01S.02-01

A, Separation Management – Modern Procedures, G01A.01-01

Program Description

Separation Management - Modern Procedures will develop en route automation enhancements to support planned NextGen operational improvements. Enhancements will be developed by evaluating operational needs, developing operational concepts, developing requirements documents, testing and prototyping of proposed enhancements and developing acquisition documents to support a decision for implementation.

This program is currently planning activities in the following areas:

- Developing en route NextGen enhancements associated with identifying and resolving conflicts and displaying that information on the radar console (Conflict Alert and Conflict Probe)
- Improving Flight Data display to:
    - notify controllers when an aircraft is not following the flight plan specification;
    - to determine feasibility for selective altitude restriction removal;
    - to alert controllers when an aircraft is predicted to enter active dynamic Special Activity Airspace
- Conducting operational evaluations for:
    - notifying controllers of potential separation conflicts in non-surveillance airspace;
    - integration of trial planning for flight plan adjustments on the radar console;
    - automating entry of clearances and amendments;
    - automating approval of lateral offsets;
    - automating airborne reroutes generated by TFMS.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Enhancements to ATC automation will allow controllers to make fuller use of available airspace by identifying complications along the aircraft's planned flight path and facilitating modification of the current trajectory. TBO requires this capability to increase airspace capacity and provide more efficient routes and altitudes to accommodate demand.

Program Plans FY 2014 – Performance Output Goals

- Complete requirements document for enhancements to Trajectory Modeling Accuracy and Conflict Alert and Detection Algorithms.
- Complete requirements document for Enhancements to Reduce the Trajectory Conformance Bounds for aircraft with performance based navigation capabilities.
- Complete requirements document for Integration of Trial Planning on the Radar Console.

- Complete requirements document for Approval of User Requests and Resolving Conflicts with Efficient Maneuvers in En Route Airspace.
- Complete test verification for Airborne Reroute Execution (ABRR).
- Complete risk reduction testing for ABRR.
- Complete end to end demo at ERAM WJHTC lab ABRR.
- Complete training (developmental activity) development for ABRR.

Program Plans FY 2015 – Performance Output Goals
- Complete requirements document for En Route Radar Controller Conflict Detection.
- Complete requirements document for Automated Controller-to-Controller Coordination to support conflict detection and resolution capabilities.
- Complete requirements document for Selectively Removing Altitude Restriction in the transition from en-route to terminal airspace.
- Complete procedural mitigations for Wake Turbulence for En Route Operations.
- Conduct an operational evaluation for the Integration of Trial Planning on the Radar Console.
- Conduct an operational evaluation for Approval of User Requests and Resolving Conflicts with Efficient Maneuvers in En Route Airspace.

Program Plans FY 2016 – Performance Output Goals
- Complete requirements document for Extending Trajectory Prediction and Automated Conflict Detection capabilities to include a flight management computer (FMC) route offset option for aircraft with performance based navigation capabilities.
- Conduct an operational evaluation for En Route Radar Controller Conflict Detection.
- Conduct an operational evaluation for Automated Controller-to-Controller Coordination to support conflict detection and resolution capabilities.
- Conduct an operational evaluation for Selectively Removing Altitude Restrictions in the transition from en-route to terminal airspace.
- Conduct an operational evaluation for wake mitigation procedures for En Route Operations.
- Validate requirements for Extending the Automated Conflict Detection capabilities.
- Develop plan for future activities to support development of NextGen capabilities identified in the 2017-2022 timeframe.
- Validate requirements for Extending the Trajectory Prediction and Automated Conflict Detection and Routing capabilities to utilize data communications.

Program Plans FY 2017 – Performance Output Goals
- Conduct an operational evaluation of Introduction of Flight Management Computer (FMC) Route Offset for Current Plans, Trial Plans, and Probed Menus.
- Conduct an operational evaluation for Automation Support for Non-Surveillance Airspace.
- Validate requirements for Extending the Trajectory Prediction and Automated Conflict Detection capabilities to support increased use of high altitude airspace.
- Conduct an operational evaluation for Extending the Trajectory Prediction and Automated Conflict Detection and Routing capabilities to utilize data communications.
- Develop a plan for transitioning promising NextGen technologies for enhanced separation management from the research phase into pre-implementation.

Program Plans FY 2018 – Performance Output Goals
- Update the plan for developing NextGen capabilities identified for implementation after 2018.
- Conduct an operational evaluation for Extending the Trajectory Prediction and Automated Conflict Detection capabilities to support increased use of high altitude airspace.
- Develop an Operational Concepts and Functional Requirements for transitioning promising NextGen technologies for enhanced separation management currently in the research phase into pre-implementation.

B, Trajectory Management – Oceanic Tactical Trajectory Management, G01A.02-02

Program Description

The Oceanic Tactical Trajectory Management (OTTM) seeks to optimize oceanic trajectories in four dimensions (4D). Aircraft will transmit and receive precise data, including aircraft routes and the times the aircraft will cross key airspace points. OTTM has adopted specific initiatives that address both the pre-departure and in-flight phases of oceanic flight, as well as projects that promote information sharing between the FAA and airspace users.

OTTM takes advantage of a wide-range of oceanic aircraft capabilities, Airline Operations Center (AOC) capabilities, and Air Navigation Service Provider (ANSP) capabilities, as well as evolving technologies (e.g., System-Wide Information Management [SWIM]) to develop these potential concepts. These oceanic capabilities include procedural and automation changes. The implementation of these capabilities will occur incrementally and will eventually affect all domains and phases of flights to improve airspace capacity. OTTM represents a shift from clearance-based control to trajectory-based control. By shifting to trajectory-based control, it would allow more airspace users to optimize their flight trajectories through collaborative efforts with air traffic management. Optimized flight trajectories result in savings of time, fuel, and emissions.

This program provides the following operational improvements:

- Aircraft-specific traffic flow management allowing for optimization of flight trajectories
- Increased management of flows at merge points
- Improved Air Traffic Management (ATM) by integrating weather information into decision support tools
- Providing decision support tools for the controllers, resulting in improved efficiency and increased safety

OTTM focuses on the Controller Capabilities initiative, a suite of capabilities that provide automation support to oceanic air traffic control that will enable airspace users to fly closer to their preferred 4D trajectories. These controller capabilities would be integrated with ATOP so these enhancements would be permanently available for controllers. These Controller Capabilities are:

- Auto Re-Probe Controller Capability that enables controller to keep track of previously-denied clearance change requests & automatically see when they are available. The automation will re-probe the denied request & notify the controller when the request is conflict-free,
- Auto Route Planner Controller Capability calculates wind-efficient reroute in situations where controller wants to offer a reroute, and
- Conflict Resolution Controller Capability that offers resolutions to controller for identified conflicts. The automation displays conflict-free resolution advisories to the controller for consideration in formulating a clearance.

This activity will develop web-enabled Collaborative Trajectory Planning (CTP) capabilities to share information with airlines so they can optimize planned oceanic routes for aircraft. The planned activity supporting this is:

- Pre-departure 4D-OTM: Operational trials will be initiated in FY 2016 based on work conducted in FY 2010-2015. Engineering activities will be focused on prototype requirements development, identifying hardware and software components, and prototyping for Web-Enabled Collaborative Trajectory Planning. Work will also continue to enhance profile de-confliction analysis and develop preferred profile data source requirements.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Aircraft will be able to fly more efficient, user-preferred oceanic routes. Increased system precision and enhanced automation allow the more efficient use of flight levels so that aircraft can more closely fly routes that realize the airlines' goals for fuel efficiency and schedule reliability. Reduced separation standards for aircraft that rely on shared state and intent data will lead to fewer predicted problems, and as a result, fewer diversions from the preferred routing. Reduced separation standards will also result in increased capacity within flow-constrained airspace, allowing more aircraft to fly through those areas, rather than being re-routed or delayed to avoid them.

Program Plans FY 2014 – Performance Output Goals
- Conduct modeling and simulation for the Auto Re-Probe controller capability.
- Conduct modeling and simulation for the Auto Re-Planner controller capability.
- Conduct modeling and simulation for the Conflict Resolution controller capability.
- Complete benefits analysis and business case.
- Complete concept validation for the Controller Capability initiative.

Program Plans FY 2015 – Performance Output Goals
- Complete development of Controller Capabilities transition package and documentation.

Program Plans FY 2016 – Performance Output Goals
- Complete Operational Trial Data Collections & Analysis Report for Pre-Departure Web-Enabled CTP.
- Refine Requirements for Pre-Departure Web-Enabled CTP.

Program Plans FY 2017 – Performance Output Goals
- Develop transition package and artifacts for Web-Enabled CTP.
- Conduct modeling and simulation and report on results for:
    - Traffic Congestion Depiction;
    - Flight Specific Likelihood Feedback;
    - Re-Profile Alert; and
    - Controller 4D Trajectory Insight.

Program Plans FY 2018 – Performance Output Goals
- Complete technology transfer and documentation for:
    - Traffic Congestion Depiction;
    - Flight Specific Likelihood Feedback;
    - Re-Profile Alert; and
    - Controller 4D Trajectory Insight.

X, Trajectory Management – Conflict Advisories, G01A.02-03

Program Description

This project provides the analysis, development and pre-implementation activities required to reduce en route controller workload by assisting controllers in determining conflict resolutions. It produces computer generated conflict resolution advisories, which are transmitted to aircraft first over voice and data communications, and ultimately using only data communications when equipage permits. It investigates the impacts of various equipage levels on the benefits associated with this solution as well as on controller workload and task performance. High performance aircraft will connect via air-ground data communications that directly link to the flight management system, facilitating electronic data communications between the Air Traffic Control (ATC) automation and the flight deck automation. As a first step and in mixed performance airspace, the controller will still be responsible for aircraft separation by responding to problems predicted by the ATC automation. Instead of monitoring the sector airspace display to predict potential problems and mentally calculating problem resolutions, the automation will not only predict the problems but determine the best solution. The controller will have option to transmit the solution via voice or data link for equipped aircraft. This level of automation support helps manage controller workload as a means of safely dealing with the predicted increases in traffic volume. This program will initially prototype relatively basic resolution capabilities (such as pre-probed altitude and speed amendments) that can be transferred both verbally by controllers and via data link. The program will also evaluate the impact these clearances have on the Computer-Human Interface (CHI) design and system performance. As the research matures, more complex capabilities will be investigated for future implementation such as multiple horizontal segment maneuvers. The research will evaluate the role of the human versus automation in voice clearance, mixed voice and data communications environments, and eventually data communications only.

The project is defined in terms of incremental builds of deployable capabilities. Build 1 capability includes the most mature set of tools and menus that support basic two stage maneuvers and an initial ranked list of automation generated resolutions. Build 2 will add more complex multiple segment maneuvers and more constraints such as time based metering. Future builds may include more complex topics such as the airspace constraints caused by convective weather.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Automated problem prediction and resolution will allow the controller to handle more aircraft (i.e., demand) because predicted problems will be resolved strategically, reducing the number of situations that require multiple time-critical actions.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

Program Plans FY 2017 – Performance Output Goals

- Update and publish revised operational concept and automation requirements for the Build 1 capability based on the latest NAS automation deployments and plans.
- Update prototype software platform to reflect revised operational concept and automation requirements for Build 1 capability.
- Perform and publish results on validation experiments with subject matter experts on the revised requirements for Build 1 capability.
- Perform simulations and analysis on revised Build 1 capability to support benefits case.
- Perform safety assessment on Build 1 capability.
- Begin technical transfer activities for implementation in En Route Automation Modernization (ERAM) baseline to support deployment for Build 1 capability.

Program Plans FY 2018 – Performance Output Goals

- Complete technical transfer and begin deployment activities for the Build 1 capability.
- Develop Build 2 version of the operational concept.
- Update prototype software platform for Build 2 capability.
- Validate automation requirements for Build 2 capability with experiments with subject matter experts.
- Perform simulations and analysis to support the benefits case for Build 2 capability.
- Perform safety assessment on Build 2 capability.

X, ADS-B In Applications – Pre-Implementation Activities, G01S.02-01

Program Description

This program will develop Minimum Operational Performance Standards (MOPS) and operational requirements for flight deck interval management. This is a key ADS-B IN application for the users. The application comes in two phases. The first phase is Flight Deck Interval Management-Spacing (FIM-S), which provides a no-closer-than distance for an aircraft to maintain from the aircraft it is following. Phase two will provide a designated interval. Designated interval spacing limits address both no closer than and no farther away and both limits provide for the most efficient, while maintaining safe separation spacing between aircraft to maximize airport capacity and throughput. This application is applicable to oceanic, en route, and terminal airspace and will require investments in both separation and flow automation systems as well as flight deck avionics. This activity will include prototype avionics, standards development, human-in-the-loop simulations and flight demonstrations. These capabilities will be implemented as a future segment of the ADS-B budget line item.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Improved interval management will optimize spacing resulting in maximum utilization of system capacity. It is anticipated that by reducing the inter-arrival spacing, utilization of system capacity may be increased. The full benefits case is part of the analysis.

Program Plans FY 2014 – Performance Output Goals
- None.

Program Plans FY 2015 – Performance Output Goals
- Develop Interval Management Requirements document.
- Develop MOPS document.
- Develop Technical Standard Order (TSO) documentation.
- Develop Significant Standards Differences (SSD) document.

Program Plans FY 2016 – Performance Output Goals
- Develop Automation Requirements document.
- Develop Automation Vender Specification Requirements document.
- Develop advisory circular.

Program Plans FY 2017 – Performance Output Goals
- Complete integrated system test.
- Complete operational test.
- Complete key site automation test.
- Complete Avionics Certification documentation.
- Develop operational specifications documentations.
- Complete integrated system test (all platforms running).
- Complete Safety Risk Management Document (SRMD).
- Complete operational benefits validation documentation.

Program Plans FY 2018 – Performance Output Goals

- Update benefits validation documentation.
- Complete key site automation test.

1A09, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – REDUCE WEATHER IMPACT*

FY 2014 Request $6.0M

- A, Weather Forecast Improvements, G04W.03-01
- B, Weather Observation Improvements, G04W.02-01

A, Weather Forecast Improvements, G04W.03-01

Program Description

The RWI Weather Forecast Improvements (WFI) program addresses the need to improve weather prediction and the use of weather information in the future NAS. National Weather Service (NWS) forecast models will be integrated into models that forecast weather impacts for aviation purposes. In today's NAS, traffic managers and users must mentally interpret weather conditions and the potential impact of weather on ATC decisions. RWI-WFI will improve the accuracy of aviation weather information and incorporate into collaborative and dynamic decision-making. RWI-WFI will:

1. Enable the integration of weather information into collaborative and dynamic decision-making
2. Implement advanced aviation weather information
3. Develop metrics to evaluate how effective weather improvements have been in increasing use of NAS capacity
4. Develop policies and guidance necessary for the allocation of roles and responsibilities in providing and using weather information to meet FAA requirements and US commitments to ICAO
5. Develop a process for quality control and standardization of aviation weather products

RWI will propose recommendations for near, mid and far time frames which will include a recommendation for transition of FAA legacy systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Reduce Weather Impact provides improved weather observations and forecasts and tailors weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It enhances capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of aircraft routing and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

Program Plans FY 2014 – Performance Output Goals

- Provide weather support to analyze benefits for Time Based Flow Management Work Package 3 (TBFM WP3) and Collaborative Air Traffic Management Tools Work Package 4 (CATMT WP4).

- Deliver assessment of weather information that can be translated for integration into collaborative and dynamic decision-making for Collaborative Air Traffic Management (CATM); Time Based Flow Management (TBFM) and Surface Trajectory Based Operations (STBO).
- Deliver assessment of the suitability of new/emerging weather translation technologies for eventual integration into NAS Decision Support Tools (DSTs)/processes.
- Deliver update to the Assessment of Weather Impact on Core Airports with recommendations for improvements.
- Establish quality management systems (QMS) techniques for AIRMETS.
- In coordination with EURO CONTROL, deliver initial reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of mid-term (2020) global weather standards for NextGen and SESAR.

Program Plans FY 2015 – Performance Output Goals
- Develop strategy plan for the development of weather translation techniques in support of future CATMT, TBFM, and STBO work packages.
- Complete transition of QMS process to NWS.
- In coordination with EURO CONTROL, deliver final reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of mid-term (2020) global weather standards for NextGen and SESAR.

Program Plans FY 2016 – Performance Output Goals
- Develop operational concepts document for development of weather translation techniques for future CATMT, TBFM, and STBO work packages.
- Develop evaluation plan for weather translation techniques in support of future CATMT, TBFM, and STBO work packages.
- In coordination with EURO CONTROL, deliver initial reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of far-term (2025) global weather standards for NextGen and SESAR.

Program Plans FY 2017 – Performance Output Goals
- Complete initial draft of documentation for weather translation techniques for future CATMT, TBFM, and STBO work packages.
- Complete initial evaluation document of weather translation techniques for future CATMT, TBFM, and STBO work packages.
- In coordination with EURO CONTROL, deliver updated reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of far-term (2025) global weather standards for NextGen and SESAR.

Program Plans FY 2018 – Performance Output Goals
- Complete final document of weather translation techniques for future CATMT, TBFM, and STBO work packages.
- Update evaluation documentation of weather translation techniques for future CATMT, TBFM, and STBO work packages.
- In coordination with EURO CONTROL, complete development of reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of far-term (2025) global weather standards for NextGen and SESAR.

B, Weather Observation Improvements, G04W.02-01

Program Description

Reduce Weather Impact (RWI) is a planning and development portfolio to ensure NextGen operational weather capabilities utilize a broad range of weather improvements and technologies to mitigate the effects of weather in future NAS operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. This portfolio will address many weather problems including, but not limited to:

- optimizing the aviation weather observation sensor network,
- transition of weather research to operations,
- development of weather impact metrics,
- supporting development of weather decision support tools,
- supporting integration of weather information into operations,
- supporting weather processor architecture redesign and restructuring, and
- the transition planning of legacy processor systems.

RWI will conduct planning, prototyping, demonstrations, engineering evaluation and investment readiness and analysis activities leading to an implementation of operational capabilities throughout NextGen near, mid and far term.

RWI-Weather Observation Improvements (WOI) is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. A consistent and effective aviation weather observation sensor network will be a cornerstone to improved NextGen weather capabilities. RWI-WOI will focus on evaluating the current observation capability against that needed to support NextGen. This evaluation will include a gap analysis to determine the optimal quantity and quality of ground, air and space based sensors. The analysis will determine whether cost effective sensor densities and performance, redundancies, or inconsistencies impact aviation operations. Improvements to the aviation weather observation sensor network will be a collaborative effort between the FAA and other NextGen partners including the National Oceanic and Atmospheric Administration (NOAA), and Department of Defense (DoD).

In the near term, RWI-WOI will develop and evaluate methods to consolidate the collection and processing of existing terminal surface weather observation sensor networks information, to provide improved capability, and allow sensor outputs to be more universally available. RWI WOI will,

- Identify and address gaps/shortfalls of legacy surface observation systems,
- Explore feasibility of potential sensor network consolidation and optimization for the collection and processing of data,
- Study alternatives that best meet the needs of the FAA over the long term,
- Explore accessibility to legacy and raw sensor products via NextGen standards, and
- Investigate advantages of multi-purpose sensors.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Reduce Weather Impact provides the analysis and engineering to improve weather observations and forecasts and to tailor weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It will enhance capacity by allowing fuller use of weather information for operational decision-making. This supports the optimal selection of aircraft routes and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations will enable the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace

Program Plans FY 2014 – Performance Output Goals

- Complete Acquisition Management System (AMS) artifacts for Concept and Requirements Definition Readiness (CRDR) for the NextGen Surface Observation Capability.
- Develop the Flexible Terminal Sensor Network (FTSN) demonstration strategy plan.

- Develop high level requirements for FTSN.
- Deliver initial draft of FTSN Technical and Operational Risk Assessment.
- Deliver multi-purpose sensor evaluation plan.

Program Plans FY 2015 – Performance Output Goals
- Complete AMS artifacts for Investment Analysis Readiness Decision (IARD) for the NextGen Surface Observation Capability.
- Initiate FTSN demonstration.
- Conduct the multi-purpose sensor evaluation.
- Deliver update to the FTSN Technical and Operational Risk Assessment.
- Deliver Terminal Communications Infrastructure Evaluation Plan.

Program Plans FY 2016 – Performance Output Goals
- Complete AMS artifacts for Initial Investment Decision (IID) for the NextGen Surface Observation Capability.
- Deliver FTSN demonstration interim assessment report.
- Conduct the Terminal Communications Infrastructure evaluation.
- Deliver update to the FTSN Technical and Operational Risk Assessment.

Program Plans FY 2017 – Performance Output Goals
- Complete AMS artifacts for Final Investment Decision (FID) for the NextGen Surface Observation Capability.
- Complete FTSN demonstration.
- Deliver final FTSN Technical and Operational Risk Assessment.

Program Plans FY 2018 – Performance Output Goals
- Conduct engineering analysis for Next Generation Weather Observation systems.

1A10, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – ARRIVALS/DEPARTURES AT HIGH DENSITY AIRPORTS*

FY 2014 Request $7.0M

- A, Trajectory Management – Surface Tactical Flow, G02A.01-01
- B, Trajectory Management – Time Based Flow Management (TBFM) Work Package 3, G02A.01-06 / X, Trajectory Management – Time Based Flow Management (TBFM) Work Package 4, G02A.01-08
- X, Trajectory Management – Surface Conformance Monitor, G02A.01-02

A, Trajectory Management – Surface Tactical Flow, G02A.01-01

Program Description

The Trajectory Management – Surface Tactical Flow project is focused on the development of trajectory-based surface operations in support of the NextGen initiative. It leverages the development efforts of the NASA Surface Management System (SMS), and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment, where the input of airlines, airports and air traffic controllers are all used to provide a shared surface situational awareness. This is required to safely improve the use of airport capacity, which is necessary to coordinate surface and airborne trajectory based operations.

The NextGen Concept of Operations, authored by the Joint Planning and Development Office (JPDO), states that "4DTs [four-dimensional trajectories] may be used on the airport surface at high-density airports to expedite traffic and schedule active runway crossings." Achieving this vision will require a series of advances in procedures and supporting automation systems, and collaboration between air traffic control and flight operators.

This project will demonstrate and document requirements for a series of capabilities that build to the NextGen vision for surface trajectory-based operations. Examples include local data exchange which leads to the sharing of flight readiness information and collaboration enabling pre-planned runway schedules integrated with airborne trajectory-based operations. Surface flow management will reduce engine operating times during surface operations, resulting in fuel-savings and reduced environmental impacts, and lead to collaborative resource allocation and avoidance of surface gridlock. When work is completed requirements will be transferred to the Program Management Organization.

The Trajectory Management – Surface Tactical Flow project will require changes to procedures in the flight operator and Tower environments. The concept and requirements development and acquisition process is designed to allow incremental steps toward the complete concept, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies. Testing and development of requirements will be realized through several phases.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Aircraft will move to and from the runway in a more efficient, predictable, and coordinated manner (complying with Traffic Management Initiatives and supporting user preferences), increasing efficiency and capacity while reducing controller workload through the automated assignment of runways, taxi routes, and departure queues.

Program Plans FY 2014 – Performance Output Goals

- Conduct a field evaluation of Airport and Runway Configuration Management Decision Support Tool, which will help tower controllers plan for and predict the need to reroute traffic to different runways based on forecast and actual changes in wind direction.
- Deliver Metrics Report (Fall), characterizing the use of the surface trajectory-based operations capabilities and associated benefits.
- Complete the Year-End Field Evaluation Report, documenting results and findings from all field evaluations.

Program Plans FY 2015 – Performance Output Goals

- Conduct a simulation and analysis of Airport and Runway Configuration Management Decision Support Tool for an additional airport.
- Conduct a field evaluation of Airport and Runway Configuration Management Decision Support Tool. Include participation of an Airport Authority in runway management decisions via collaborative data exchange.
- Complete an initial technical transfer of mature capabilities to the Program Management Organization.
- Complete the Year-End Field Evaluation Report.

Program Plans FY 2016 – Performance Output Goals

- Conduct a simulation of Airport and Runway Configuration Management Decision Support Tool in a Metroplex environment.
- Complete a technical transfer of mature capabilities to the Program Management Organization.
- Complete the Year-End Field Evaluation Report.

Program Plans FY 2017 – Performance Output Goals

- Conduct a simulation of a Time-Based Taxi Route Generation tool.
- Complete the Year-End Field Evaluation Report.

Program Plans FY 2018 – Performance Output Goals

- Conduct a Human-in-the-Loop evaluation of Time-Based Taxi Route Generation Tool.
- Complete a technical transfer of mature capabilities to the Program Management Organization.
- Complete the Year-End Field Evaluation Report.

B, Trajectory Management – Time Based Flow Management (TBFM) Work Package 3, G02A.01-06 / X, Trajectory Management – Time Based Flow Management (TBFM) Work Package 4, G02A.01-08

Program Description

Time Based Flow Management (TBFM) Work Packages 3 and 4 will modernize and enhance the current Traffic Management Advisor (TMA) System. The TMA is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. TMA is an automation system currently available that enables the use of time-based metering to optimize the flow of aircraft as they approach and depart congested airspace and airports. TMA has been field-tested over the past 10 years and is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the TMA Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM will improve upon TMA and directly address NextGen Solution Sets.

<u>TBFM Work Package 3 (G02A.01-06):</u>
TBFM Work Package 3 is a follow-on phase of TBFM WP2 that will implement additional NextGen concepts, such as optimized descent during time-based metering; terminal sequencing and spacing to provide efficient sequencing and runway assignment; expansion of the Integrated Departure/Arrival Capability (IDAC) to additional locations; and making TBFM more flexible to accommodate reroute operations during adverse weather conditions. The design, development and deployment of these concepts will occur during the 2015-2019 timeframe. These enhancements support the current NextGen Operational Improvements including:

- ***Improved Management of Arrival/Surface/Departure Flow Operations (104117)*** **–** Enables access to surface information to improve departure time predictions and supports a more integrated arrival/departure operation and more efficient flows.
- ***Point-in-Space Metering (104120)*** **–** Provides the flexibility to enable alternate, Predefined Meter Points (PDMP) in en route airspace, which will help to supports metering during reroute operations when nominal meter points are not available or useable due to weather or changes to traffic flows. Also adds path stretching to advisories to enable meter times to be met more efficiently and more accurately.
- ***Time-Based Metering in the Terminal Environment (104128)*** **–** Supports a time-based sequencing and spacing capability in the terminal environment by providing TBFM runway and sequence assignment information to terminal automation for display to controllers.
- ***Improved Management of Arrivals/Surface/Departure Flow Operations*** (***104117***) **–** Integrates and automates the departure capability with the TMA system (IDAC).

<u>TBFM Work Package 4 (G02A.01-08):</u>
TBFM Work Package 4 will improve the management of traffic flow in all phases of flight by using dynamic metering; replacing aged equipment with new modern equipment; providing NAS user preferences including preferred runway, arrival sequence or slot swapping; and integrating strategic and tactical scheduling to reduce delays for departures.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Target

The TBFM Work Package 3 will continue to provide complete time-based metering solutions across all phases of flight. This will increase daily airport capacity by reducing the last minute maneuvering of aircraft as they approach their destination airport and assist controllers and traffic management coordinators/specialists in organizing the arrival stream for maximum use of that airport capacity.

Program Plans FY 2014 – Performance Output Goals

TBFM Work Package 3 (G02A.01-06):

- Complete investment documentation to achieve a Final Investment Decision for TBFM Work Package 3.

TBFM Work Package 4 (G02A.01-08):

- None.

Program Plans FY 2015 – Performance Output Goals

TBFM Work Package 3 (G02A.01-06):

- Award Work Package 3 enhancements/work to approved vendor.
- Initiate lower level requirements definition and design documentation to enable the implementation of TBM WP3 capabilities.

TBFM Work Package 4 (G02A.01-08):

- None.

Program Plans FY 2016 – Performance Output Goals

TBFM Work Package 3 (G02A.01-06):

- Continue lower level requirements definition and design documentation to enable the implementation of TBM WP3 capabilities.
- Develop integrated test strategies to test and evaluate TBFM WP3 capabilities.
- Initiate the development of air traffic and technical operations training regimes and operational procedures to support the implementation of TBFM WP 3 capabilities.

TBFM Work Package 4 (G02A.01-08):

- None.

Program Plans FY 2017 – Performance Output Goals

TBFM Work Package 3 (G02A.01-06):

- Continue lower level lower level requirements definition and design documentation to enable the implementation of TBM WP3 capabilities.
- Conduct integrated testing.
- Begin the deployment of TBFM WP3 capabilities.

TBFM Work Package 4 (G02A.01-08):

- Complete investment analysis documentation for a TBFM WP4 Investment Analysis Readiness Decision.

Program Plans FY 2018 – Performance Output Goals

TBFM Work Package 3 (G02A.01-06):

- Complete the deployment of TBFM WP3 capabilities.

TBFM Work Package 4 (G02A.01-08):

- Complete investment analysis documentation for a TBFM WP4 Final Investment Decision.

X, Trajectory Management – Surface Conformance Monitor, G02A.01-02

Program Description

The Surface Conformance Monitoring (SCM) program is designed to show the potential safety and workload benefits that can be achieved through conformance monitoring of an aircraft following an assigned taxi route. The Air Traffic Controller would transmit a precise, unambiguous taxi clearance to the aircraft via data link and conformance to the clearance would be monitored by automation in the ATCT. An important consideration is the development and demonstration of user-friendly, minimal-workload methods to help the controller specify the taxi route. Conformance monitoring can be limited to route adherence only, or both route and timing through the inclusion of timed check points in the taxi clearance. By using a proactive approach to separation on the airport surface, taxiing aircraft can be "de-conflicted" with other aircraft in the taxi, landing, and takeoff phases of flight, resulting in safer ground operations. The reduction in taxi time will support use of Trajectory-Based Operations (TBO) on the airport surface.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for Taxi Conformance Monitoring in an ATCT.
- Evaluate performance of pre-established taxi routes vs. controller-generated taxi routes in a SCM environment.
- Evaluate performance of prototype surface conformance algorithms.
- Demonstrate TBO on the airport surface.

This program will not procure any new system but rather will result in the transfer of mature concepts and supporting documentation to the Tower Flight Data Manager program which will develop and implement that system with the capacity to host this surface-based capability.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

An automated means to monitor surface conformance and alert controllers to deviations from the expected taxi route will reduce controller workload, thereby freeing up controllers to manage more aircraft on the surface environment, resulting in improved capacity and efficiency. It can also reduce taxi times resulting in reduced surface delays at congested airports.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

Program Plans FY 2017 – Performance Output Goals

- Develop report documenting Human-in-the-Loop Simulations of Time-Based Surface Trajectory-Based Operations (STBO) Surface Conformance Monitoring.
- Develop field evaluation plan for 2D Surface Conformance Monitoring capabilities.
- Develop report of shadow mode evaluation of 2D Surface Conformance Monitoring at prototype field site.
- Develop operational safety assessment report for 2D Surface Conformance Monitoring.

Program Plans FY 2018 – Performance Output Goals

- Develop report based on field evaluation of 2D Surface Conformance Monitoring at prototype field site.
- Develop Concept of Use document for Time-Based Surface Trajectory-Based Operations (STBO) Surface Conformance Monitoring including Flight Deck and ground based conformance integration.

- Complete a technical transfer of mature capabilities to the Program Management Organization.

1A11, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – COLLABORATIVE AIR TRAFFIC MANAGEMENT (CATM)*

FY 2014 Request $41.0M

- A, Flow Control Management – Strategic Flow Management Integration, G05A.01-01
- B, Flow Control Management – Strategic Flow Management Enhancement, G05A.01-02
- C, Flight & State Data Management – Common Status & Structure Data, G05A.02-01
- D, Flight & State Data Management – Advanced Methods, G05A.02-02
- E, Flight & State Data Management – Flight Object, G05A.02-03
- F, Flight & State Data Management – Concept Development for Integrated NAS Design & Procedure Planning, G05A.02-04
- G, Collaborative Information Management (CIM), G05M.02-01
- H, System Development – Information Management, G05M.03-01
- X, Capacity Management – Dynamic Airspace, G05A.04-01

A, Flow Control Management – Strategic Flow Management Integration, G05A.01-01

Program Description

Strategic Flow Management Integration (SFMI) (Execution of Flow Strategies into Controller Tools) provides funding for the implementation of the En Route Automation Modernization (ERAM) modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline. These improvements include automatic identification to controllers of aircraft affected by Traffic Flow Management (TFM) Traffic Management Initiatives (TMIs). It also enables traffic managers to electronically transmit reroutes from TFM automation to ERAM for delivery to the airline operations center/flight operations center (AOC/FOC), flight crew, and the relevant air traffic control (ATC) operational positions. These decision support tools (DST) will help monitor how well aircraft are conforming to the TMI, and suggest controller actions to achieve the flow strategy.

While the process of executing a TMI is time consuming and mostly manual today, improvements in the TFM and ATC infrastructure over the next several years will make this process more efficient. ERAM is implementing flight information services as part of System Wide Information Management (SWIM) segment 1. Flight Information Services will be used to exchange flight data amendments with other Air Traffic Management (ATM) automation. SWIM is funding the infrastructure improvements which include the establishment of nodes and bandwidth requirements to connect over FAA Telecommunications Infrastructure (FTI) for data exchange, but not the applications. SFMI is providing the Concept of Operations (CONOPS), requirements and Interface Requirements documents (IRD) for the TMI information exchange to be implemented in ERAM.

This activity will also fund the requirements definition, risk mitigation and the assessment of possible changes in work behavior due to emerging technologies/DST's for increments of Flow Strategy integration. It will also begin engineering analysis for future Airborne Re-route integration needs, such as communication of complex reroutes from AOC/FOC to TFMS through ERAM to the aircraft via Data Communications in the Post-release 3 timeframe.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This program addresses the CATM performance objectives of increased capacity and flexibility. Increased capacity is achieved by the integration of strategic flow management with Trajectory-Based Operations (TBO) which provides a more structured traffic flow so that the capacity of a given airspace increases to meet demand. Flexibility is improved by more frequent use of dynamic reroutes which allows controllers and pilots to react to changing operational conditions. New rerouting concept provides controllers, pilots, and flight operators with more choices when negotiating dynamic reroutes for active aircraft.

Program Plans FY 2014 – Performance Output Goals

- Develop Preliminary Requirements document which will identify expected capabilities.
- Create Preliminary Design Document which will identify potential changes to current communication process between AOC and TMC.
- Develop Preliminary Operational Impact Document which addresses potential impact on operation.

Program Plans FY 2015 – Performance Output Goals

- Develop Initial Concept of Use document.
- Develop Operational Sequence Diagrams.
- Develop Human in the Loop (HITL) Plan for Concept Validation.
- Develop Final Operational Impact Document.

Program Plans FY 2016 – Performance Output Goals

- Develop Human in the loop simulation report.
- Develop Preliminary Computer Human Interface requirements document.

Program Plans FY 2017 – Performance Output Goals

- Develop preliminary Gap Analysis document.
- Develop preliminary benefits analysis document.

Program Plans FY 2018 – Performance Output Goals

- Prepare documents to support Concept Requirements Development Readiness (CRDR) decision.

B, Flow Control Management – Strategic Flow Management Enhancement, G05A.01-02

Program Description

The Flow Control Management – Strategic Flow Management Enhancement (SFME) program develops promising concepts to address operational Traffic Flow Management (TFM) shortfalls. In addition, the SFME program prepares analysis and documentation for the developed concepts in order to achieve Final Investment Decision for implementation.

The fundamental goal of Traffic Flow Management (TFM) is to manage the flow of air traffic to minimize delays and congestion due to system stressors such as weather or equipment outages. Today's operations could be made more efficient through establishing strategic methods for mitigating delay and capacity issues. These strategic plans may provide predictability as well as a resource to base future decisions. The systems and capabilities that are used for TFM today do not provide an adequate foundation for future enhancements.

As systems and capabilities in TFM evolved, there was little attention paid to their integration. The Traffic Management Units of today provide piecemeal operational information and tools, but do not come together to formulate a dynamic, complete view of the operation or to provide optimal support to operational decision-making. Many of the functions performed by Traffic Managers require manual assimilation of data from various sources. Similarly, limited modeling capabilities necessitate mental integration and projection of data into the future. The potential impact of some traffic management initiatives is not known until the initiative is implemented. Traffic Managers do their best to estimate the impact by gathering data and applying their experience of how the initiative has performed in the past. Not only are these processes cognitively demanding and workload-intensive, they also make the effectiveness of the outcome highly dependent on the individuals' skills and experience.

A comprehensive view of NAS status and the initiatives that are already in place will provide Traffic Managers with the information they need to identify problems earlier and to make better decisions. Better modeling capabilities will allow them to assess the effectiveness and potential impact of their decisions before they are implemented and eliminate the "wait-and-see" approach that is used today.

The SFME program will provide analysis and documentation needed for CATMT Work Package 4 (WP4) to achieve Final Investment Decision (FID) in 2015. In 2017, the SFME program will begin development of the next set, or package, of TFM enhancements.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Implementation of the capabilities in CATMT WP4 (and future TFM enhancements) will provide traffic managers with the tools and information they need to implement better, more efficient traffic management initiatives (TMIs). More efficient TMIs translates to the improved usage of available NAS resource capacity.

Program Plans FY 2014 – Performance Output Goals
- Complete document development to support the CATMT WP4 Investment Analysis Readiness Decision (IARD), including a preliminary program requirements document, enterprise architecture products and amendments, and a rough order of magnitude (ROM) Cost Estimate.
- Achieve IARD.
- Issue Screening Information Request (SIR).

Program Plans FY 2015 – Performance Output Goals
- Complete development of documents to support the CATMT WP4 Final Investment Decision.
- Achieve Final Investment Decision.
- Complete contract technical and cost proposal evaluations and award the new contract.

Program Plans FY 2016 – Performance Output Goals
- None.

Program Plans FY 2017 – Performance Output Goals
- Complete Gap analysis document to determine operational, functional and performance gaps associated with TFM after WP4.
- Complete priority ranking document of gaps for next set of TFM enhancements.
- Develop Initial Shortfalls Analysis Report and Concepts and Requirements Document (CRD) Plan.
- Achieve Concept Requirements Development Readiness (CRDR).

Program Plans FY 2018 – Performance Output Goals
- Develop necessary documentation to support IARD.
- Achieve IARD.

C, Flight & State Data Management – Common Status & Structure Data, G05A.02-01

Program Description

The Common Status and Structure program will establish the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange. The common data and information services and integration activities enable improved flight planning and pilot briefing services, increased on-demand NAS operational performance information and better airspace management using timely schedule information and a common awareness of special activity airspace (SAA) status across the NAS. This program enables the FAA to improve situational awareness through improved access to aeronautical information and a common language so that external (DoD, AOC/FOCs, GA pilots) and ANSP (users of NAS automation systems ingesting the aeronautical information feeds – e.g. TFMS) end users can make more informed decisions and plans based on the most current information available with regard to SAA, airport configuration, static constraints, and NOTAMs affecting the NAS to support NextGen capabilities.

Key elements of the Common Status and Structure program include:

- The Aeronautical Common Services (ACS) platform, which will be used to ingest data from the authoritative databases, process and combine data from these multiple sources, and distribute the data via the SWIM infrastructure. The combination of the ACS, SWIM network, and authoritative NAS databases will provide an enterprise level platform for accessing and delivering both (1) the authoritative data and/or (2) products created from multiple authoritative data sources. This enterprise level approach will enable delivery of consistent, timely, and authoritative data across various user communities including the NAS, DoD, general aviation, etc. Cloud, virtualization, and other shared platform designs for SWIM access to the data are being considered as part of the larger Agency effort to transition to a set of enterprise information and common support services,
- Capturing and maintaining digital information about flow constraints, reference data, and NAS status information affecting operations,
- Publishing aeronautical status information digitally using international standards,
- Providing value added services using aeronautical status information such as fused airspace, NOTAMs, and airport reference data in a common data model for improved flight planning and briefing services. Examples of value added services are: AI visualization/mapping, relational filtering (e.g. airspace affected by a given NOTAM, Letter of Agreement (LOA) constraints affecting a given geographic location, and SAA schedule deconfliction services), and
- Using the status information to improve operational performance metrics calculations and forecasting of airspace system performance.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Common Status and Structure Data (CSSD) provides the information, systems and tools necessary to implement comprehensive NAS safety and capacity management. CSSD will achieve this by establishing the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange. When fully realized the FAA will have the ability to model how new procedures, new regulations and new airspace changes affect current and future NAS capacity.

Identifying the requirements and benefits of integrated flight planning and briefing (including flight constraint information) will lead to better flight planning and arrival/departure capacity plans by supporting preflight, during flight and post-operational aeronautical information for exchange and use by NAS automation systems. The resulting efficiency gains will enable the FAA to maximize use of NAS capacity.

An integrated set of data services delivering both static and dynamic data through well-defined exchange mechanisms across the NAS will enable users to more easily consume and visualize the NAS status. This synthesis of the various data using standard models and ubiquitous availability in the cloud will deliver a greater degree of shared situational awareness as data can be integrated, compared, and evaluated using additional constraints and the assurance that data are related in clearly defined ways. Thus, enhanced business intelligence capabilities and a comprehensive NAS data warehouse along with new benchmarking and forecasting capabilities will enable the FAA to intelligently manage the NAS resources to optimize capacity in the face of changing conditions.

Program Plans FY 2014 – Performance Output Goals
- Develop concept of operations for the collection and dissemination of standard operating procedure/letters of agreement (SOP/LOA) to decision support tools for performing flight planning and providing situation awareness.
- Demonstrate limited SOP/LOA capture and dissemination prototype in line with the concept of operations.
- Demonstrate limited data fusion of aeronautical information including the static constraint data in SOP/LOA such as miles in trail restrictions, boundary crossings, with SAA definitions and schedules, NOTAM status, and airport configuration definition data through web services.
- Document shortfalls met by expansion of SOP/LOA data availability to consumers across a range of stakeholders and SOP/LOA scenarios through stakeholder analysis and working group feedback.
- Perform safety assessments.
- Develop artifacts to support investment analysis for AIM Modernization future Segment 3.

Program Plans FY 2015 – Performance Output Goals
- Develop cross-domain requirements document identifying operational and design requirements for users of automation systems and decision support tools to connect and ingest static aeronautical information including airspace definitions, airport configurations, schedules, and other constraints such as miles in trail restrictions, boundary crossing data, via the Aeronautical Common Services.
- Conduct IARD for AIM Modernization future Segment 3.

Program Plans FY 2016 – Performance Output Goals
- Develop interface requirements document with decision support tools and other automation using AIM information, for example, ERAM or TFDM. Specifically this effort will support acquisition engineering for those programs within the On-Demand NAS Information Portfolio in the Bravo timeframe (FY2015-FY2018).
- Conduct IID for AIM Modernization future Segment 3.
- Develop requirements for ingesting and fusing static SAA and airport configuration data including airspace definitions and schedules, airport configuration definitions and business rules with dynamic SAA and airport configuration data such as airspace hot/cold status, airport configuration in use, and additional status information from NAS systems including ERAM and TFDM respectively to deliver common status and structure data and integrated information products through web services.

Program Plans FY 2017 – Performance Output Goals
- Develop artifacts to support investment analysis for AIM Modernization future Segment 4.
- Conduct FID for AIM Modernization future Segment 3.

Program Plans FY 2018 – Performance Output Goals
- Conduct IARD for AIM Modernization future Segment 4.

D, Flight & State Data Management – Advanced Methods, G05A.02-02

Program Description

Advanced Methods for Traffic Flow Management (TFM) will explore technologies, infrastructure enhancements, and procedural changes to meet current and future traffic management needs. This work will improve airport capacity, increase sector throughput, and reduce sector delays by providing the NAS Users and Air Traffic Management (ATM) with a common understanding of the NAS Constraints. The Advanced Methods program is currently pursuing three areas for improvement: Unified Flight Planning and Filing (UFPF); NAS Common Reference (NCR); and Learning Automation.

Unified Flight Planning and Filing (UFPF):
The UFPF integrates flight planning and flight filing through an iterative and continuous process that uses a common foundation of data and functionality. The UFPF enhances strategic flight planning, improves operational performance and reduces air traffic control (ATC) workload.

NAS Common Reference:
The NCR is envisioned as an automation application for the correlation and dissemination of NAS operational data. NCR is a conceptual multidimensional model that facilitates the storage, management, retrieval, filtering, and presentation of the various types of 3-D and 4-D information. NAS operational data must be near real time due to rapidly moving aircraft, changing weather and unforeseen constraints such as runway closures or equipment failures. The NCR harmonizes and integrates information from disparate systems connecting the data objects to one another via the location, time, and functional relationships among them, storing only the relationships that associate them to one another.

Learning Automation:
Currently, traffic managers at the national level make decisions based on the current state of the NAS, near-term predictions of weather and traffic, and personal experience. The Learning Automation will examine historical weather and traffic data along with the corresponding Traffic Management Initiatives (TMIs) that were implemented and examine impacts to the system and provide recommendations on TMI or other initiates to aid decision-makers with the implementation.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Advanced methods for TFM will leverage different technologies, infrastructure enhancements, and procedural changes that will improve use of airport capacity, increase sector throughput, and reduce sector delays.

Program Plans FY 2014 – Performance Output Goals
Unified Flight Planning and Filing (UFPF):
- Develop UFPF Specific Functional Allocation – Report.
- Develop UFPF Cost Analysis for Functional Allocation – Report.

NAS Common Reference (NCR):
- Develop NCR Initial Functional Analysis – Report.
- Develop NCR Initial Functional Allocation Analysis – Report.
- Develop NCR Operational Integration Strategy – Report.

Program Plans FY 2015 – Performance Output Goals
Unified Flight Planning and Filing (UFPF):
- Develop UFPF Operational Integration Strategy – Report.
- Develop UFPF Policy Procedure Assessment – Report.

NAS Common Reference (NCR):
- Develop NCR Initial Cost Analysis – Report
- Develop NCR Initial Benefits Analysis – Report.

Learning Automation:
- Develop Initial Functional Analysis for Learning Automation – Report.
- Develop Initial Functional Allocation Analysis for Learning Automation – Report.
- Develop Operational Integration Strategy for Learning Automation – Report.

Program Plans FY 2016 – Performance Output Goals
Unified Flight Planning and Filing (UFPF):
- Develop UFPF Initial Program Requirements – Report.
- Develop UFPF Range of Alternatives – Report.
- Develop UFPF Safety Risk Assessments – Report.
- Develop a Plan for UFPF Initial Investment Analysis – Report.
- Achieve Investment Analysis Readiness Decision.

NAS Common Reference (NCR):
- Develop NCR Initial Program Requirements – Report.
- Develop NCR Range of Alternatives – Report.
- Develop NCR Safety Risk Assessments – Report.
- Develop a Plan for NCR Initial Investment Analysis – Report.
- Achieve Investment Analysis Readiness Decision.

Learning Automation:
- Develop Initial Cost Analysis for Learning Automation – Report.
- Develop Initial Benefits Analysis for Learning Automation – Report.

Program Plans FY 2017 – Performance Output Goals
Unified Flight Planning and Filing (UFPF):
- Develop Initial Business Case for the UFPF – Report.
- Develop a plan for the UFPF Final Investment Analysis – Report.
- Achieve Initial Investment Decision.

NAS Common Reference (NCR):
- Develop Initial Business Case for the NCR – Report
- Develop a plan for the NCR Final Investment Analysis – Report
- Achieve Initial Investment Decision

Learning Automation:
- Develop Learning Automation Initial Program Requirements – Report.
- Develop a Plan for Learning Automation Initial Investment Analysis – Report.
- Achieve Investment Analysis Readiness Decision.

Program Plans FY 2018 – Performance Output Goals
Unified Flight Planning and Filing (UFPF):
- Construct acquisition program baseline for the UFPF.
- Develop final Implementation Strategy and Planning documents for the UFPF.
- Achieve Final Investment Decision.

NAS Common Reference (NCR):
- Construct acquisition program baseline for the NCR.
- Develop final Implementation Strategy and Planning document for the NCR.
- Achieve Final Investment Decision.

Learning Automation:
- Develop Initial Business Case for the Learning Automation – Report.
- Develop a plan for the Learning Automation Final Investment Analysis – Report.

- Achieve Initial Investment Decision.

E, Flight & State Data Management – Flight Object, G05A.02-03

Program Description

NAS systems currently operate as separate entities servicing different flight domains (Preflight, Airport, Terminal, Enroute, Oceanic). Similarly, International Air Navigation Service Providers (ANSPs) also operate as separate entities servicing their own airspace. Even though flight data may be found in multiple NAS systems, a unified, complete, accurate, up-to-date, and easily-accessible picture of any and all flights does not exist today. The primary goal of the Flight Object program is to develop an International data standard, "FIXM" (Flight Information Exchange Model) and to support systems implementation of this data standard. This data standard will support the exchange of flight information between systems across multiple domains (including both NAS and International systems).

The Flight Object will be the standard medium for capturing and sharing the most up-to-date information on any flight, and will serve as the single common reference for all system information about that flight. A Flight Object will be created for each proposed flight, and the Flight Object information will be updated throughout the entire time the flight progresses from gate to gate. The Flight Object will collect, manage and provide flight-specific data, such as aircraft identification, aircraft parameters, current flight plan information, operator preferences, flight capabilities, and security information. The Flight Object is not envisioned to include environment or weather information, since these are system-wide elements that affect multiple flights. The sum of information contained in the Flight Object will be much richer than today's flight data construct. FIXM is part of a family of information exchange models (including AIXM - Aeronautical Information Exchange Model and WXXM - Weather information Exchange Model) designed to cover the information needs of Air Traffic Management (ATM). FIXM is an International data exchange standard, and it will receive annual incremental updates to add/delete/modify FIXM data elements as necessary.

The Flight Object work program will be composed of two major components:
1. Development of the FIXM standard, and
2. Engineering and planning of Flight Object Management Service (FOMS).

<u>Development of FIXM Standard:</u>
The FIXM Standard will be updated on an annual basis (FIXM V1.1 was approved in 2012). The following artifacts will be created for each version: FIXM data dictionary, data models and XML schema. The updates will be created with collaboration with FAA stakeholders, International partners, industry, ICAO (International Civil Aviation Organization) and IATA (International Air Transport Association).

<u>Engineering and planning of FOMS:</u>
The Flight Object Management Service (FOMS) will be the infrastructure to support a consolidated national exchange of standardized flight data. FOMS engineering and planning work will produce an implementation plan, an investment analysis and strategy, and a technical strategy. FOMS engineering and planning will be conducted in partnership with candidate FOMS programs such as TFDM, En Route Automation, Terminal Automation, TBFM, and TFMS.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Use of FIXM will provide a unified, complete, accurate, up-to-date, and easily-accessible picture of any and all flights. This use of standardized flight data will increase data quality and availability between stakeholders, enabling operational benefits such as increased coordination, common situational awareness, and collaborative decision-making across all phases of flight, thereby improving planning, decision making, and NAS capacity. Additionally, as new technologies emerge and drive solution development, the use of FIXM will improve system-to-system interoperability and can alleviate integration challenges between legacy and future systems, thereby reducing engineering and deployment costs.

Program Plans FY 2014 – Performance Output Goals

Development of FIXM Standard:

- Develop final FIXM v3.0 artifacts.
- Develop draft FIXM v4.0 artifacts.

Engineering and planning of FOMS:

- Complete engineering and investment analysis in support of the utilization of FOMS by the Traffic Flow Management System.
- Complete Requirements Document for the consolidated national exchange of standardized flight data for FOMS.

Program Plans FY 2015 – Performance Output Goals

Development of FIXM Standard:

- Develop final FIXM v4.0 artifacts.
- Develop draft FIXM v5.0 artifacts.

Engineering and planning of FOMS:

- Complete engineering and Investment Analysis planning for utilization of FOMS (FIXM v4.0) by ATM Systems (e.g., TBFM, TAMR, and TFDM).
- Complete Alternative Analysis for consolidated national exchange of standardized flight data for FOMS.

Program Plans FY 2016 – Performance Output Goals

Development of FIXM Standard:

- Develop final FIXM v5.0 artifacts.
- Develop draft FIXM v6.0 artifacts.

Engineering and planning of FOMS:

- Complete engineering and Investment Analysis planning for utilization of FOMS (FIXM v5.0) by ATM Systems.
- Complete Investment Analysis for implementation of consolidated national exchange of standardized flight data for FOMS.

Program Plans FY 2017 – Performance Output Goals

Development of FIXM Standard:

- Develop final FIXM v6.0 artifacts.
- Develop draft FIXM v7.0 artifacts.

Engineering and planning of FOMS:

- Complete engineering and Investment Analysis planning to incorporate FIXM v6.0 into FOMS.

Program Plans FY 2018 – Performance Output Goals

Development of FIXM Standard:

- Develop final FIXM v7.0 artifacts.
- Develop draft FIXM v8.0 artifacts.

Engineering and planning of FOMS:

- Complete engineering and Investment Analysis planning to incorporate FIXM v7.0 into FOMS.

F, Flight & State Data Management – Concept Development for Integrated NAS Design & Procedure Planning, G05A.02-04

Program Description

The program objective is to develop and assess airspace procedures that would allow implementation of NextGen's best equipped best served concept of operations. This concept would allow FAA to use certain altitudes and routes for those aircraft with the navigational system accuracy and the flight performance to comply with traffic management efforts to maximize the use of airspace capacity. It would also refine airport approach procedures so well equipped aircraft use more efficient descent profiles.

When some aircraft are NextGen equipped and others are not, both types of aircraft can use the airspace in different ways. To accommodate this many challenges must be addressed. It may be possible to vary separation standards based on the accuracy of the equipment aircraft use to fly approaches and departures.

Development activities will include enhancing existing fast time models and testing of alternative airspace and procedures changes using the simulators and models. Fast time modeling and human in the loop simulation of proposed airspace and procedures will be used to valid the proposed changes.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This program will contribute to the average daily airport capacity metric by providing the modeling and analysis needed to modify airspace and procedures. This will result in more efficient use of airspace thereby increasing capacity.

Program Plans FY 2014 – Performance Output Goals
- Develop a preliminary business case analysis report for Required Navigational Performance to Instrument Landing System (RNP to ILS) capture.
- Develop Design Document for initial Standard Instrument Departure / Standard Terminal Arrival Route (SID/STAR) RNP separation procedure.

Program Plans FY 2015-2018 – Performance Output Goals
- None.

G, Collaborative Information Management (CIM), G05M.02-01

Program Description

Collaborative Information Management (CIM) is an information sharing capability that promotes inter-agency communication and collaboration through the use of modern network enabled tools, technologies, and operational procedures. Stakeholders will be provided with the connectivity and interoperability necessary to rapidly and dynamically share information. The connectivity and interoperability will be enhanced by validation and development of processes and procedures to share relevant information with other government agencies that have their own System Oriented Architectures (SOA), such as the Department of Homeland Security (DHS) and the Department of Defense (DoD). The Collaborative Information Management project will also look at the use of mobile applications in a System-Wide Information Management (SWIM) structure; specifically focusing on the non-safety critical ATM function. The long term goal is to establish the requirements for robust inter-agency SOA environment that provides the equivalent of the FAA's SWIM functionality.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

With collaborative situational awareness tools available to the FAA, DoD and DHS, decision making for flights will be done efficiently and with more precise timing. This will greatly enhance the communication needed to handle future Unmanned Aircraft flights and the projected increase in air travel.

Program Plans FY 2014 – Performance Output Goals

- Report on validation of requirements for mobile applications for SWIM to support non safety-critical ATM functions,
- Report on validation of requirements of SOA-to-SOA interchange for interagency network and information exchange. Agencies such as DoD and DHS have SOA environment, this work will explore the requirements to connect and exchange information.

Program Plans FY 2015 – Performance Output Goals

- Develop a concept of use document for joint agency information sharing for operational training scenarios in NAS airspace.

Program Plans FY 2016 – Performance Output Goals

- Prepare an evaluation report on identity/access management infrastructure for joint agency information sharing.

Program Plans FY 2017 – Performance Output Goals

- Develop a prototype a joint agency framework for common computer language information sharing.

Program Plans FY 2018 – Performance Output Goals

- Prepare a report evaluating the sharing of enhanced operational data products between FAA and other agencies.

H, System Development – Information Management, G05M.03-01

Program Description

The Information Management Program addresses issues that arise when an agency moves from managing and sharing information in a legacy environment, which is controlled through a physical connection into a network environment, which only requires a simple subscription. Recent experience in sharing surface data information with users in the new service-oriented architecture approach highlighted the need to move from data sharing to full information management. This includes allocating information service by type and amount needed based on a business case analysis, establishing performance requirements for the delivery of the information and monitoring performance, establishing common protocols and standards across classes of information, and establishing the governance of how and when the information is provided. Information management is necessary to ensure the efficient use of FTI and SWIM as conduits of information.

The research on Information Management will identify the shortfalls in moving from data sharing to a network environment including: governance and evaluation techniques, criteria for managing standards, and performance monitoring techniques and policies to ensure compliance. After this analysis is complete, the activities will shift to development and implementation of the required capabilities and governance.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The goal is to ensure that in the transformation to NextGen, the necessary and required information sharing to improve situational awareness are provided with guaranteed performance. Implementation of Information Management will allow information to be shared at a level of service that will enable the NAS to more efficiently manage NAS resources to optimize capacity in the system. Achieving capacity goals requires increased sharing of data with guaranteed delivery and performance. To assure this delivery is cost effective within the evolving SWIM environment, the agency needs to migrate data sharing from a matter of access and authorization into well-defined management of data as information.

Program Plans FY 2014 – Performance Output Goals

- Complete Concept of Use Document for Information Management and governance.
- Complete Information Management Functional Description document.
- Develop responsibility matrix for information publishing.

Program Plans FY 2015 – Performance Output Goals

- Complete analysis and allocate the responsibility for publishing additional sets of information that may be required by most sophisticated users.
- Develop Information Management Governance standards.

Program Plans FY 2016-2018 – Performance Output Goals

- Complete report on performance monitoring methods to ensure delivery of agreed service performance.
- Develop and implement performance monitoring.
- Complete common information protocols and standards documentation.

X, Capacity Management – Dynamic Airspace, G05A.04-01

Program Description

CATM – Capacity Management – Dynamic Airspace will provide the tools to air traffic managers to reconfigure airspace to expand or contract air traffic control sectors to match the overall level of activity in the facility’s airspace and to dynamically deactivate restrictions on travel through designated areas. The Airspace Resource Management System (ARMS) will provide the tools for controlling the reconfiguration of the NextGen networked communications infrastructure in response to an operational requirement for reconfigurable airspace.

It is expected that airspace reconfiguration will be flexible, so that it can be applied across time horizons of varying scale – from year to month to day to hours. It will allow adjacent areas within a facility and adjacent facilities to transfer airspace when that would improve efficiency of operations, especially when faced with major constraints such as weather. The capability also provides a robust business continuity function.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Dynamic Airspace and ARMS will allow traffic managers to optimize the airspace configuration across the NAS to maximize capacity of workload-constrained airspace while addressing weather and Special Use Airspace (SUA).

Program Plans FY 2014-2016 – Performance Output Goals

- None.

Program Plans FY 2017 – Performance Output Goals

- Prepare case study of spectrum coverage and implementation analysis.
- Prepare documentation of voice switch requirements.
- Prepare operational study evaluating processes for moving sector boundaries and airspace configurations.
- Develop documentation for information loading of new airspace frequency plan into ERAM.
- Develop documentation of adaptation requirements for surveillance, flight plan posting, etc.
- Develop operational requirements for implementing Dynamic Spectrum coverage for communication.

Program Plans FY 2018 – Performance Output Goals

- Update documentation of adaptation requirements for surveillance, flight plan posting, etc.
- Update requirements documentation for radio spectrum coverage.
- Prepare operational study analyzing the reallocation for flight information for airspace among the position of an ARTCC.
- Develop Concept of Use for Dynamic Airspace Management infrastructure.
- Develop initial interface requirements.

1A12, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – FLEXIBLE TERMINAL AND AIRPORTS*

FY 2014 Request $15.0M

- A, Separation Management – Wake Turbulence Mitigation for Departures (WTMD), G06A.01-01
- B, Separation Management – Wake Turbulence Mitigation for Arrivals (WTMA), G06A.01-02
- C, Separation Management – Approaches, Ground Based Augmentation System, G06N.01-01
- D, Separation Management – Closely Spaced Parallel Runway Operations, G06N.01-02
- E, Separation Management – Approaches, NextGen Navigation Initiatives, G06N.01-03
- F, Separation Management – Alternative Positioning Navigation and Timing (APNT), G06N.01-06
- X, Surface/Tower/Terminal Systems Engineering, G06A.02-01

A, Separation Management – Wake Turbulence Mitigation for Departures (WTMD), G06A.01-01

Program Description

The Wake Turbulence Mitigation for Departures (WTMD) project will place a decision support tool into FAA air traffic control towers (ATCTs) to allow more efficient use of an airport's closely spaced parallel runways for aircraft departure operations by determining when wake turbulence effects on adjacent runways are diminished. WTMD applies NASA research along with Massachusetts Institute of Technology Lincoln Laboratory (MIT/LL) software algorithms to process both surface wind observations and forecast winds aloft, in determining when favorable crosswinds exist in relation to an airport's Closely Spaced Parallel Runways (CSPR). WTMD alerts ATCTs when these favorable meteorological conditions would allow reduced departure spacing. The ATCT personnel use WTMD inputs and other existing operational decision aids to decide if and when to reduce departure spacing. WTMD also provides alarms when such favorable crosswind conditions cease to exist. Reduced spacing on departure yields significant improvements in use of available departure capacity at airports with CSPRs. Ten of the 30 busiest U.S. airports are candidates for WTMD, based on potential capacity benefit for those airports. Benefits from the use of WTMD range between 2 to 8 more departures per hour, depending on weather, departure demand and fleet mix in the runway departure queue.

The WTMD project is a multi-year development project that in Phase 1 has developed and built the WTMD Operational Demonstration stand-alone systems. WTMD has been installed at Houston George Bush International Airport (IAH) and San Francisco International Airport (SFO) and will be installed later in FY 2013 at Memphis International Airport (MEM). The demonstration period at all three airports will be for a minimum of one year operational evaluation. This then completes the WTMD project Phase 1. If the WTMD evaluations at IAH, MEM and SFO indicate that the WTMD does deliver the expected departure capacity increase for these airports, the second and final stage of WTMD development and implementation (WTMD project Phase 2) will be proposed for implementing WTMD at the remaining seven candidate airports which are Boston (BOS), Detroit (DTW), Newark (ERW), Miami (MIA), Philadelphia (PHL), St. Louis (STL), and Seattle (SEA). A JRC decision on Phase 2 is planned to occur in FY 2013.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This project implements a technology based solution that will allow reduction of the required wake mitigation separation for aircraft departing on an airport's closely spaced parallel runways. When the runway crosswind is favorable, WTMD will allow waiving the 2 or 3 minute wake mitigation departure delay imposed on aircraft that are departing after a Boeing 757 or "heavy" wake category aircraft takes off from the adjacent CSPR. This provides 2 to 8 more departures per hour for an airport that uses its closely spaced parallel runways for departures and has a significant percentage of Boeing 757 and "Heavy" aircraft departure demand. The project will allow airports to have an incremental increased departure capacity without having to invest in runway or taxiway expansions. FAA and air carrier analyses have projected that even 2 more departures per hour at an airport will have a beneficial cascading effect during periods of heavy demand at the airport by reducing the time aircraft (and passengers) spend in the runway departure queue and by reducing the missed connections at the next airport. WTMD is also one of the first NextGen tools using weather information (in this case airport winds – actual and predicted) to provide enhanced capacity efficient air traffic control services. Results from the WTMD development can be used in subsequent NextGen era air traffic control decision support tools to service more flights into and out of capacity constrained airports and associated airspace.

Program Plans FY 2014 – Performance Output Goals

- Provide engineering support of WTMD Operational Demonstrations at Intercontinental/Houston Airport (IAH), Memphis International Airport (MEM), San Francisco International Airport (SFO) and additional airports that receive the WTMD capability.
- Conduct MEM airport's one year WTMD Operational Demonstration.
- Conduct SFO airport's one year WTMD Operational Demonstration.
- Assess system performance with new gridded wind product and identify changes to wind forecast algorithm that will safely enhance availability of reduced separation operations.
- Conduct airspace analyses for airports that are candidates for receiving the WTMD capability.

- Develop implementation waterfall and service life cycle options.
- Further deployment of WTMD depending on JRC decision.

Program Plans FY 2015-2018 – Performance Output Goals
- None.

B, Separation Management – Wake Turbulence Mitigation for Arrivals (WTMA), G06A.01-02

Program Description

This program will evaluate air traffic control wake separation decision support tool capabilities and associated prototypes as possible enablers to safely meet the predicted NextGen demand for capacity to handle additional flights in the nation's air transportation system. If the capabilities demonstrated by the prototypes are evaluated to be beneficial and are incorporated into the terminal automation systems, more flights can be accommodated by existing airport runways and in the existing airspace due to safely reducing the required wake mitigation separations between aircraft. This program is taking the results of technology research and development and new wake separation concept modeling and simulation efforts and evaluating concept feasibility prototypes for flight safety and impact on the NAS capability for meeting the demand for more flights.

Evaluation of the Wake Turbulence Mitigation for Arrivals (WTMA) capabilities will continue and requirements for implementation will be developed. The WTMA procedures would be used by controllers in reducing wake separations imposed on aircraft following behind Boeing 757 or Heavy wake category aircraft when landing on an airport's set of closely spaced parallel runways (CSPR) (runways less than 2500 feet apart).

This project will complete an adaptation of the Advanced Terminal Proximity Alert (ATPA) decision support tool to provide controller's a visual display of the required wake mitigation minimum separations to be applied during of WTMA-Procedural (WTMA-P) operations. WTMA-Procedural (WTMA-P) allows reduced wake separations to be applied during instrument landing operations at airports that meet certain CSPR layout criteria.

The WTMA capabilities, when implemented, will provide an economic boost to the nation's aviation system by restoring part of the airport landing capacity lost when an airport has to change its operation from visual approach operations to instrument approach operations and apply its attendant required wake mitigation separation minima between landing aircraft. High level analyses have indicated that the current air traffic control wake mitigation separations process, aided by technology, can be more capacity efficient while at the same time remain safe. It is expected that the project's WTMA evaluation and requirements development products will allow a rapid integration of the WTMA capability into the NextGen era FAA automation platforms.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The procedures and technology evaluated by this project will reduce the gap between an airport's visual operations landing capacity and its instrument operations landing capacity. The WTMA decision support tool capability would allow controllers to use diagonal dependent wake separations during instrument approach operations to an airport's closely spaced parallel runways in all wind conditions at some airports and at many other airports when the decision support tool is enhanced to factor in favorable crosswinds. – resulting in 8 to 10 more CSPR landings (depending on fleet mix) per hour than the airports can currently achieve during instrument operating conditions. The WTMA incremental capacity improvement can be achieved without any changes to the aircraft fleet's equipage and has a compounding beneficial flight delay reduction effect when weather conditions would otherwise have more severely cut an airport's capacity to accept flights.

Program Plans FY 2014 – Performance Output Goals

- Complete and submit the WTMA-Procedural (WTMA-P) Safety Risk Management Document (SRMD).
- Complete adaptation changes to ATPA software for the candidate airport and obtain approval to use operationally at the candidate airport.
- Complete development of WTMA-P training package for candidate airport.
- Conduct operational demonstration of the WTMA-P procedure and associated modifications to ATPA software at the candidate airport.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

C, Separation Management – Approaches, Ground Based Augmentation System, G06N.01-01

Program Description

The Ground Based Augmentation System (GBAS) augments the current Global Positioning System (GPS) service for terminal, non-precision and precision approaches in the NAS. GBAS is a cost effective alternative to Instrument Landing Systems (ILS) for Category II/III operations because a single device can serve an entire airport versus multiple ILS facilities (one at each runway end). GBAS will eliminate the need to install ILS localizers; however, approach lighting systems would still be required. The GBAS determines a correction to the GPS signal and that correction is transmitted for use by aircraft instrumentation to ensure the accuracy necessary for guidance to a runway end during limited visibility conditions.

GBAS is a component of the FAA plan to transition from a ground-based navigation and landing system to a satellite-based navigation system. The Local Area Augmentation System (LAAS) is the United States version of internationally accepted standards for Ground Based Augmentation System (GBAS) Category I (GBAS Approach Service Type C, GAST-C) services.

The worldwide community has adopted GBAS as the official term for this type of navigation system. GBAS is a ground-based augmentation to GPS that focuses its service on the airport area (approximately a 20-30 mile radius) for precision approach, departure procedures, and terminal area operations. GBAS is intended as an alternative to ILS with technical, operational, and maintenance advantages over ILS. However, because GBAS is GPS dependent, it cannot be utilized as the sole means for approaches and navigation therefore backup systems will be required.

A GBAS Category I design, the Honeywell SLS-4000, has been approved and design upgrades for radio frequency interference (RFI) mitigation are being tested at Newark. Currently a Category III Satellite Navigation (SATNAV) solution is still desired worldwide leading to the development of International Civil Aviation Organization (ICAO) standards for Category III GBAS, which have been published and are in the validation phase. The FAA work in this program builds on the Category I design and experience from that program will be used to validate the ICAO GBAS Category III requirements. The goal of this project is to support commercial development of a prototype of a Category III GBAS capability (GBAS Approach Service Type D, GAST-D) for validation testing with an option for the vendor to seek a Category III non-federal approval using the developed baseline. The Department of Defense (DoD) also plans to implement GBAS Technology in their Joint Precision Approach and Landing System (JPALS) program. Civil interoperability is a "Key Performance Parameter" to this DoD system. The FAA will support DoD developments, facilitating technology transfer as applicable.

An FAA-owned GBAS (SLS-4000) installed in Atlantic City International Airport (ACY) will continue to be used as an interim platform to develop and validate Category III requirements under this project. This program will support activities necessary to complete the required integrity reviews and produce documentation describing the results. Also, the program will conduct specialized research and development activities to address GPS degradation due to Radio Frequency Interference (RFI) issues that were identified in the implementation of a non-Fed LAAS (GBAS Cat III systems predecessor). In addition, the program will identify and address GBAS development risks, refine system and ground station requirements, and investigate potential development and procurement alternative architecture opportunities to provide future GNSS Category II/III services.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

GBAS will allow for increased flexibility in the Terminal Area by eliminating the capacity constraint due to ILS critical area limitations and thus reducing arrival and taxi delays. Future enhancements to GBAS when combined with surveillance, may allow for reduced aircraft separation in all weather conditions. Similarly, once the capability has been validated, GBAS will eventually be able to provide navigation guidance for continuous descent approaches and curved-segmented approaches in extremely low visibility conditions. In addition, GBAS will allow for increased access by allowing airports to operate in low visibility conditions where there is not sufficient demand for ILS or sites where an ILS installation is not possible due to location specific restrictions such as terrain.

Program Plans FY 2014 – Performance Output Goals

- Provide engineering analysis reports for Category III landing approach requirements to support commercial prototype development contracts.
- Provide approval documents for commercial system design.
- Complete validation of compliance with the International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPS) for the GBAS Category III system.
- Complete requirements development of GBAS Approach Service Type D (GAST-D).
- Complete Standards and Recommended Practices (SARPs) validation activities for GAST-D design modification to address impact of local GPS RFI.
- Conduct assessments and flight test support of CAT I non-Federal GBAS systems, to gain operational experience for CAT III GBAS.

Program Plans FY 2015 – Performance Output Goals

- Complete initial documentation for GBAS System Design Approval (SDA) for GAST-D.
- Complete data collection and analysis of CAT I non Federal GBAS systems for proof of concept of Cat III GBAS.

Program Plans FY 2016 – Performance Output Goals

- Complete GBAS SDA activities for GAST-D.
- Conduct initial studies for Cat III multi-constellation GNSS interoperability and requirements formulation.

Program Plans FY 2017 – Performance Output Goals

- Complete studies for Cat III multi-constellation GNSS interoperability and requirements formulation.

Program Plans FY 2018 – Performance Output Goals

- Conduct studies for Cat III multi-frequency GNSS interoperability and requirements formulation.

D, Separation Management – Closely Spaced Parallel Runway Operations, G06N.01-02

Program Description

Closely Spaced Parallel Operations (CSPO), which refers to the simultaneous approaches of aircraft pairs to airports with parallel and multiple parallel runways that are closely spaced (runways that are closer than 4300 feet), has been implemented at several Metroplex airports to meet the increased demand. Independent CSPO operations provide the maximum capacity increase while weather conditions are less than visual. But, if High Update Rate (HUR) surveillance is used in conjunction with CSPO, these operations can be used when the runway separation is 3400 feet, or in some cases, 3000 feet if one of the approaches is offset from the opposite parallel approach path. In comparison, separation standards for dependent runway operations (separation standards used for a single runway apply) can be used when runways are separated by 2500 feet or less at a limited number of airports having approval for dependent staggered approaches under specific restrictions. Instrument Meteorological Conditions (IMC) can reduce the airport arrival rate for dependent runway operations by half since aircraft are scheduled on the assumption of good weather and cleared or released based upon current and forecasted weather. Dependent CSPO under IMC conditions cause delays and increase aircraft operating costs.

The CSPO program will accelerate activities to provide increased arrival, departure and taxi operations to airports with closely spaced parallel runways in Instrument Meteorological Conditions (IMC). CSPO will develop the performance requirements that enable the implementation of innovative procedures, tools and/or controller/pilot aids that increase capacity at airports utilizing multiple independent and dependent operations. This initiative will enhance procedures that allow dependent operations to closely spaced parallel runways or converging approaches to runways closer than 2500 feet, as well as supporting independent operations to parallel runways between 2500 feet and 4300 feet. Furthermore, CSPO will identify potential alternatives for meeting functional requirements such as the application of existing and new technologies to current standards, reevaluation of the applicability of the blunder model assumptions and the use of the model on risk assessments, the application of emerging NextGen technologies to current standards, and the development of new standards to facilitate NextGen applications.

The research funded by this program is directed towards providing the aircrew with a monitoring capability that mimics the visual monitoring the aircrew uses to self-separate from other aircraft and obstacles, as allowed in Visual Meteorological Conditions (VMC) operations.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

CSPO research is focused on finding safe ways to recover lost capacity induced by the current aircraft-to-aircraft separation procedures required for simultaneous Instrument Meteorological Conditions (IMC) operations to closely spaced parallel runways. The goal of CSPO analysis is to maintain arrival rates regardless of weather conditions (IMC vs VMC). It is expected IMC arrival rates will be close to VMC rates. Some airports may increase arrival rates by as much as 6 to 12 operations per hour, though benefits will vary based on local operations and procedures.

Program Plans FY 2014 – Performance Output Goals

- Acquire High Update Rate (HUR) Surveillance Data for future analysis with closely spaced parallel operations.
- Develop departure concepts for paired aircraft.
- Prepare engineering analysis based on fast-time simulations for triple approaches or operations using three closely spaced parallel runways.
- Prepare documentation to revise dependent stagger distances from 1.5nm to 1.0nm for aircraft approaches.
- Complete document analyzing Automatic Dependent Surveillance Broadcast (ADS-B) systems application to closely spaced parallel operations.

Program Plans FY 2015 – Performance Output Goals
- Complete site-specific evaluation report for candidate site with the goal of performing fast-time simulations and collecting data via two data collection events (one in the lab and the other on-site).
- Complete enhancements and upgrades to the Modeling and Simulation Tool Suite.
- Complete report analyzing and supporting the implementation of the 3400 feet stagger and 3000 feet offset approach standards.
- Finalize Simplified Aircraft-Based Paired Approach (SAPA) Algorithm.
- Perform Human-in-the-Loop (HITL) simulations using algorithms developed for SAPA.

Program Plans FY 2016 – Performance Output Goals
- Complete enhancements to the CSPO blunder model.
- Complete report analyzing the SAPA concept.
- Complete development of Timed Paired Departure concepts.
- Conduct Timed Paired Departure Site-Specific Evaluation at a candidate site.

Program Plans FY 2017 – Performance Output Goals
- Conduct human-in-the-loop simulations of paired departure and SAPA concepts.
- Finalize analysis of paired approaches to CAT I minima.
- Support the implementation of paired approaches to CAT I approach minima at applicable airports (e.g. safety reviews and publishing orders).
- Finalize analysis of the Timed Paired Departure Concept.

Program Plans FY 2018 – Performance Output Goals
- Finalize analysis of SAPA concept for paired approaches to CAT II/III approach minima.
- Support the implementation of paired approaches to CAT II/III approach minima at applicable airports (e.g. safety reviews and publishing orders).
- Support the implementation of Paired Departures at applicable airports (e.g. safety reviews and publishing orders).

E, Separation Management – Approaches, NextGen Navigation Initiatives, G06N.01-03

Program Description

This program supports the NextGen goal to increase capacity of the NAS. It is laying the foundation to increase and improve use of area Navigation (RNAV) using Distance Measuring Equipment (DME) in the terminal domain, improve situational awareness on the airport surface, especially during low visibility, and develop requirements to move difficult new NextGen navigation initiatives forward. The two main program elements address each of these areas.

<u>Terminal RNAV DME-DME:</u>
This activity supports terminal RNAV through use of DME-DME (use of 2 or more distance measuring navigational aids) down to 2000 feet above ground level (AGL) and potentially to the Final Approach Fix (FAF), with and without the need for an inertial reference unit (IRU) in the aircraft. The success of this work will allow expansion of NextGen RNAV benefits to properly equipped aircraft other than air carriers and high end business jets. Current research and testing may lead to significant changes to the National Standard for DME usage within the United States, last updated in 1982, as well as associated FAA Orders. Implementing DME-DME RNAV requires a case-by-case analysis on each runway to determine if Expanded Service Volumes (ESVs) are feasible and plan how to implement them. The results of the work under this initiative could lead to a future service volume that is larger than the currently desired ESV as the new Standard Service Volume (SSV) throughout the NAS. This could be achieved by a standalone DME that could also aide in the VOR discontinuance effort. Research and testing is focused on determining the technical issues that are required to allow for DME-DME RNAV without IRU. This leads to a future where a greater number of operational aircraft can take advantage of RNAV beyond the major carriers.

NextGen Navigation Support:
This activity focuses on systems engineering support for new and advanced NextGen navigational concepts. This effort will provide requirements development to integrate and align development activities with tactical and strategic goals. Requirement definition is needed to support development of Enhanced Flight Vision Systems (EFVS) and the Enhanced Low Visibility Operations (ELVO) capabilities considering the impact of LED technology. This activity will also examine methods to provide improved pilot situational awareness resulting in safe surface operations during high traffic density and complex airport layout conditions. This activity would identify the navigation requirements for the aircraft to support the new Surface Movement Guidance Control System (SMGCS) Order recently published in August, 2012. Other activities include analysis for operational use of advanced technologies such as Wide Area Augmentation System (WAAS).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

This program supports the increased capacity goal by enabling an:
- Greater number of users to utilize Performance Based Navigation; and
- Greater throughput through increased surface navigation capability and situational awareness.

Program Plans FY 2014 – Performance Output Goals
Terminal RNAV DME-DME:
- Finalize and coordinate changes to National Standard (1982) for DME usage.
- Accomplish all testing necessary for NAS implementation of DME/DME RNAV without IRU.
- Complete implementation and training plan for NAS operations using DME/DME RNAV without IRU.

NextGen Navigation Support:
- Complete analysis into obtaining lower minima for satellite-based approaches, that is, ELVO 1800 feet RVR minimums for WAAS.
- Complete report investigating sensor issues for Enhanced Flight Vision Systems (EFVS), Enhanced Vision Systems (EVS), and Synthetic Vision Systems (SVS).
- Prepare report identifying issues associated with the upcoming Surface Movement Guidance Control System (SMGCS) Order for the NAS.
- Develop integrated schedule for all activities, including F&E and O&M.

Program Plans FY 2015 – Performance Output Goals
Terminal RNAV DME-DME:
- Work coordination to move stand-alone DME into NAS operations to include Agency position on increased Class B airspace, implementation and acquisition strategy proposal for regional and/or NAS-wide.

NextGen Navigation Support:
- Move ELVO Phase III work tying SMCGS and surface control to include at least SMGCS strategies and plans for NAS, concept requirements definition documentation, and impact to operations assessment.
- Develop white paper addressing alignment of strategic and tactical issues associated with NextGen navigational challenges.

Program Plans FY 2016-2018 – Performance Output Goals
Terminal RNAV DME-DME:
- Work coordination to move stand-alone DME into NAS operations.

NextGen Navigation Support:

- Move ELVO Phase III work tying SMCGS and surface control.
- Develop Action Plan and work activities based on identified need through 2016 analysis.
- Show results of Action Plan based on performance metrics.
- Publish final requirements and guidance report for ELVO Phase III SMCGS and surface control.
- Complete any AMS and pre-implementation work required associated with operations implementation already achieved, similar to ELVO Phase II.
- Complete actions per the integrated plan.
- Prepare final report on alignment of strategic and tactical issues associated with NextGen navigational challenges.

F, Separation Management – Alternative Positioning Navigation and Timing (APNT), G06N.01-06

Program Description

The Separation Management – Alternative Positioning, Navigation, and Timing (APNT) project is investigating alternatives for providing a back up for Global Positioning System (GPS)-based position, navigation, and timing (PNT) services. GPS PNT services are the enablers of performance-based navigation (PBN) and Automatic Dependent Surveillance – Broadcast (ADS-B) services that, in turn, enable Trajectory-Based Operations (TBO), area navigation (RNAV), Required Navigation Performance (RNP), and other NextGen improvements. National Policy (PPD-21/HSPD-7/NSPD-39) requires the FAA to provide a backup in the event of a GPS interference event or outage to maintain safety and security and preclude significant economic impact. NextGen APNT will provide a means for users to seamlessly continue RNAV and RNP operations to a safe landing and support critical Air Traffic Management (ATM) services during periods when Global Navigation Satellite Systems (GNSS) services are unavailable.

The FAA currently relies on aging legacy systems for GNSS alternative navigation. Existing systems, consisting of Very High Frequency Omnidirectional Range (VOR), Distance Measuring Equipment (DME) and Tactical Air Navigation (TACAN), do not fully support RNAV and RNP or Trajectory Based Operation. The NextGen APNT will explore the full range of alternatives to provide the NAS with a GPS independent backup solution to support performance based navigation.

The APNT program will conduct engineering analysis and standards development to identify technical and operational alternatives based on a concept of operations that will ensure that the services it provides will be equivalent or near-equivalent to that provided by GNSS. The APNT program will follow the FAA's AMS process to develop products including a shortfall analysis, functional analysis, operational safety assessments, requirements, range of alternatives, and cost estimates. The process will yield the best alternative for ensuring the support of NextGen operational improvements during a GNSS outage.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

This program supports maintaining operational availability of the NAS by ensuring PNT services remain available during GNSS outages. The APNT strategy is consistent with Destination 2025, the NextGen Implementation Plan and FAA Strategic Goals 1 and 2 for increased safety and capacity, respectfully. Pilots, dispatchers, and controllers will all benefit from the availability of APNT services. Specifically, pilots will be able to utilize the availability of aircraft position, navigation, and timing services during GPS outage. This will avoid inefficiencies for the pilot by eliminating an operational transition from performance-based to conventional VHF Omni-directional Range (VOR) based navigation. Furthermore, aircraft dispatchers will preserve the ability to continue to schedule operations and to choose preferred trajectories during a GPS outage. Controllers in conjunction with automation improvements will be able to manage separation services and continue performance-based operations during the loss of GPS.

Program Plans FY 2014 – Performance Output Goals
- Develop requirements document for accuracy; integrity; availability; continuity; Time to Alarm (TTA); security technology; and common time reference for alternatives' assessment.
- Award feasibility study contract(s) to develop and test prototypes for all alternatives.
- Develop Enterprise Architecture products including: High-Level Operational Concept, Operational Activity Model, Operational Event-Trace Description, System Functionality Description, Overview and Summary Information, and Integrated Dictionary.
- Develop and provide documentation for the Investment Analysis Plan.
- Develop Specialty Engineering Assessments including spectrum and signal analysis, human, and environmental factors.
- Develop safety risk management strategies and documentation.
- Complete cost estimate and preliminary benefit analysis for Investment Analysis Readiness Decision.
- Finalize Enterprise Architecture Products.
- Achieve Investment Analysis Readiness Decision (IARD).

Program Plans FY 2015 – Performance Output Goals
- Prepare initial Program Requirements Document.
- Prepare initial Business Case documentation.
- Prepare initial Implementation Strategy and Planning Document.
- Prepare final Investment Analysis Plan.
- Prepare document analyzing potential candidate solutions.
- Achieve Initial Investment Decision (IID).

Program Plans FY 2016 – Performance Output Goals
- Prepare Business Case with stakeholder involvement.
- Prepare finalized detailed program requirements.
- Prepare validated range of alternatives.
- Prepare Risk Assessment and potential mitigations.
- Prepare program budget profile.
- Prepare acquisition program baseline.
- Achieve Final Investment Decision (FID).

Program Plans FY 2017 – Performance Output Goals
- Award contract for implementation of approved solution.
- Complete key site implementation planning for initial operating capability.
- Complete Operational Test Report.
- Complete In-Service Review Checklist Status Review.
- Finalize In-Service Decision Documentation.

Program Plans FY 2018 – Performance Output Goals
- Initiate an APNT implementation plan.

X, Surface/Tower/Terminal Systems Engineering, G06A.02-01

Program Description

The Surface/Tower/Terminal Systems Engineering program is an early stage developmental program to refine and validate Terminal NextGen concepts for improving the efficiency of traffic flow in the terminal area. This program will reduce the risks inherent with introducing new technology and operational procedures using Systems Engineering analysis that examines the integrated use of techniques and equipment necessary to achieve these efficiencies. System engineering will consider the impact on the NAS architecture and the needed changes throughout the product development lifecycle for terminal systems. This program will create specific products for use by the Terminal Services organization as they develop the final system configuration.

The Surface/Tower/Terminal Systems Engineering program will primarily identify issues relative to the proposed TRACON automation capabilities as part of a Safety Risk Management activity. The program will refine the definition of proposed concepts and validate them as viable necessary additions to the NAS. Concept engineering activities include analysis, evaluation, and assessments to develop and mature concepts for changes to Terminal / TRACON automation as well as identifying procedure changes needed to support automation change within the TRACON domain. The TRACON Automation Work Package has three primary areas of focus:

- Evolution of terminal operations with an emphasis on TRACON airspace.
- Analyzing near term benefits available from proposed changes.
- NextGen concepts, plans and architecture to ensure terminal capabilities developed are in alignment with the NextGen vision.

The activities conducted in support of TRACON Automation Work Package development will reduce technical risk, quantify benefits, support alternatives development, and identify safety concerns.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The Surface/Tower/Terminal Systems Engineering project supports greater capacity by analyzing and evaluating concepts that support more efficient transfer of flight information including movement constraints to interconnected systems, facilities, controllers, pilots, and airport operators. This project will develop capabilities that will enable the Terminal domain to more efficiently balance arrivals, departures, and surface operations. The Terminal domain will be better able to sufficiently share or exchange data among the Terminal domain, other NAS domains, and NAS stakeholders that are involved in air traffic management decision making.

Program Plans FY 2014 – Performance Output Goals

- None.

Program Plans FY 2015 – Performance Output Goals

- Conduct terminal concept engineering and validation activities.
- Update the Surface/Tower/Terminal Systems Engineering program requirements document.
- Develop initial business case for the Surface/Tower/Terminal Systems Engineering program.
- Develop initial implementation strategy and planning documents for the Surface/Tower/Terminal Systems Engineering program.
- Develop a plan for the Surface/Tower/Terminal Systems Engineering program to go to final investment analysis.
- Achieve Initial Investment Decision.

Program Plans FY 2016 – Performance Output Goals

- Construct acquisition program baseline for the Surface/Tower/Terminal Systems Engineering program.
- Develop final Surface/Tower/Terminal Systems Engineering program requirements document.
- Develop final business case for the Surface/Tower/Terminal Systems Engineering program.
- Develop final implementation strategy and planning document for the Surface/Tower/Terminal Systems Engineering program.
- Update enterprise architecture products and amendments.
- Achieve Final Investment Decision.

Program Plans FY 2017 – Performance Output Goals

- Conduct analysis for TFDM capabilities not included in the core requirements.
- Develop high level architecture and requirements for future TFDM capabilities.

Program Plans FY 2018 – Performance Output Goals

- Complete concept engineering and requirements definition of future TFDM enhancements.
- Finalization and technology transfer of future TFDM enhancements.

1A13, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SYSTEM NETWORKED FACILITIES*

FY 2014 Request $9.0M

- A, Networked Facilities – Integration, Development and Operations Analysis Capability, G03M.02-01
- B, Networked Facilities – Test Bed Demonstration, G03M.03-01

A, Networked Facilities – Integration, Development and Operations Analysis Capability, G03M.02-01

Program Description

The NextGen Integration and Evaluation Capability (NIEC) supports the development, reconfiguration, and sustainment of a laboratory environment to assess NextGen technologies and concepts in an integrated and rapid prototyping environment. The NextGen concepts of operation and supporting technologies are not only sophisticated, but very complex. This laboratory allows early evaluations, concept development, and/or demonstrations in a real-time environment without being encumbered by the present structure of the NAS.

The primary goal of NextGen is to address and meet the rapidly changing needs of the United States aviation industry. For example, NextGen breaks down the geographical boundaries that characterize air traffic control and leads to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. New infrastructure, automation, aircraft equipage, procedures, and regulations are designed to support this seamless operational concept which must evolve from a geographical focus to a broader air traffic management concept. It will be necessary to test the integration, development, and operations functions in a real-time and flexible environment to validate the broad framework of concepts, technologies, and systems introduced by NextGen.

The NIEC has been designed with the intent to support the development, refinement and validation of NextGen from concept definition, to requirements maturity, to integration of NAS capabilities across the various NAS domains. As such, the NIEC infrastructure provides a flexible (e.g., researchers can select features to include in a project), extensible (e.g., additional hardware can be added as well as software/functionality), and reconfigurable environment (e.g., capabilities may reside in the NIEC or be networked in) to implement existing and new ATM systems, as well as to implement prototypes and capabilities, for the purpose of evaluating and demonstrating NextGen concepts. The requirements in this area will continue to grow as NextGen matures.

Key characteristics of the laboratory capability include:

- A collocated display area to support Human-in-the-Loop simulations;
- A real-time rapid prototyping and simulation environment that simulates the NAS while integrating NextGen enabling components;
- A low-to-medium fidelity simulation environment; and
- An integrated federal laboratory capability to support high fidelity simulations.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The integration, development, and operational analysis capability provides the support services, and software and hardware required to enhance and sustain the NextGen Integration and Evaluation Capability (NIEC) to conduct early proof of concept studies, rapid prototyping, validate and mature concepts, reduce risks, and improve operational performance across all NextGen solution sets. With the collocation of NIEC and the William J. Hughes Technical Center laboratories, each NextGen program need not establish and maintain separate laboratory facilities. It enables the FAA to evaluate concepts and programs that span more than one domain of the NAS and integrate NextGen solutions into the NAS.

Research activities in the NIEC do not require a NAS change proposal and does not fund the acquisition program office when changes are required of the NAS system that is simulated in the NIEC. The NIEC has on staff computer programmers that can modify the FAA owned source code to add in the new functionality (i.e., increase DataComm messages, display new weather information or enhance data blocks). The researcher can conduct their research in the NIEC and get the results needed in a timelier and cheaper manner than using the FAA fielded system. The programming staff can often add new capabilities in days or weeks rather than the months or years it would take to get a NAS change proposal, contract modification, and have code written and tested by the vendor. It should be noted that the NIEC offers to the NextGen researcher a laboratory that is available and flexible when compared to scheduling other FAA laboratories that is mainly used for 2nd level maintenance support. Utilizing the NIEC for research purposes reduces the impact to the FAA’s operational milestones in the areas of test, implementation, and 2nd level maintenance. This reduces the overall risks and cost to the FAA and helps critical NextGen programs maintain cost and schedule targets. This results in overall operational efficiency and cost savings to the FAA.

Program Plans FY 2014 – Performance Output Goals

- The NIEC facility will maintain a minimum of 80% up-time for customer availability.
- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations for FY 2014.
- Integrate Traffic Flow Management (TFM) Auxiliary Platform into the NIEC to support the NextGen studies such as the Mini Global Study. This will include the ability to manipulate information on the Traffic Situation Displays (TSDs) and to drive data to the Florida Test Bed.
- Complete the Reconfigurable Cockpit Simulator technology refresh.

Program Plans FY 2015 – Performance Output Goals

- The NIEC facility will maintain a minimum of 80% up-time for customer availability.
- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations for FY 2015.
- Integration of the En Route Automation Modernization (ERAM) Evaluation System (EES) into the NIEC and the ability to use the EES for NIEC projects.
- Identify and develop additional Traffic Management Unit (TMU) capabilities in the NIEC.

Program Plans FY 2016 – Performance Output Goals

- The NIEC facility will maintain a minimum of 80% up-time for customer availability.
- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations for FY 2016.
- Enhance NIEC System Wide Information Management (SWIM) Segment 1 services to support emulated SWIM Implementation Programs in the NIEC.
- Add a new aircraft model to the Reconfigurable Cockpit Simulator.

Program Plans FY 2017 – Performance Output Goals

- The NIEC facility will maintain a minimum of 80% up-time for customer availability.
- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations for FY 2017.
- Augment the Terminal capability in the NIEC with an Automated Safety Alerting Tool.

Program Plans FY 2018 – Performance Output Goals

- The NIEC facility will maintain a minimum of 80% up-time for customer availability.
- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations for FY 2018.
- Add a new aircraft model to the Reconfigurable Cockpit Simulator.

B, Networked Facilities – Test Bed Demonstration, G03M.03-01

Program Description

The Florida NextGen Test Bed (FTB) provides a robust platform where early-stage NextGen concepts can be integrated, demonstrated, and evaluated. Partnerships with industry are key to the mission of the FTB, where industry, airlines, cargo carriers, other Air Navigation Service Providers (ANSPs) and academia have the opportunity to work in a joint effort with the FAA to help advance NextGen technologies. The site provides the FAA and industry an agile environment for the rapid integration of new and emerging technologies, prototypes and applications into existing or planned NAS systems.

The FTB core infrastructure is architected and configured to enable remote connections with other FAA NextGen and industry partner sites to allow for multi-site demonstration capabilities. Through appropriate governance and oversight, the FTB provides the ability for industry to bring and integrate new concepts and technologies, maintain and sustain their systems at the FTB, and conduct ongoing activities. This unique approach promotes innovation from industry, encourages in-kind contributions and R&D investment, and leverages industry's capabilities to provide cost savings to the FAA and help accelerate NextGen development.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The NextGen Test Bed provides a platform for new NextGen demonstrations to be quickly and efficiently conducted at an early stage without affecting NAS operations. This reduces risk and overall costs by enabling the FAA to evaluate the viability of these new technologies and concepts before making further investments and decisions on potential implementation in operations. In addition, the NextGen Test Bed approach of establishing partnerships with industry promotes contributions and R&D investment from industry, and leverages industry's capabilities, which provides cost avoidance to the FAA and helps to accelerate NextGen development.

Program Plans FY 2014 – Performance Output Goals

- Continue the integration of systems between remote FAA and Industry sites and leverage each other's capabilities including the capabilities required to support global harmonization.
- Establish core supporting services, including data archiving and data playback capabilities to support growing demonstration needs.
- Install a Target Generation Facility (TGF) system in the FTB to provide simulated CONUS radar data services.
- Enhance the System Wide Information Management (SWIM) system, NAS Enterprise Messaging System (NEMS), infrastructure to align with current SWIM program standards and support future NextGen studies.

Program Plans FY 2015 – Performance Output Goals

- Develop bi-directional communications between the ground and aircraft, for the exchange of information between ground systems and en-route aircraft to facilitate demonstration concepts.
- Establish Airline Operation Center (AOC) flight planning, filing, and monitoring capabilities to augment airline operations capabilities.
- Establish connectivity to Department of Defense (DoD) Defense Research and Engineering Network (DREN) to support inter-agency research activities.
- Develop plan for FY 2016 FTB technology refresh.

Program Plans FY 2016 – Performance Output Goals

- Perform technology refresh of FTB systems and network equipment to support upcoming NextGen concepts and maintain reliability, improve performance, and ensure compatibility with current-day Commercial of the Shelf (COTS) systems.
- Provide additional demonstration scenario development, validation, and analysis tools to facilitate NextGen Test Bed demonstrations.

Program Plans FY 2017 – Performance Output Goals

- Expand telecommunication infrastructure with increased bandwidth and data services to support additional live data streams to the FTB.
- Expand virtual tower environment to enable Staffed NextGen Tower operational concepts and demonstration activities.
- Review and update the Governance model, document, and associated agreements and supporting documents based on lessons learned.

Program Plans FY 2018 – Performance Output Goals

- Establish connection to Daytona Beach (DAB) airport tower to provide communication with FTB systems and support shadow operations.
- Review and update FTB website and other outreach materials (brochures, etc.) to promote industry participation.

1A14, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – FUTURE FACILITIES*

FY 2014 Request $10.0M

Networked Facilities – Future Facilities – Segment 1, Project 1, G03F.01-01

Program Description

The Future Facilities program office is responsible for planning, developing, and designing air traffic control facilities of the future. The scope of the Future Facilities Program is focused on the near-term goal of addressing facility challenges and air traffic delays in New York (NY). The New York metropolitan area accounts for up to 46% of delays in the NAS. The FAA plans to integrate the NY TRACON (N90) and NY ARTCC (ZNY), and combine operations into an Integrated Control Facility (ICF) – NY ICF.

The NextGen program benefits from redesigned air traffic control systems that are flexible, scalable, and easily maintained. FAA's infrastructure, automation, equipage, procedures, and regulations must evolve from a geographical focus to support the seamless operational and broader air traffic management. Air traffic control facilities must be redesigned to accommodate new technologies and facilitate new operational approaches.

The Future Facilities Program received an Initial Investment Decision (IID) on November 16, 2011. The program is currently developing a business case for the NY ICF and is actively working with the Airspace Redesign Office to determine the share of operational benefits realized by the integration of the New York area En Route and Terminal operations. The NY ICF will help the Agency take full advantage of the benefits of airspace redesign efforts, increase operational efficiencies, maintain or improve safety, and deliver an improved work environment for employees.

The Future Facilities Program will continue to develop its Portfolio Level Agreements (PfLAs) with FAA's inter-dependent programs, such as En Route Automation (ERAM), Advanced Technologies & Oceanic Procedures (ATOP), terminal automation replacement (TAMR), NAS Voice System, Power Systems, and other efforts to ensure that critical equipment is available for installation and testing at the new NY ICF.

Site selection, land acquisition and the appropriation of funds for the building construction are required to enable the program to move forward. The funding presented in Appendix C assumes that the construction funds proposed in the FY 2014 President's budget as part of the Immediate Transportation Initiative (ITI) are appropriated. Approval of the site selection is planned in 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The Future Facilities Program focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. The program will provide for expanded services; service continuity; and optimal deployment and training of the workforce all supported by cost-effective and flexible systems for information sharing and back-up. Traffic will be assigned to facilities on both a long-term and daily basis with service continuity a foremost requirement. Business continuity will be built into the system to provide for a more resilient infrastructure, better contingency operations, and a higher degree of service. With these new infrastructure capabilities, the ability to efficiently handle current and future demand will be improved resulting in increased system capacity.

Program Plans FY 2014 – Performance Output Goals
- Conduct internal and external review of land appraisals.
- Complete final site selection report.
- Complete draft layout of operational floor configuration.

Program Plans FY 2015 – Performance Output Goals
- Complete land environmental assessment.
- Complete land acquisition.

Program Plans FY 2016 – Performance Output Goals
- Complete facility design.
- Complete site preparation and setup of utility infrastructure.
- Award construction contract (dependent upon ITI).

Program Plans FY 2017 – Performance Output Goals
- Complete electronics engineering design.
- Procure Prime Mission Equipment (PME).

Program Plans FY 2018 – Performance Output Goals
- Update operational transition plan.
- Procure remaining PME.

1A15, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – PERFORMANCE BASED NAVIGATION (PBN) – METROPLEX AREA NAVIGATION (RNAV)/REQUIRED NAVIGATION PERFORMANCE (RNP)*

FY 2014 Request $32.2M

- A, Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP), G05N.01-01
- B, Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – NAVLean, G05N.01-02

A, Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP), G05N.01-01

Program Description

NextGen Performance Based Navigation – Metroplex RNAV/Required Navigation Performance (RNP) will develop procedures at Metroplexes to improve airspace efficiency. The Airspace Optimization Group will begin integrated airspace design and associated activities, including traffic flow analysis, arrival and departure route design and procedures optimization. This will lay the framework for developing PBN initiatives. Airspace and procedure integration for Metroplexes allows:

- examining use of additional transition access/egress points not tied to ground-based navigation aids;
- concurrent development and implementation of arrival and departure procedures;
- ensuring an integrated approach to optimizing procedures;
- decoupling conflicting operations to and from primary and secondary/satellite airports serviced by the same complex terminal airspace; and
- developing high altitude routes through congested airspace to create more efficient routes between major metropolitan areas.

Implementation of RNAV and RNP routes and procedures will address the RTCA Task Force 5 recommendations, maximize benefits, and accelerate NextGen concepts.

<u>Optimization of Airspace and Procedures for Metroplexes (OAPM):</u>
Airspace Redesign and procedure development will target specific Metroplex areas that have been designated as high priority by criteria established by FAA with input from RTCA, through the use of quantitative and qualitative metrics. The current plan (study team through implementation) will address 13 Metroplex efforts. These can be unique Metroplex locations (e.g. North Texas with Dallas/Fort Worth (DFW), Dallas Love Field Airport (DAL), and other regional airports) or consolidated Metroplex locations (e.g. Central and Southern Florida Metroplexes (Orlando (MCO), Miami (MIA), Tampa (TPA), Palm Beach (PBI), Fort Lauderdale (FLL) and other regional airports) combined into a single effort to take advantage of overlapping areas of concern. This approach will begin in FY 2010 and will complete implementation at the selected locations by FY 2017. Study Teams' results will guide the implementation of those improvements that have the highest benefits. Design work will include analyses and simulations, assessments of alternatives, and modeling of projected airspace and procedures benefits.

Optimization of Airspace and Procedures in the Metroplex Waterfall with Phases Schedule.

	FY11		FY12				FY13				FY14				FY15				FY16				FY17				FY18		
Site	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
DC	D	D	D	D	E	E	E	E	E	I	I	I	I	P	P														
No Tex		D	D	D	E	E	E	E	E	I	I	I	I	P	P														
Houston	S	S		D	D	E	E	I	I	I	I	P	P																
Charlotte	S			D	D	D	E	E	E	E	E	E	I	I	I	I	P	P											
Atlanta		S	S	D	D	D	E	E	E	E	E	I	I	I	I	P	P												
No Cal	S			D	D	D	E	E	E	E	E	E	I	I	I	I	P	P											
So Cal		S	S				D	D	D	E	E	E	E	E	E	I	I	I	I	P	P								
Florida					S	S			D	D	D	E	E	E	E	I	I	I	I	P	P								
Phoenix							S	S	D	D	D	E	E	E	E	E	I	I	I	I	P	P	P						
Chicago								S	S	D	D	D	E	E	E	E	E	I	I	I	I	P	P						
Memphis											S	S		D	D	D	D	E	E	E	E	I	I	I	I	P	P		
Cleveland/Detroit											S	S		D	D	D	E	E	E	E	E	I	I	I	I	P	P		
Boston												S	S		D	D	D	E	E	E	E	E	I	I	I	I	P	P	

Key:

Eastern Service Area
Central Service Area
Western Service Area

S Study
D Design
E Evaluate
I Implement
P Post-Eval

- Study and Scoping: The Study Phase is conducted by teams that identify issues and propose potential solutions through facility and industry interface meetings. Lead carriers will provide industry representatives. This phase will produce a set of conceptual designs, with a high-level assessment of benefits, costs, and risks.

- Design and Procedure Development: The Design Phase creates the detailed Integrated Airspace and Procedures design work. The work conducted in this phase uses the results of the study teams and is conducted by a D&I team. Lead carriers will provide industry representatives. When appropriate and justified, on-site Human-in-the-Loop (HITL) simulations and other design analyses may be part of this phase.

- Evaluation: The Evaluation Phase is conducted by the D&I team after design and procedure development. It includes all necessary operational modeling, safety management system (SMS) analyses, and environmental reviews. Lead carriers will provide industry representatives. If analyses are conducted during the Design Phase, they may be used for the Evaluation Phase.

- Implementation and Training: The Implementation Phase is the last part of the OAPM process conducted by the D&I team. This phase includes all steps required for implementation of the OAPM project including flight inspections, publishing procedures, planning and executing training. Lead carriers will provide industry representatives.

- Post Implementation Review and Modifications: The Post-Implementation Phase includes a review of the implemented airspace and procedures changes to determine if they have delivered desired benefits and/or caused other impacts. Modifications or refinements may be made to better achieve desired benefits or address unforeseen impacts.

NextGen Safety:

Changes to the NAS require safety analyses and documentation. Funding will be used to obtain support services from the Aviation Safety organization to review and approve the implementation of these new flight procedures. Safety inspectors, engineers and other safety staff will be needed to support RNAV and RNP approvals and the associated surveillance techniques to ensure pilots follow the procedures. Safety personnel will also update standards to be consistent with modern aircraft capabilities such as PBN operations utilizing a Dual Heads-Up Display (HUD). A contract will fund technical support and training material including course development, video production, maintenance of training equipment, and course implementation.

Specific areas of work will include:

- Study and implement improvements to separation standards for arrivals, departures, approaches, and en route operations in support of Metroplex operations and evolving PBN criteria.
- Enhancements to PBN operations through improvements to low visibility operations using Enhanced Flight Vision System (EFVS), Synthetic Vision System (SVS), and Combined Vision System (CVS).
- Provide safety risk analysis and studies, flight simulation and data collection for continued improvements to PBN operations. This will provide supporting data to update PBN instrument flight procedure criteria and guidance materials.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 1 – Optimize airspace and Performance Based navigation (PBN) procedures to improve efficiency an average of 10 percent across core airports by 2018.*

Relationship to Performance Metric

Developing performance based navigation in Metroplex airspace will allow more efficient use of the airspace and increases in arrival and departure flows.

Program Plans FY 2014 – Performance Output Goals

Optimization of Airspace and Procedures for Metroplexes (OAPM):

- Complete analysis and studies at two Metroplex locations.
- Begin OAPM design work at two Metroplex locations.
- Begin OAPM pre-implementation/evaluation activities at three Metroplex locations.

NextGen Safety:

- Evaluate evolving PBN operations including low visibility operations and determine if revised criteria or additional policy and guidance are needed.

Program Plans FY 2015 – Performance Output Goals

Optimization of Airspace and Procedures for Metroplexes (OAPM):

- Completion of the Evaluation Phase at one Metroplex location.
- Completion of Design and Procedure proposals for three Metroplex locations.
- Completion of the Evaluation Phase at one Metroplex location.

NextGen Safety:

- Perform safety studies to validate criteria development.

Program Plans FY 2016 – Performance Output Goals

Optimization of Airspace and Procedures for Metroplexes (OAPM):

- Completion of the Implementation Phase at three Metroplex locations.
- Completion of the Evaluation Phase at two Metroplex locations.
- Complete Post-Implementation and lessons learned evaluation resulting in a complete prioritization of sites for Phase two of OAPM.
- Completion of Study Team Procedure proposals for one Metroplex locations.

NextGen Safety:

- Develop criteria, policy, and guidance.
- Continue to evaluate PBN operations.

Program Plans FY 2017 – Performance Output Goals

Optimization of Airspace and Procedures for Metroplexes (OAPM):

- Completion of the Implementation Phase at two Metroplex locations.
- Completion of Study Team Procedure proposals for two Metroplex locations.
- Completion of Design Team Procedure proposals for two Metroplex locations.

NextGen Safety:

- Issue revised criteria policy and guidance.
- Perform safety studies to validate criteria development.

Program Plans FY 2018 – Performance Output Goals

Optimization of Airspace and Procedures for Metroplexes (OAPM):

- Initiate the Post-implementation Phase at two Metroplex locations
- Completion of Study Team Procedure proposals for two Metroplex locations.
- Completion of Design Team Procedure proposals for two Metroplex locations.

NextGen Safety:

- Develop criteria, policy, and guidance.
- Continue to evaluate PBN operations.

B, Collaborative ATM (CATM) – NextGen Performance Based Navigation (PBN) – NAVLean, G05N.01-02

Program Description

The Navigation Procedures Implementation Plan (NAV Lean) was published in June, 2011, in response to the Navigation (NAV) Procedures Project Final Report, dated September 2010, containing 21 recommendations to streamline the Instrument Flight Procedures (IFP) development process. This program will facilitate implementation of the recommendations to include a streamlined version of the current core process (request, design and development, approval, implementation, and maintenance) for developing instrument flight procedures. It will also clarify the role of auxiliary processes, such as Safety Management System (SMS), environmental, and operational approval. The process will be better managed by having all IFP requests submitted through an authorized Web-based portal established as the official entry point into a system for processing, tracking, and managing the IFP development life cycle.

NAV Lean will allow participants in the process to obtain up-to-date information concerning an IFP status, exchange information with other system users, and will provide an archive function and audit trail. This system will also serve as a gateway to the consolidated databases required for IFP design and development, applicable publications, and forms and templates. Consolidation and standardization of the databases will provide improved data integrity and improved process management. Use of this system will facilitate early screening of requests to ensure they are complete and have been assigned a priority, and it will provide transparency for users. It will also ensure that safety, airspace, operational approval, and environmental aspects are all considered early in the process. Use of this common portal will also facilitate the early recognition of potential requirements for new or modified criteria.

NAV Lean Implementation of the future IFP process is expected to significantly reduce the average time required to implement IFPs and will position the FAA to meet the increased demand for instrument flight procedures that are the cornerstone for NextGen. Achieving this optimal future process and all of its benefits will require full implementation of all recommendations.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Measure 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

Nav Lean improved processes will result in better managed IFP requests which have been submitted through an authorized web-based portal established as the single entry point into a system for requesting, processing, tracking, and managing the IFP development life cycle. At least a 40% improvement in processing time is estimated and this high quality procedure development will enhance NextGen efforts.

Program Plans FY 2014 – Performance Output Goals
- Establish standardized databases with designated custodianship and data stewards.
- Deliver data layer (data services) for Nav Lean subject areas.
- Standardize software and data formats.
- Support provision of a single set of data via web services in conjunction with other NAV Lean recommendations.
- Develop and implement a secured technical solution for authentication and access point for external users.
- Complete integration and implementation of Survey, Obstacles, and Navaids Authoritative Sources.
- System development and testing phase of Airports, Points and Holding, Enroute, Departures, and Approaches Authoritative Sources.
- Establish electronic process to allow abbreviated amendments for Standard Terminal Approach Routes (STARs).
- Establish a Web-based Operations Approval Entry portal and a Web-based work package.
- Establish and implement a Web-based request and access portal as the mandatory entry point for all IFP requests and/or inquiries.

Program Plans FY 2015 – Performance Output Goals
- Migrate National Airspace System Resource (NASR) functionality into AirNav 2.0.
- Complete implementation of a secured technical solution for authentication and access point for external users.
- Complete system development and testing of Airports, Points and Holding, Enroute, Departures, and Approaches Authoritative Sources.
- Complete integration and implementation of Airports, Points and Holding, Enroute, Departures, and Approaches Authoritative Sources.
- Complete Web based Request and Access Portal Testing and Implementation.
- Complete Web based Request and Access Portal Stakeholder and User Training.
- Standardize software and data formats that allow auto-population/extraction of data to produce, populate, and edit documents that are accessible to all parties for review.
- Develop, implement, and ensure standards to electronically communicate, transfer, and integrate data among tools.

Program Plans FY 2016-2018 – Performance Output Goals
- None.

1A16X, Next Generation Air Transportation System (NextGen) – Safety, Security and Environment*

FY 2014 Request $0.0M

X, Security Integrated Tool Set (SITS), G07A.01-01 / X, Security Integrated Tool Set (SITS) – Work Package 1, G07A.01-02

Program Description

The Security Integrated Tool Set (SITS) is part of the NextGen. It is an automated system used to identify airborne security threats in the NAS and communicate that information to the appropriate information system or agency. It will collect data from several sources to determine the level of the security threat or, in the case of lost pilot or NORDO (no radio), whether it is a threat or not. It will collect data from several automation systems and be able to share it with agencies with a national security responsibility. This data will be provided to selected FAA users and to inter-agency defense and homeland security partners (e.g., Department of Defense, Transportation Security Agency, and Customs and Border Protection) through a secure network to allow real-time collaboration and a Common Operational Picture to monitor these threats, determine the threat level, and help to facilitate the operational response.

The Security Integrated Tool Suite (SITS) is a suite of applications designed to provide integrated security solution support for Air Traffic Management (ATM) operations. SITS automation capabilities will integrate FAA and interagency systems to ensure seamless and effective delivery of capabilities. The FAA must ensure the SITS automation includes a robust ability for providing shared situational awareness (SSA), decision support (including risk analysis leveraging interagency resources), information sharing, automated threat detection, monitoring, and post-event analysis and playback. NextGen will see a substantial off-loading of routine tasks from the user to automation, so SITS must accommodate this approach while ensuring that there is a "human-in-the-loop" to make crucial security decisions when required. The NextGen environment will present new challenges because of the volume of information which needs to be processed, consolidated, and interpreted by the SITS system so it can be presented to all stakeholders in an efficient and logical way.

<u>SITS (G07A.01-01):</u>
Activities will include reviewing prior SITS program documentation and updating as required to complete Initial Investment Decision (IID) in FY 2016 and Final Investment Decision (FID) in FY 2017. AMS artifacts developed will include the Investment Analysis Plan, Operational Safety Assessment, Critical Concepts Identification/Analysis, Initial Program Requirements, Initial Alternative Analysis, Business Case Analysis Report, Implementation Strategy and Planning Document, Enterprise Architecture Product Update, and Acquisition Program Baseline.

<u>SITS Work Package One (WP1) (G07A.01-02):</u>
Establish the acquisition program for SITS WP1. The primary outcome of this project is to produce a fully deployed and supported operational capability that fulfills stated requirements, is acceptable to the users, is integrated with other NAS products and services, and realizes the benefits in the WP1 product baseline. Product segment specifications will be completed as well as FAA internal and external system Interface Control Documents (ICDs). Detailed software and hardware design documents will be developed leading to demonstration and initial deployment of the SITS capability in 2020.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate)*
- *FAA Performance Measure 4 – Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent*

Relationship to Performance Target

Provide a system which distributes airspace security related information in a secure infrastructure so that a common situational awareness can be achieved among all of the agencies involved in providing for National Security. Develop preparedness tools that enable us to sustain this common security situational awareness.

Program Plans FY 2014-2015 – Performance Output Goals
- None.

Program Plans FY 2016 – Performance Output Goals
<u>SITS (G07A.01-01):</u>
- Complete update of Program Management Plan.
- Complete documentation for IID in 2016.

<u>SITS WP1 (G07A.01-02):</u>
- None.

Program Plans FY 2017 – Performance Output Goals
<u>SITS (G07A.01-01):</u>
- Complete analysis and documentation for SITS FID in 2017.

<u>SITS WP1 (G07A.01-02):</u>
- None.

Program Plans FY 2018 – Performance Output Goals
<u>SITS (G07A.01-01):</u>
- Award SITS WP1 development contact.

<u>SITS WP1 (G07A.01-02):</u>
- Begin SITS WP1 Implementation with Initial Operation Capability (IOC) in FY 2020.

ACTIVITY 2: AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A: En Route Programs

2A01, EN ROUTE AUTOMATION MODERNIZATION (ERAM)

FY 2014 Request $26.1M

En Route Automation Modernization (ERAM), A01.10-01

Program Description

ERAM replaces hardware and software for the En Route automation system at all 20 Air Route Traffic Control Centers (ARTCCs) and at the Technical Center. The baseline ERAM program (A01.10-01) has four segments: Enhanced Backup Surveillance (EBUS), En Route Information Display System (ERIDS), ERAM Release 1, and ERAM Releases 2 and 3. The first segment, EBUS was completed during FY 2006. The second, ERIDS, was completed in FY 2008. ERAM Release 1 replaced the current Host Computer System with a new automation system that expands the Host's capability so the new system can handle additional airspace capacity, and improve efficiency and safety. From a functionality standpoint, Release 1, as originally planned, was intended to contain the capabilities and performance required to achieve acceptable operational suitability and effectiveness. ERAM Release 2 was a planned maintenance software release containing fixes to software problems. ERAM Release 2 also allowed the program office to incorporate a substantial amount of core functionality improvements, as articulated in the Office of Management and Budget (OMB) improvement plan and reflected as part of the Joint Resource Council (JRC) re-baselining in June 2011. Release 3 was planned to incorporate NextGen transformational program infrastructure into ERAM including interfaces with Automatic Dependent Surveillance – Broadcast (ADS-B), Pre-Departure Re-Route, and address International Civil Aviation Organization (ICAO) 2012 requirements.

Releases 1-3 were originally scheduled to be complete in FY 2011. However, there were challenges that were encountered once operational testing of the software at the key sites began in June 2009. These included problems with interfaces with other facilities and other systems that were not identified earlier due to the limitations of the testing environments at the William J. Hughes Technical Center and at the contractor's facility not being fully representative of the actual complex operational environment at field facilities. Additionally, there were problems with some interfaces that are only needed during the transition from the legacy automation system to ERAM but are not needed once ERAM is fully operational. Also, additional familiarization time was needed because ERAM does some processing differently than HOST so system behaviors are different than what the field operators have been used to and were expecting. These challenges resulted in delaying the implementation of ERAM through FY 2014 and requiring additional acquisition funding in FY 2011 – FY 2014 of approximately $330M.

As many of the required fixes were already developed in conjunction with Release 2, the program decided to use Release 2 for the waterfall deployment of ERAM. The Salt Lake City (ZLC) key site has been successfully operating ERAM Release 2 in a continuous Operational Suitability Demonstration (OSD) phase since October 19, 2010 and the Seattle (ZSE) site since Dec 28, 2010. Independent Operational Assessment (IOA) was conducted at both the Salt Lake City and Seattle key sites and an In-Service Decision was approved on March 29, 2011 with an Action Plan to address hazards documented through the IOA process. The core functionality improvements necessary to mitigate the identified hazards were implemented in three build phases as part of Release 2 completion. The IOA re-assessment against the identified hazards was completed in December 2011 and confirmed that the high hazards had been successfully mitigated to sufficient levels to continue with the waterfall deployment. Both Salt Lake City and Seattle sites have obtained Operational Readiness Date (ORD) on March 23, 2012 and April 23, 2012 respectively. Additionally, Seattle achieved ORD on Release 3 on August 20, 2012. Three sites (Denver (ZDV), Albuquerque (ZAB), and Minneapolis (ZMP)) successfully achieved Initial Operating Capability (IOC) by the end of December 2011. An additional three sites (Chicago (ZAU), Los Angeles (ZLA), and Oakland (ZOA)) successfully achieved IOC in the second quarter of FY 2012. FY 2012 funding will complete software updates required for deployment to these sites with additional funding required to complete the waterfall deployment to the remaining sites in FY 2013. On April 14, 2012, IOC with ERAM Release 3 was achieved with ADS-B at the Houston (ZHU) ARTCC Release 3 is planned to be used as the waterfall release for the remainder of the sites during the completion of the IOC waterfall through FY 2013.

All sites are planned to achieve IOC by the end of FY 2013 and the last site ORD is planned to be achieved prior to the end of FY 2014. The ERAM program was re-baselined to incorporate the additional cost ($330M) and schedule (from December 2010 to the end of August 2014) in June 2011.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

ERAM contributes to the FAA's strategic goal Delivering Aviation Access through Innovation and the Performance Metric for achieving average daily airport capacity by increasing the number of flight plans that can be stored to 65,536 (versus the current 2,600); providing flexibility in airspace configuration; and extending the radar coverage in all En Route Centers by increasing the number of radar feeds from 24 to a maximum of 64. ERAM also provides better flight planning data, integrates additional surveillance data which facilitates controllers' ability to optimize the airspace, provides more dynamic routing and situational awareness of the airspace, and quicker updates of critical aircraft information. Additionally, improved access to flight conditions and meteorological information provided by the ERAM allow controllers to access this information more quickly and efficiently and to integrate it more readily into the decision making processes, reducing controller workload. In addition to the baseline improvements, ERAM provides the infrastructure to realize improved navigation, communications, and surveillance benefits of NextGen which drive efficiency enhancements and will allow the FAA to handle the anticipated growth and complexity of the NAS.

Program Plans FY 2014 – Performance Output Goals

- Complete ERAM deployment achieving last site ORD.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

System Implementation Schedule

2A02, En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements (ERAM System Enhancements and Technology Refreshments and ERAM Sector Enhancements)*

FY 2014 Request $65.0M

Trajectory Based Operations – Separation Management – En Route Automation Modernization (ERAM) D-Position Upgrade and System Enhancements, G01A.01-04

Program Description

The ERAM D-Position Upgrade and System Enhancements program consists of the following segments: "ERAM System Enhancements and Technology Refreshments" and "ERAM Sector Enhancements".

<u>ERAM System Enhancements and Technology Refreshment:</u>
"ERAM System Enhancements and Technology Refreshment" consists of any necessary Technology Refresh; as well as enhancements outside the scope of the original core ERAM system which were either identified by ERAM users after ERAM was deployed and operational, or are enhancements which were identified and matured through NextGen research and development investment. In particular, System Enhancements are intended to improve aircraft separation services by reducing levels of missed and false alerts from tactical and strategic conflict alerting functions. ERAM System Enhancements also include improvements to Special Activity Airspace (SAA) automation and ATOP interaction enhancements.

Technology Refresh will address ERAM equipment that has become obsolete or is near or at end-of-service life. A substantial number of ERAM components were procured in 2006 and require planning for long lead times for procurement and deployment to the NAS.

<u>ERAM Sector Enhancements:</u>
Sector Enhancements provides software and hardware enhancements to the ERAM system for the En Route sector controller team. It is a multi-year effort to improve the efficiency and effectiveness of En-Route Sector operations by facilitating increased strategic and tactical cooperation between the Radar Controller position (R-Position) and the Radar Associate position (D-Position) as well as establish a common processing platform, with similar tool sets, that may be tailored for either position. This program will re-engineer the D-Position computer-human interface (CHI) software, along with a modification to the R-Position CHI software, to provide a common interface at both positions. The D-Position upgrade would provide commercially-available-off-the-shelf monitors, which are larger than the FAA-specific equipment currently installed, and higher capacity processors that can readily manage more data.

Initial and final investment decisions are planned for FY 2014. Prime contractor system engineering, software development, and implementation activities are planned to begin in 2015 and complete in 2020. Hardware upgrades start in 2015 with deployment to En Route labs in 2016.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The ERAM effort will enable NextGen capabilities to be implemented allowing the increased efficiency and capacity benefits projected for this system enhancement.

Program Plans FY 2014 – Performance Output Goals
<u>System Enhancements and Technology Refreshment:</u>
- System engineering for high priority enhancements based on input from ERAM users.
- Software design, development and deployment of enhancements based on input from ERAM users.
- Complete software and hardware requirements documentation for initial enhancements based on inputs from ERAM users.
- Complete system engineering documentation for first round of technology refreshments.

ERAM Sector Enhancements:

- Complete Sector Enhancements Requirements Document.
- Complete Early System Engineering, Risk Reduction and Prototyping activities.
- Achieve Initial Investment Decision (IID) and Final Investment Decision (FID) in FY 2014.

Program Plans FY 2015 – Performance Output Goals

System Enhancements and Technology Refreshment:

- Procure and install first round of ERAM Technology Refresh equipment at developer and WJHTC facilities.
- Develop and install candidate high priority ERAM system enhancements that are based on needs identified by ERAM users.
- Complete software development of candidate high priority ERAM System Enhancements with mature requirements and software designs, which will likely include Conflict Probe improvements, R-Position Conflict Probe, redesigned Aircraft List on the D-Position, ATOP interactions and update of D-Side software to match the new "alerts" functionality of the R-Side.
- Complete software development for En Route Information Display System (ERIDS) enhancements.
- Commence the integration and test of system enhancements.
- Commence ERIDS hardware and software installations at supplemental sites.
- ERAM System Enhancements software installations.
- Engineer first round of ERAM Technology Refresh.

ERAM Sector Enhancements:

- Complete ERAM Sector Enhancements software design.
- Conduct Software Design Review of ERAM Sector Enhancements.
- Complete hardware Engineering Analysis, Trade Study, and Selection documentation for the Sector Enhancements display and processor.

Program Plans FY 2016 – Performance Output Goals

System Enhancements and Technology Refreshment:

- Complete the integration and test of system enhancements developed in FY 2015.
- Develop and deploy high priority ERAM system enhancements that are based on needs identified by ERAM users.
- Complete Software Requirements Specifications of additional ERAM System Enhancements.
- Commence system and software engineering of additional ERAM System Enhancements.
- Complete software design review of additional ERAM System Enhancements.
- Complete Technology Refresh Implementation Plan for second round of ERAM Technology Refresh.
- Develop and test first round of ERAM Technology Refresh solutions.

ERAM Sector Enhancements:

- Start Sector Enhancements software development.
- Complete Sector Enhancements Hardware Design.
- Procure and install Sector Enhancements hardware at contractor and WJHTC labs.
- Complete Sector Enhancements Hardware Implementation Plan.
- Procure Sector Enhancements hardware.

Program Plans FY 2017 – Performance Output Goals

System Enhancements and Technology Refreshment:

- Begin software development of additional System Enhancements.
- Complete the integration and test of system enhancements developed in FY 2016.
- Develop requirements documentation for high priority ERAM system enhancements that are based on needs identified by ERAM users.
- Continue investment analysis activity to baseline follow-on program segment to the ERAM D-Position and System Enhancements Program.
- Complete Engineering design for second round of ERAM Technology Refresh.

ERAM Sector Enhancements:
- Complete software development of ERAM Sector Enhancements.
- Complete integration and test of the ERAM Sector Enhancements software.

Program Plans FY 2018 – Performance Output Goals
System Enhancements and Technology Refreshment:
- Complete integration and test of ERAM System Enhancements developed in FY 2017.
- Complete software development of additional ERAM system enhancements.
- Begin integration and test of additional ERAM System Enhancements.
- Complete Requirements Document for follow-on program segment to the ERAM System Enhancements and Technology Refreshment program.
- Develop high priority ERAM system enhancements that are based on needs identified by ERAM users.
- Continue investment analysis activity to baseline follow-on program segment to the ERAM System Enhancements and Technology Refreshment program.
- Develop and test second round of ERAM Technology Refresh solutions.
- Complete Technology Refresh Implementation Plan for third round of ERAM Technology Refresh.

ERAM Sector Enhancements:
- Complete Sector Enhancements hardware acquisition and begin deployment to sites.
- Complete deployment of Sector Enhancements hardware upgrades at Key Site.

2A03, EN ROUTE COMMUNICATIONS GATEWAY (ECG)
FY 2014 Request $2.2M

En Route Communications Gateway (ECG) – Technology Refresh, A01.12-02

Program Description

The En Route Communications Gateway (ECG) system is a computer system that formats and conveys critical air traffic data to the En Route Automation Modernization (ERAM), Host Computer System (HCS) and the Enhanced Backup Surveillance (EBUS) System at the Air Route Traffic Control Centers (ARTCC's). The ECG is fully operational at the ARTCC's.

ECG increases the capacity and expandability of the NAS by enabling the current automation systems to use new surveillance technology, such as Automatic Dependence Surveillance Broadcast (ADS-B) and Wide Area Multilateration (WAM). ECG introduced new interface standards and data formats which are required for compatibility with International Civil Aviation Organization (ICAO) standards. ECG also increased capacity to process data to accommodate inputs from additional remote equipment such as radars. ECG provides the system capacity and expandability to support anticipated increases in air traffic and changes in the operational environment. ECG was a prerequisite to deploying ERAM software and hardware.

This program is structured in two activities – Performance Monitoring and Technology Refresh.

Performance Monitoring:
The ECG Operational Analysis (OA) and Sustainment and Technology Evolution Plan (STEP) activities monitor the actual performance of the ECG system and provide valuable input to the ECG Technology Refresh activity. OA monitors system availability and performance and documents the results with a quarterly ECG OA Report. STEP facilitates Post Production Support of the ECG system and identifies the processes/procedures that will be implemented to support the evolution and sustainment of the ECG system. ECG STEP provides a monthly report detailing product End-of-Life (EOL), End-of-Service (EOS), support termination and performance or supportability limitations.

Technology Refresh:
Based on input from ECG OA, STEP, and the evolving operational needs of the NAS, the ECG Technology Refresh Activity plans, procures, and deploys ECG hardware or software components to maintain a high level of system availability. The items refreshed can be for EOL, EOS, or performance issues as well as modifications to increase capacity, and new interface and data formats. Upgrades can be required due to various product factors that may include cost of maintaining the existing system, system failures, licenses, spare quantities, and repair turn-around time. The following components will be deployed to the ARTCC's to address EOL and EOS status: Interface Processor, Magma Chassis and Router Fire Wall.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The ECG Technology refresh project will replace some of the hardware and update critical software in this key air traffic control automation system. It is important to keep this system up to date to avoid failures and system outages. This investment will reduce supportability limitations and increase the ECG systems availability and reliability. Quarterly ECG Operational Analysis Reports indicate an operational availability of 100% from first site Operational Readiness Demonstration (ORD) in 2004 through December 31, 2012.

Program Plans FY 2014 – Performance Output Goals
Performance Monitoring:
- Deliver monthly STEP EOL Reports.
- Deliver quarterly OA Reports.

Technology Refresh:
- Complete procurement of Interface Processor production hardware.

Program Plans FY 2015 – Performance Output Goals
Performance Monitoring:
- Deliver monthly STEP EOL Reports.
- Deliver quarterly OA Reports.

Technology Refresh:
- Complete procurement of Magma Chassis production hardware.
- Complete procurement of Peripheral Component Interconnect – Express (PCI-E) Long Port Cards.
- Complete procurement of Random Access Planned Position Indicator (RAPPI) hardware.

Program Plans FY 2016 – Performance Output Goals
Performance Monitoring:
- Deliver monthly STEP EOL Reports.
- Deliver quarterly OA Reports.

Technology Refresh:
- Complete procurement of Router Fire Wall production hardware.

Program Plans FY 2017 – Performance Output Goals
Performance Monitoring:
- Deliver monthly STEP EOL Reports.
- Deliver quarterly OA Reports.

Technology Refresh:

- None.

Program Plans FY 2018 – Performance Output Goals

Performance Monitoring:

- Deliver monthly STEP EOL Reports.
- Deliver quarterly OA Reports.

Technology Refresh:

- None.

2A04, Next Generation Weather Radar (NEXRAD)

FY 2014 Request $4.1M

NEXRAD – Service Life Extension Program (SLEP) Phase 1, W02.02-02

Program Description

NEXRAD SLEP is a 9-year refurbishment program to extend the service life of 12 FAA-owned NEXRAD systems until 2030, when a replacement capability is expected be deployed. NEXRAD is a long range weather radar that detects, analyzes, and transmits weather information for use by the ATC System Command Center, en route, terminal and flight service facilities. This weather information helps determine the location, time of arrival, and severity of weather conditions to determine the best routing for aircraft. The National Weather Service (NWS) collects and redistributes NEXRAD weather data from radars they operate and some of the 12 FAA radars and creates forecasts that are used in all phases of flight. NEXRAD products and services are processed by FAA's Weather and Radar Processor, Integrated Terminal Weather System, and the Corridor Integrated Weather System.

Currently there are 160 NEXRAD systems operated jointly by the Tri-Agency partners – the National Weather Service (NWS), the Federal Aviation Administration, and the Department of Defense. NWS is the lead agency for the NEXRAD program. FAA independently owns 12 of these systems located in Alaska (7), Hawaii (4) and Puerto Rico (1).

NEXRAD radars were initially deployed from 1992-1997 and the FAA-owned NEXRAD systems will be reaching their 20-year end-of-life state beginning in 2015. The Tri-Agency partners plan to keep NEXRAD in full operation through 2030. A favorable Final Investment Decision for NEXRAD was received on 19 September 2012, and a new cost and schedule baseline was established. This program will have four main purposes:

1. Extend the life of the NEXRAD to 2030, and beyond. There are four NEXRAD subsystems that have been identified as needing replacement/refurbishment:
   a. Signal Processor (replace)
   b. Pedestal (refurbish)
   c. Transmitter (refurbish)
   d. NEXRAD shelters and facilities (refurbish)
2. Provide continued support for product improvements to the Legacy NEXRAD program in accordance with the Tri-Agency Memorandum of Agreement (MOA). Each year, the FAA pays its pro-rata share of NEXRAD Product Improvement (NPI) Science Evolution costs.
3. Install hardware and software technology refresh updates on the 12 FAA-owned NEXRADs. In particular, the Radar Product Generator (RPG) and Radar Data Acquisition (RDA) computers and peripherals will require technology refresh beginning in 2014.
4. Optimize and validate FAA-specific algorithms that discern and display in real time, incidences of in-flight icing and hail. A prime objective is to develop operationally suitable displays to be used by pilots, controllers, Flight Service specialists, and dispatchers for use as a decision making tool for avoiding and/or mitigating airborne threats due to the presence of airborne icing and hail.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The NEXRAD program contributes to the Delivering Aviation Access through Innovation goal by ensuring sustained operational availability of NEXRAD. NEXRAD measures precipitation intensity, storm motion, and weather echo tops, and provides this data in varied displays directly or indirectly to all Core airports and most other air traffic control facilities in the continental United States. To date, this system has met or exceeded the 96% operational availability requirement (98% for FAA systems) to reliably observe weather and detect severe storms.

Program Plans FY 2014 – Performance Output Goals
- The Radar Operations Center (ROC) will issue a contract to start development of Signal Processor software.

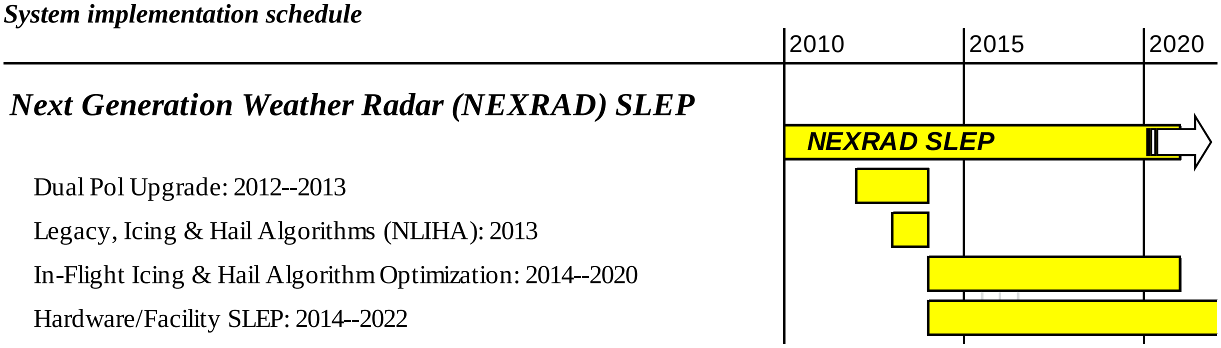
Program Plans FY 2015 – Performance Output Goals
- Conduct Signal Processor Deployment Readiness Review.
- Complete first Facility SLEP project (Project TBD).

Program Plans FY 2016 – Performance Output Goals
- Complete first Transmitter refurbishment.
- Complete first Signal Processor replacement.

Program Plans FY 2017 – Performance Output Goals
- Deliver Upgraded Icing algorithm to ROC
- Complete last Signal Processor replacement.

Program Plans FY 2018 – Performance Output Goals
- Complete first Pedestal refurbishment.

System implementation schedule



2A05, ARTCC Building Improvements/Plant Improvements

FY 2014 Request $53.0M

ARTCC Modernization, F06.01-00

Program Description

The Air Route Traffic Control Center (ARTCC) Modernization and Expansion program supports En Route Air Traffic operations and service-level availability by providing life cycle management of the physical plant infrastructure at the 21 ARTCCs and two Center Radar Approach Control (CERAP) facilities. These structures were built in the 1960's and expanded several times since then. As of FY2011 there was a $93.8 million facility backlog. This backlog increases the risk of outages and may result in increased maintenance costs. This program modernizes and sustains these buildings to meet air traffic service requirements and to reduce the backlog. Each year, several major renovation projects and numerous smaller sustain projects are funded.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The ARTCC Modernization/Expansion program contributes to the FAA's performance metric of maintaining operational availability of the NAS by ensuring that buildings that house en route air traffic control equipment are sustained and modernized to meet operational requirements. The improvements to ARTCC facility infrastructure will extend the service life of facilities and minimize outages that would delay air traffic. Associated risks to operations include potential equipment damage, mold and operations interruptions from incidents such as roof leaks and pipe ruptures. In FY 2006 there were eight ruptures of aged pipes, one of which required draping plastic sheets over controller consoles to maintain operations. In addition, the chiller plants for air conditioning are currently approaching and/or past their life expectancies. Replacement of these plants are underway but will not be complete until approximately 2019. A catastrophic failure of a chiller plant could ultimately result in the loss of Air Traffic services at an ARTCC.

Program Plans FY 2014 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Albuquerque, Boston and Houston ARTCCs.
- Fund and Award Contract for Administration Wing reconfiguration and Seismic Upgrade at Oakland ARTCC.
- Fund and Award Contract for Control System projects at the Chicago, Ft. Worth, Memphis and New York ARTCCs.
- Fund and Award Contract for M-1 Room reconfiguration at the Los Angeles ARTCC.
- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for project at the Oakland and Anchorage ARTCCs.
- Provide funding to all ARTCCs and CERAPs for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database for four sites and paper upgrades for all other ARTCCs and CERAPs.

Program Plans FY 2015 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Indianapolis ARTCCs.
- Fund and Award Contract for Control System projects at the Albuquerque, Houston and Boston ARTCCs.
- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for projects at the Cleveland, Kansas City and Washington ARTCCs.

- Fund and Award Contract for Administration Wing Mod at Anchorage ARTCC.
- Fund and Award Contract for M-1 Room Build Out Phase II for Miami ARTCC
- Provide funding to all ARTCCs and CERAPs for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database for three sites and paper upgrades for all other ARTCCs and CERAPs.

Program Plans FY 2016 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Oakland, Cleveland, Kansas City and Washington ARTCCs.
- Fund and Award Contract for Control System projects at the Indianapolis and Anchorage ARTCCs.
- Fund and Award Contract for Control Wing Basement Design Cost for project at the Los Angeles ARTCC.
- Fund and Award Contract for Control Wing Basement/ Major Mechanical Design Cost for projects at the Atlanta, Salt Lake City and Seattle ARTCCs.
- Provide funding to all ARTCCs and CERAPs for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database for three or four sites and paper upgrades for all other ARTCCs and CERAPs.

Program Plans FY 2017 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Los Angeles, Salt Lake City and Atlanta ARTCCs.
- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for project at the Denver ARTCC.
- Fund and Award Contract for Control System projects at the Cleveland, Kansas City, Washington and Oakland ARTCCs.
- Provide funding to all ARTCCs and CERAPs for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database for three or four sites and paper upgrades for all other ARTCCs and CERAPs.

Program Plans FY 2018 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Seattle and Denver ARTCCs.
- Fund and Award Contract for Control System projects at the Los Angeles, Atlanta, Salt Lake City and Minneapolis ARTCCs and Guam CERAP.
- Provide funding to all ARTCCs and CERAPs for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database for three or four sites and paper upgrades for all other ARTCCs and CERAPs.

2A06, AIR TRAFFIC MANAGEMENT (ATM)

FY 2014 Request $13.8M

TFM Infrastructure – Technology Refresh, A05.01-12 / TFM Infrastructure – Field/Remote Site Technology Refresh, A05.01-13

Program Description

The Traffic Flow Management (TFM) system is the automation backbone for the Air Traffic Control System Command Center (ATCSCC) and the Traffic Management Units (TMUs) at en route centers and TRACONs that assist the ATCSCC in strategic planning and management of air traffic. TFM hosts the software decision support systems that are used in managing and metering air traffic to reduce delays and make maximum use of system capacity. These tools help the ATCSCC and TMUs to dynamically balance growing flight demands with NAS capacity. The system compares the projected traffic with the capacity of destination airports to determine if steps need to be taken to manage the flow and prevent delays. The FAA uses the information from this system to collaborate with aviation customers to develop and implement airspace management programs that reduce delays and ensure smooth and efficient traffic flow through FAA-controlled airspace. Saving for the flying public and airlines are estimated to be in the millions of dollars. TFM benefits all segments of aviation including airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, and partner countries.

TFM Infrastructure – Technology Refresh (A05.01-12):
TFM Infrastructure – Technology Refresh (FY 2011-2015), was approved by the FAA JRC on March 29, 2011. This new segment provides a replace-in-kind technology refresh of the central data processing hardware for the TFM system (TFMS). The program replaces the hardware used by the TFM Processing Center (TPC) (also called TFMS Core), the TFM application National Traffic Management Log (NTML), located at the William J. Hughes Technology Center (WJHTC), the TFMS backup system located at the Disaster Recovery Center (DRC), and the prime contractor site. Last replaced in 2006, the hardware is no longer produced, and it will be unable to support future processing needs. The hardware must be replaced to avoid obsolescence, system performance degradation and impact to other programs.

The baselined TFMS Technology Refresh segment has three elements:
1. Spares: Procurement of Spares for the TFM TPC is a primary risk mitigation effort so that the TFMS will be fully functional until the technology refresh is completed in 2015. The current TFMS hardware is no longer produced. This mitigation effort will minimize outages due to equipment failure and will minimize the impact to development of CATMT capabilities in Work Package 2 and Work Package 3.
2. Phase 1: The technology refresh of NTML. The activities include engineering analysis, procurement, test and installation of the NTML replacement hardware. The current NTML equipment is no longer produced and no longer supported. The NTML is a TFM application that logs actions the Traffic Managers take to mitigate congestion and demand and shares this information with other FAA Traffic Management facilities for better situation awareness, collaboration and decision support.
3. Phase 2: Perform technology refresh of TFM Production Center, also called the TFMS Core. The activities include: engineering analysis, procurement, test and installation of replacement hardware.

TFM Infrastructure – Field /Remote Site Technology Refresh (A05.01-13):
TFM Infrastructure Field/Remote Site Technology Refresh will replace TFMS equipment at field sites (remote sites). Purchased in 2008-2009 the field equipment will no longer be produced in 2014 and will require another replace-in kind hardware technology refresh. Hardware will be replaced at over 81 TFM-equipped ATC facilities around the country including TMUs at En Route Centers, Terminal Radar Facilities, Control Towers, and Airline Operation Centers (AOCs). The planned date for the FID is December 2013.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

When the NAS is impacted by severe weather, congestion and/or outages, TFM predicts chokepoints and facilitates the collaboration and execution of mitigation initiatives with stakeholders, using common information displays and tools to minimize NAS delays.

The TFM Infrastructure program will support the FAA's Aviation Access through Innovation goal through the use of automated systems that provide more accurate and timely information for all TFM system users, improve operator and passenger access to flight information, and reduce system delays. Keeping the TFMS fully mission capable also serves as an enabling function for the NextGen CATMT WP 2 & 3 effort, as they both reside and operate on TFMS.

Program Plans FY 2014 – Performance Output Goals

TFM Infrastructure – Technology Refresh (A05.01-12):

- Phase 2 – Complete system test, installation and initial deployments of TFM Production Center (also called TFMS Core) replacement hardware of the operational, test, development and back-up strings located at WJHTC, Disaster Recovery Center (DRC), and prime contractor site.

TFM Infrastructure – Field /Remote Site Technology Refresh (A05.01-13):

- Conduct Site Surveys.

Program Plans FY 2015 – Performance Output Goals

TFM Infrastructure – Technology Refresh (A05.01-12):

- Phase 2 – TFMS Core operational - In Service Decision on replacement hardware, September 2015. (APB Milestone)
- Complete TFMS Technology Refresh segment and conduct close out and transition.

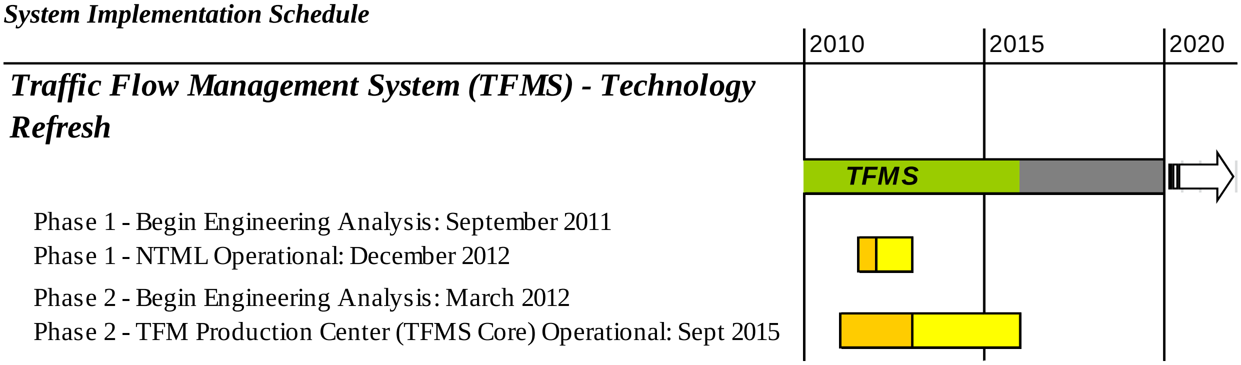
TFM Infrastructure – Field /Remote Site Technology Refresh (A05.01-13):

- None.

Program Plans FY 2016-18- Performance Output Goals

- None.

System Implementation Schedule



2A07, AIR/GROUND COMMUNICATIONS INFRASTRUCTURE

FY 2014 Request $5.5M

Radio Control Equipment (RCE) - Sustainment, C04.01-01 / Communications Facilities Enhancement – Expansion, C06.01-00 / Communications Facilities Enhancement – RFI Elimination – Technology Refresh, C06.03-01

Program Description

The Communications Facilities Enhancements (CFE) and Radio Control Equipment (RCE) programs provide new, relocated or upgraded remote communication facilities (RCF's) to enhance the A/G communications between air traffic control and aircraft when there are gaps in coverage or new routes are adopted. Various upgrades to RCF's include building and tower grounding, lightning protection, and replacing the cables from the equipment to antennas whenever necessary to improve radio equipment performance. RFI Elimination Technology Refresh will provide equipment and support to detect and resolve radio frequency interference.

Radio Control Equipment – Sustain (C04.01-01):

The RCE program replaces obsolete radio signaling and control equipment, which allows a controller to select and use a remote radio channel. The RCE program improves reliability and maintainability by replacing older non-supported tone control equipment (e.g. GRIMM and Intelect tone control equipment is no longer supported). Additionally, new equipment provides more functionality than older type tone control equipment which improves operational performance. Additional functionality such as split voice/data which splits the control data from the voice circuit so the voice circuit can be compressed offering the ability to use less telephone line bandwidth. Reduced bandwidth saves operating costs for satellite communications because fees are based on the bandwidth used. Also, the new equipment will provide dual control functionality which gives the option of toggling control of a remote communications facility between two towers allowing transfer of frequency control to another facility when a tower is closed for the night. RCE is required at service delivery sites such as ARTCCs, TRACON facilities, ATCTs, CERAP, Radar Approach Control, and AFSSs. This equipment is also installed at supporting facilities such as: Remote Center A/G facilities that serve ARTCCs, Remote Transmitter/Receiver facilities that serve terminal facilities, and Remote Communications Outlet facilities that serve flight service stations). In FY 2014, a supportability life cycle analysis will be initiated.

Communications Facilities Enhancement – Expansion (C06.01-00):
The Air-to-Ground (A/G) Communications Infrastructure expansion program enhances operational efficiency and effectiveness by establishing, replacing and upgrading radio equipment. This radio equipment is installed at remote sites that allow communications between pilots and controllers when an aircraft is beyond normal direct transmission range of the radios in the air traffic facility. The program also renovates buildings that house this equipment and improves site conditions and access for these remote radio sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):
The RFI Elimination and Technology Refresh program is designed to expedite the detection and facilitate the resolution of radio frequency interference events to minimize delays and congestion thereby improving air traffic capacity, while maximizing the overall throughput of the NAS. This program is needed to provide the Service Areas with the tools and support services necessary to quickly restore NAS radio services.

RFI mitigation can be addressed by adding Receiver (RX) Multicouplers at Radio Communication Facilities (RCF's). The RX Multicoupler allows connection of multiple radio receivers to one antenna. Doing so reduces RFI by utilizing the internal filters of the RX Multicoupler and additionally provides greater capacity by installing more frequencies on the limited number of antennas located at an RCF. Presently, there are approximately 900 RX Multicouplers used in the NAS; however, many of these units were purchased locally, are not supply supportable and have failing power supplies that cannot be replaced. In June, 2007, a contract was awarded for 4 & 8-port RX Multicouplers. A technology refresh is planned to replace all of the current RX Multicouplers in the NAS that were locally purchased and are not depot supported with RX Multicouplers that are new generation FAA logistically supported units off of this new 10-year contract.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

CFE projects reduce the number of outages by replacing aging and increasingly unreliable communications equipment with modern equipment. In addition, the CFE and RCE projects improve and provide upgrades needed at A/G Communication sites and facilities to sustain reliable operation.

Program Plans FY 2014 – Performance Output Goals
Radio Control Equipment – Sustain (C04.01-01):
- Deliver supportability and life cycle analysis documentation.

Communications Facilities Enhancement – Expansion (C06.01-00):
- Establish/Replace/Upgrade six CFE sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):
- Procure and deliver 110 Receiver Multicoupler units to FAA Depot.

Program Plans FY 2015 – Performance Output Goals

Radio Control Equipment – Sustain (C04.01-01):

- None.

Communications Facilities Enhancement – Expansion (C06.01-00):

- Establish/Replace/Upgrade four CFE sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):

- None.

Program Plans FY 2016 – Performance Output Goals

Radio Control Equipment – Sustain (C04.01-01):

- None.

Communications Facilities Enhancement – Expansion (C06.01-00):

- Establish/Replace/Upgrade four CFE sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):

- None.

Program Plans FY 2017 – Performance Output Goals

Radio Control Equipment – Sustain (C04.01-01):

- None.

Communications Facilities Enhancement – Expansion (C06.01-00):

- Establish/Replace/Upgrade four CFE sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):

- None.

Program Plans FY 2018 – Performance Output Goals

Radio Control Equipment – Sustain (C04.01-01):

- None.

Communications Facilities Enhancement – Expansion (C06.01-00):

- Establish/Replace/Upgrade four CFE sites.

Communications Facilities Enhancement – RFI Elimination Technology Refresh (C06.03-01):

- None.

2A08, AIR TRAFFIC CONTROL EN ROUTE RADAR FACILITIES IMPROVEMENTS

FY 2014 Request $5.9M

Long Range Radar Improvements – Infrastructure Upgrades/Sustain, S04.02-03

Program Description

The Long Range Radar (LRR) Infrastructure Upgrades/Sustain Program modernizes and upgrades the radar facilities that provide aircraft position information to FAA En Route control centers and to other users (e.g., Department of Defense and Homeland Security). These planned improvements also support the installation and lifecycle modernization of the secondary beacon radars (Mode Select and Air Traffic Control Beacon Interrogator (ATCBI); both standalone and those co-located with the long-range primary radars. Secondary radars typically have their antennas mounted above the long-range primary radar antennas, and the processors are installed in facilities constructed in the 1950's and 60's. These facilities have reached the end of their designed service life, and will require renovation and upgrades to maintain their current level of serviceability. Some En Route secondary radar service outages were due to leaking roofs and antiquated air conditioning systems. These outages can impact air traffic flow and in turn cause delay to aircraft departures and arrivals.

The scope of work of the LRR Infrastructure Upgrades includes:

- Replacement of engine generators,
- Replacement of uninterruptible power supply (UPS),

- Upgrade of existing lightning protection, grounding, bonding, and shielding (LPGBS) systems
- Upgrade of radar structural components to support LRR Service Life Extension Program (SLEP) and ATCBI-6 deployments,
- Major repair and replacement of access roads, grounds, storm water controls, security lightings and walkways,
- Refurbishment of Heating, Ventilation, and Air Conditioning (HVAC), cooling fans, duct works, elevators, wiring and lighting systems, and walkways,
- Repair or replacement of building and antenna tower roofs, structural components such as foundations, beams, columns, bracings, struts, platforms, walls and concrete slabs.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The LRR program supports the FAA's Strategic Goal 3, Delivering Aviation Access through Innovation by providing renovation of existing FAA-owned surveillance facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance equipment. Repairs, improvements, and modernization to existing infrastructure will enable facilities to meet current operational, environmental, and safety needs economically, extend the service life of facilities, and reduce the chance of outages that cause air traffic delays. Infrastructure failure resulted in almost 11 percent of Air Route Surveillance Radar (ARSR) outages experienced from August 2010 to August 2011.

Program Plans FY 2014 – Performance Output Goals

- Complete upgrades of critical infrastructure systems at seven ARSRs including UPS and HVAC systems (actuals may vary based upon validation and priority for the year).
- Complete sustaining improvements to existing facility infrastructures at 20 ARSR, Fixed Position Surveillance (FPS), and ATCBI-6 facilities including; roof replacements, tower foundation repairs, power panel retrofits, road repairs, alarm system replacements, and security gate replacements (actuals may vary based upon validation and priority for the year).

Program Plans FY 2015 – Performance Output Goals

- Complete upgrades of critical infrastructure systems at seven ARSRs including UPS and HVAC systems (actuals may vary based upon validation and priority for the year).
- Complete sustaining improvements to existing facility infrastructures at 20 ARSR, Fixed Position Surveillance (FPS), and ATCBI-6 facilities including; roof replacements, tower foundation repairs, power panel retrofits, road repairs, alarm system replacements, and security gate replacements (actuals may vary based upon validation and priority for the year).

Program Plans FY 2016-2018 – Performance Output Goals

- None.

2A09, VOICE SWITCHING CONTROL SYSTEM (VSCS)

FY 2014 Request $20.0M

Voice Switching and Control System (VSCS) – Technology Refresh – Phase 3, C01.02-04

Program Description

The Voice Switching and Control System (VSCS) controls the switching mechanisms that allow controllers to select the communication channel they need to communicate with pilots, other controllers, other air traffic facilities, and commercial telephone contacts. It is essential that controllers be able to quickly select the proper channel so they can communicate with pilots, coordinate with other controllers and/or contact emergency services as necessary. These large switches handle communication connections for 70 to 210 active air traffic control workstations at each en route center.

The VSCS Technology Refresh program will replace and upgrade hardware and software components for the voice switching systems in all 21 en route air traffic control centers (ARTCCs). The real time Field Maintenance/Testing System at the FAA William J. Hughes Technical Center (WJHTC) and the Training System at the FAA Academy will also be upgraded to perform the same as an operational site. These upgrades will ensure that the air-to-ground and ground-to-ground communications capabilities are reliable and available for separating aircraft, coordinating flight plans, and transferring information between air traffic control facilities in the en route environment. To date, this program has replaced VSCS internal control systems, updated the obsolete language used in some software programs, and replaced the VSCS Timing and Traffic Simulation Unit at the FAA WJHTC. This WJHTC test bed is being used to test the capabilities of the upgraded systems to determine if they meet the formal baseline requirements established for VSCS performance. Additional upgrades will be completed to ensure that the VSCS continues to provide reliable voice communications, which can support future en route operations.

VSCS Technology Refresh Phases 1 and 2 included funding for Work Station Upgrades, VSCS Display Module Replacement (VDMR), VSCS Integrated Test Suite (VITS) Replacement, Maintenance Test Replacements (MTSR-F), Power Supply upgrades, VSCS Training and Backup Switch (VTABS) Test Controller Replacement (VTCR), as well as some Programming Language for Microcomputers (PLM) to C software code conversion.

VSCS Technology Refresh Phase 3 will be dependent upon Engineering Analysis which will include Ground-to-Ground (G/G) node reduction efforts (approximately 10 nodes), fiber optic tie trunk (FOTT) power supply replacements (approximately 500 supplies), LAN Transceiver retrofits (approximately 5,000), and the PLM to C software conversion for the Air-to-Ground (A/G) switch. A Final Investment Decision for VSCS Technology Refresh Phase 3 was obtained in November 2012.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The VSCS Technology Refresh program supports the Performance Metric to maintain operational availability of the National Airspace System by improving the system reliability of en route voice communications for both current and future operations by replacing and upgrading components of the obsolete, non-supportable elements of VSCS hardware and software. VSCS Technology Refresh Phase 3 is required to maintain both the operational availability of the VSCS/VTABS switches and to maintain the ability of the VSCS Depot to support site requisitions.

Program Plans FY 2014 – Performance Output Goals

- G/G node reduction: Perform key site test of G/G node reduction.
- FOTT power supply replacement: Enter production build test.

Program Plans FY 2015 – Performance Output Goals

- G/G node reduction: Excess nodes removed from seven additional ARTCCs (10 total).
- FOTT power supply replacement: Replace 124 out of 404 FOTT power supplies.

Program Plans FY 2016 – Performance Output Goals
- FOTT power supply retrofits 50% complete.

Program Plans FY 2017 – Performance Output Goals
- FOTT power supply retrofits 100% complete.

Program Plans FY 2018 – Performance Output Goals
- A/G PLM to C software conversion: Complete deployments to all sites.

System Implementation Schedule

2A10, Oceanic Automation System

FY 2014 Request $4.8M

Advanced Technologies and Oceanic Procedures (ATOP), A10.03-00

Program Description

The ATOP program replaced oceanic air traffic control systems, updated procedures and modernized the Oakland, New York, and Anchorage ARTCCs, which house these oceanic automation systems. A support system was installed at the William J. Hughes Technical Center. ATOP fully integrates flight and radar data processing, detects conflicts between aircraft, provides data link and surveillance capabilities, and automates the previous manual processes for oceanic air traffic control.

A technology refresh for the automation system was completed for all three operational sites and the system installed at the William J, Hughes Technical Center (WJHTC). This technology refresh increased system performance, capacity, and usability, and made improvements to software functionality. Additional safety and efficiency enhancements will be delivered through FY 2016 by planned software modifications that provide evolutionary improvements to the ATOP Ocean21 system. These modifications will address needed functionality changes to support airspace expansion initiatives, address Agency-required system infrastructure changes (e.g., X.25 to IP interface upgrades), and support FAA and International Civil Aviation Organization (ICAO) mandated system changes.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

ATOP allows properly equipped aircraft (i.e., ADS-C, Controller-Pilot Data Link Communications (CPDLC), Required Navigation Performance-4 nm (RNP-4)) and qualified aircrews to operate using reduced oceanic separation criteria. This enables more aircraft to fly optimal routes and reduce aircraft flight time (and increase fuel and payload efficiency) during oceanic legs of their flights. Reduced lateral (side-to-side) separation provides space for additional routes between current locations or new direct markets. Reduced longitudinal (nose-to-tail) separation provides more opportunities to add flights without delays (e.g., climbs, descents, reroutes, or speed penalties). By reducing the potential for delays (i.e., increasing the number of available routes, increasing airspace capacity, enhancing the interfacility coordination of air traffic, reducing flight times, etc.), ATOP facilitates an increase in the on-time performance of scheduled air carriers.

Program Plans FY 2014 – Performance Output Goals

- Deliver software enhancements in the operational release to address operational problems and system improvements to all three Oceanic sites in November 2013 and support transition of Anchorage domestic airspace to ATOP. The exact number of enhancements implemented will be determined five months prior to the release date.
- Deliver software enhancements in the operational release to address operational problems and system improvements to all three Oceanic sites in June 2014. Enhancements will include changes needed for the ATOP system to support Surveillance and Broadcast Services (SBS) Acquisition Program Baseline (APB) milestone. The exact number of enhancements implemented will be determined five months prior to the release date.

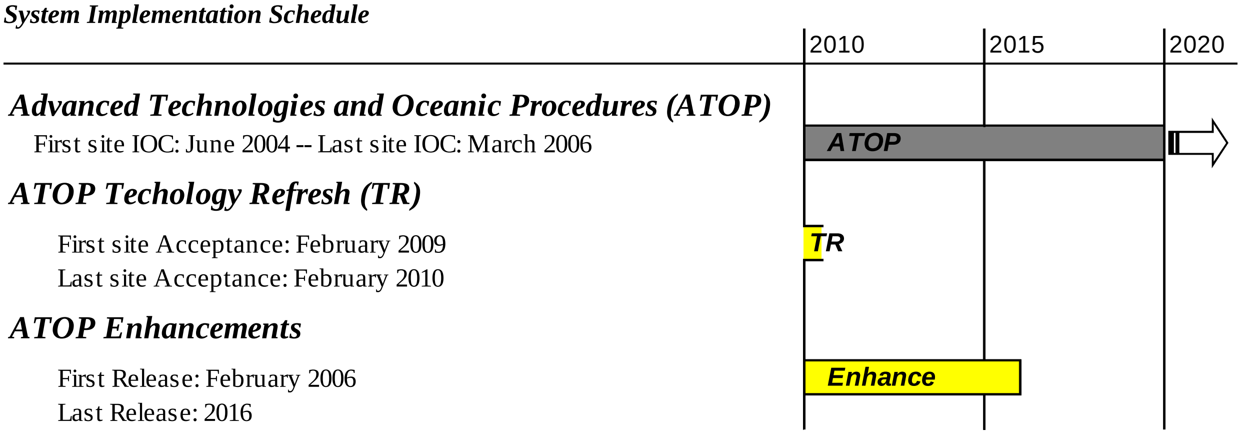
Program Plans FY 2015 – Performance Output Goals

- Deliver software enhancements in the operational release to address operational problems and system improvements to all three Oceanic sites in November 2014. The exact number of enhancements implemented will be determined five months prior to the release date.
- Deliver software enhancements in the operational release to address operational problems and system improvements to all three Oceanic sites in April 2015. Enhancements will include changes needed for the ATOP system to support NextGen ADS-C Climb and Decent capability. The exact number of enhancements implemented will be determined five months prior to the release date.

Program Plans FY 2016-2018 – Performance Output Goals

- None.

System Implementation Schedule



2A11, NEXT GENERATION VERY HIGH FREQUENCY AIR/GROUND COMMUNICATIONS SYSTEM (NEXCOM)

FY 2014 Request $20.3M

Next-Generation VHF and UHF A/G Communications (NEXCOM) – Segment 2 – Phase 1 of 2, C21.02-01

Program Description

The NEXCOM program replaces and modernizes the aging and obsolete NAS air-to-ground (A/G) analog radios that allow direct voice communication with pilots. Replacing the radios is part of a larger program to address the limitations on increasing the spectrum available that is needed to ensure that the air traffic system's capability grows to effectively manage the projected U.S. air traffic requirements of the future. In addition, replacement of these radios improves A/G radio equipment maintainability and reliability, and enhances A/G information security and communications control. Segment 1a of the NEXCOM program will have replaced all en route radios (30,000) with Multimode Digital Radios (MDRs) by the end of FY 2013.

NEXCOM Segment 2 program is replacing radios at terminal and flight services facilities during the period from FY 2009 to FY 2027. Segment 2 is separated into two phases. Phase 1 has JRC approval from 2011 to 2018. The NEXCOM procurement for Segment 2, Phase 1 will have a combined contract to deliver Very High Frequency (VHF) radios for civil aviation and Ultra High Frequency (UHF) radios for military aviation. A total of 12,000 radios will be replaced in Phase 1. The VHF radio can emulate the existing 25 kHz voice mode protocol for channel separation, or they can operate in the more efficient 8.33 kHz voice mode currently used in Europe. The 8.33 kHz voice-only mode divides the current bandwidth for one channel into three channels and this increase in the number of channels recovers the spectrum needed for a stand-alone data communications system (i.e., Datacom program). To support the NextGen NAS Voice systems (NVS) program, Voice over Internet Protocol (VoIP) will be integrated into Segment 2, Phase 1 VHF and UHF radios.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

NEXCOM will reduce the number of unplanned outages by replacing existing communications equipment with modern A/G equipment. An added performance benefit will be the ability to increase capacity by expanding the number of communications channels within the spectrum assigned to the FAA. The Mean Time Between Failure performance metric, which is closely related to availability, will be increased from 11,000 hours to 50,000 hours at the completion of NEXCOM Segment 2, Phase 1.

Program Plans FY 2014 – Performance Output Goals
- Achieve In Service Decision for Segment 2 Phase 1, October 2013. (APB milestone)
- Achieve first site initial operational capability for Segment 2 Phase 1, April 2014. (APB milestone)
- Deploy 1780 new Terminal Air Traffic Control and Flight Service Radios.

Program Plans FY 2015 – Performance Output Goals
- Deploy 2700 new Terminal Air Traffic Control Radios.

Program Plans FY 2016 – Performance Output Goals
- Deploy 2700 new Terminal Air Traffic Control Radios.

Program Plans FY 2017 – Performance Output Goals
- Deploy 2700 new Terminal Air Traffic Control Radios.

Program Plans FY 2018 – Performance Output Goals
- Deploy 2700 new Terminal Air Traffic Control Radios.
- Achieve IOC at 450 sites. (APB milestone)

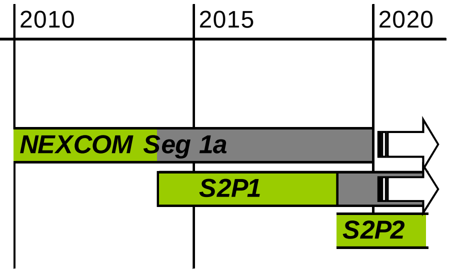
System Implementation Schedule

Next-Generation VHF A/G Communications (NEXCOM) – Segment 2 - Phase 1/2

First site IOC: July 2003 -- Last site IOC: September 2013

First site IOC: April 2014 -- Last site IOC: September 2018

First site IOC: 2019 -- Last site IOC: August 2027



2A12, SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM)*

FY 2014 Request $70.5M

- A, System Wide Information Management (SWIM) – Segment 1, G05C.01-01
- B, System Wide Information Management (SWIM) – Segment 2A, G05C.01-04 / X, System Wide Info Management (SWIM) – Segment 2B, G05C.01-08
- C, System Wide Info Management (SWIM) – Common Support Services Weather (CSS-Wx), G05C.01-06
- X, System Wide Info Management (SWIM) – Common Support Services Aeronautical Information Management (AIM), G05C.01-07

A, System Wide Information Management (SWIM) – Segment 1, G05C.01-01

Program Description

In 2007, the FAA established the System Wide Information Management (SWIM) Program to implement a set of Information Technology (IT) capabilities in the NAS to provide users with relevant and commonly understandable information. The principles behind the SWIM concept include the following:

- Separation of information provision and consumption in such a way that the number and nature of the consumers can evolve through time;
- Loose system coupling, in which each component has little or no knowledge of the definitions of other separate components;
- Using publicly available open standards; and
- Using Service Oriented Architecture (SOA) implemented as a suite of interoperable services.

SWIM maximizes the use of current infrastructure while allowing sharing of information between diverse systems enabling the NextGen delivery of the right information to the right places at the right time. The program achieves this by providing the IT enterprise infrastructure necessary for NAS systems to share and reuse information and increase interoperability.

SWIM's enterprise infrastructure will enable systems to publish information of interest to NAS users, request and receive information from other NAS services, and support NAS security requirements. Further, SWIM provides Governance to NAS Programs to ensure services are SWIM compliant and meet all FAA SOA standards. By providing this Governance and the supporting enterprise infrastructure, SWIM will reduce the cost and risk for NextGen programs to develop and deploy services.

SWIM is being developed in segments. In SWIM Segment 1, nine SWIM capabilities are being implemented with SWIM-provided governance, standards, and software to support development of reusable SOA services. Segment 1 results in SOA services deployed to all Air Route Traffic Control Centers (ARTCCs), 39 Terminal Radar Approach Controls (TRACONs), the Air Traffic Control System Command Center, the William J. Hughes Technical Center (WJHTC), and NAS Enterprise Management Centers (NEMCs). The Segment 1 capabilities are as follows:

- Aeronautical Information Management (AIM) Special Use Airspace (SUA) Automated Data Exchange,

- Integrated Terminal Weather System (ITWS) Data Publication,
- Corridor Integrated Weather System (CIWS) Data Publication,
- Weather Message Switching Center Replacement (WMSCR) Pilot Report (PIREP) Data Publication,
- Reroute Data Exchange,
- SWIM Terminal Data Distribution System (STDDS),
- Traffic Flow Management (TFM) Flow Data Publication,
- Runway Visual Range (RVR) Data Publication, and
- Flight Data Publication Service (FDPS).

In FY 2011, ITWS and CIWS capabilities have become operational and AIM SUA Data Exchange achieved an Initial Operating Capability (IOC). In FY 2012, WMSCR became operational and STDDS achieved an IOC.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

SWIM will reduce the number and types of unique interfaces, reduce redundancy of information, better facilitate information-sharing, improve predictability and operational decision-making, and reduce the cost of service. The improved coordination that SWIM will provide will allow for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. In addition, SWIM will provide the foundation for greatly enhanced information exchange and sharing outside the FAA.

Program Plans FY 2014 – Performance Output Goals

- Begin operating on Runway Visual Range (RVR) Publication Service for the SWIM Terminal Data Distribution Service (STDDS). (APB milestone)
- Complete Flight Data Publication Service (FDPS) OT&E. (APB milestone)
- Continue to operate the NAS Service Registry/Repository, COTs Repository, the SWIM Developer Wiki.
- Continue to provide SOA governance of the Segment 1 SWIM Implementing Programs (SIPs).

Program Plans FY 2015 – Performance Output Goals

- Begin operating on Flow Information Publication. (APB milestone)
- Begin operating on Flight Data Publication. (APB milestone)
- Complete Implementation – SWIM Tool Kits. (APB milestone)

Program Plans FY 2016-2018 – Performance Output Goals

- None.

B, System Wide Information Management (SWIM) – Segment 2A, G05C.01-04 / X, System Wide Info Management (SWIM) – Segment 2B, G05C.01-08

Program Description

In 2007, the FAA established the SWIM Program to implement a set of Information Technology (IT) capabilities in the NAS to provide users with relevant and commonly understandable information. The principles behind the SWIM concept include the following:

- Separation of information provision and consumption in such a way that the number and nature of the consumers can evolve through time;

- Loose system coupling, in which each component has little or no knowledge of the definitions of other separate components;
- Using publicly available open standards; and
- Using Service Oriented Architecture (SOA) implemented as a suite of interoperable services.

SWIM maximizes the use of current infrastructure while allowing sharing of information between diverse systems enabling the NextGen delivery of the right information to the right places at the right time. The program achieves this by providing the IT enterprise infrastructure necessary for NAS systems to share and reuse information and increase interoperability.

SWIM's enterprise infrastructure will enable systems to publish information of interest to NAS users, request and receive information from other NAS services, and support NAS security requirements. Further, SWIM provides Governance to NAS Programs to ensure services are SWIM compliant and meet all FAA SOA standards. By providing this Governance and the supporting enterprise infrastructure, SWIM will reduce the cost and risk for NextGen programs to develop and deploy services.

<u>SWIM – Segment 2A (G05C.01-04):</u>
Segment 2A includes the following key elements:

- Development, deployment, and maintenance of SOA Core Services. These SOA Core Services, which are comprised of Enterprise Messaging, Enterprise Service Management, Interface Management, and Security services, are provided for use by multiple FAA domains and programs;
- Responsibility for all acquisition, management and maintenance activities for the hardware and software associated with developing and deploying those capabilities that will result in a consolidated SOA infrastructure (e.g., supporting SOA Core Services).

<u>SWIM – Segment 2B (G05C.01-08):</u>

- Plans for Segment 2B include the following: continued on ramping of programs onto the NAS Enterprise Messaging Service (NEMS); providing additional NAS enterprise services such as orchestration, interaction services, and other support services through additional NEMS capabilities; and enhancement of the Flight Data Publication Service (FDPS) to make it independent of HOST/Air Traffic Management Data Distribution System (HADDS).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

SWIM will reduce the number and types of unique interfaces, reduce redundancy of information, better facilitate information-sharing, improve predictability and operational decision-making, and reduce the cost of service. The improved coordination that SWIM will provide will allow for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. In addition, SWIM will provide the foundation for greatly enhanced information exchange and sharing outside the FAA.

Program Plans FY 2014 – Performance Output Goals
<u>SWIM Segment 2A (G05C.01-04):</u>

- Complete publication of Integrated Terminal Weather System (ITWS), Time-Based Flow Management (TBFM), Enhanced Weather Information Network (EWIN), Terminal Automation Modernization Replacement (TAMR) and Collaborative Air Traffic Management Technologies (CATMT) WP2 using SWIM NEMS services. (APB milestone)
- Complete NEMS Dynamic Subscription Capability Development. (APB milestone)
- Complete NEMS demand assessment and associated deployment of new NEMS Nodes. (APB milestone)

- Complete SOA suitability assessments for NAS programs entering the FAA investment analysis process in 2014.
- Complete Segment 2B JRC Final Investment Decision Approval Process.

SWIM Segment 2B (G05C.01-08):
- None.

Program Plans FY 2015 – Performance Output Goals

SWIM Segment 2A (G05C.01-04):
- Complete NEMS demand assessment and associated deployment of new NEMS Nodes. (APB milestone)
- Complete NEMS Security Services Capability Development. (APB milestone)
- Complete NEMS Web Services Capability Development. (APB milestone)
- Complete SOA suitability assessments for NAS programs entering the FAA investment analysis process in 2015.

SWIM Segment 2B (G05C.01-08):
- None.

Program Plans FY 2016 – Performance Output Goals

SWIM Segment 2A (G05C.01-04):
- Complete NEMS demand assessment and associated deployment of new NEMS Nodes. (APB milestone)
- Complete SOA suitability assessments for NAS programs entering the FAA investment analysis process in 2016.

SWIM Segment 2B (G05C.01-08):
- Complete Segment 2B Contract Award.
- Complete transition from Segment 2A to Segment 2B.

Program Plans FY 2017 – Performance Output Goals

SWIM Segment 2A (G05C.01-04):
- None.

SWIM Segment 2B (G05C.01-08):
- Complete Run-Time Registry.
- Begin operating on Basic Interoperability and Enhanced On-Ramping Services Interoperability.
- Complete NEMS demand assessment and associated deployment of new NEMS Nodes.
- Complete SOA suitability assessments for NAS programs entering the FAA investment analysis process in 2017.

Program Plans FY 2018 – Performance Output Goals

SWIM Segment 2A (G05C.01-04):
- None.

SWIM Segment 2B (G05C.01-08):
- Complete Enterprise Repository.
- Begin operating on Basic Service Orchestration and Enhanced On-Ramping Service Orchestration.
- Complete NEMS demand assessment and associated deployment of new NEMS Nodes.
- Complete SOA suitability assessments for NAS programs entering the FAA investment analysis process in 2018.

C, System Wide Info Management (SWIM) – Common Support Services Weather (CSS-Wx), G05C.01-06

Program Description

Common Support Services for Weather (CSS-Wx), formerly known as NextGen Network Enabled Weather (NNEW), will be the FAA's first instance of a common support services capability. CSS-Wx will establish an aviation weather publishing capability for the NAS. It will enable universal access and the standardization of weather information for dissemination to users by System Wide Information Management (SWIM), a data management and sharing system the FAA is implementing for the NextGen. CSS-Wx will filter weather information by location and time. Consumers of the information published by CSS-Wx will include air traffic controllers, traffic managers, commercial aviation, general aviation and the flying public. CSS-Wx will also make weather information available for integration into NextGen's enhanced decision support tools such as Route Availability Planning tool (RAPT) and Collaborative Airspace Constraint Resolution (CACR). CSS-Wx will be the FAA's single provider of aviation weather data, consolidating several legacy weather information systems. CSS-Wx will also be scalable to facilitate the addition of new users and new systems. The system is scheduled to achieve initial operating capability in 2016.

The CSS-Wx System will ultimately:

- Provide weather information via Web Coverage Service (WCS), Web Feature Service (WFS), and Web Map Service (WMS),
- Filter weather information by location and time to provide only the specific data requested by a user (e.g., along a flight path in support of trajectory-based operations),
- Provide weather information in common, standardized formats identified by the Open Geospatial Consortium (OGC),
- Store, archive, and retrieve weather information, and
- Discover weather information in near real-time for users.

The CSS-Wx System will make improved weather products provided by the NextGen Weather Processor (NWP), the National Oceanic and Atmospheric Administration's (NOAA) 4-Dimensional Weather Data Cube, and other weather sources, available to FAA and NAS users for input into collaborative decision making.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access Through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

CSS-Wx is an enterprise service that provides access to common weather observations and forecasts to enable collaborative and dynamic NAS decision making. It will enable integration of information from weather sources into all applicable NextGen decision-support systems. It fuses weather observations into a common, virtual, continuously updated, weather information data set available to all network users. CSS-Wx will enable Airline Operations Centers and Traffic Flow Management to better develop weather mitigation plans and replans, by selecting flight paths that maximize use of available capacity in weather impacted environments, and it will provide NWP mosaics enabling en route and terminal controllers to provide more precise and timely information to respond to pilot requests for deviations around hazardous weather CSS-Wx helps maximize use of airport capacity by providing more precise information on weather location and movement, which allows runways to remain in use longer and reopen more quickly after an adverse weather event.

Program Plans FY 2014 – Performance Output Goals

- Complete FID for CSS-Wx.
- Contract Award for CSS-Wx software development.
- Contract Award for CSS Cloud Computing Infrastructure/services.
- Initiate Preliminary Design Review (PDR) for CSS-Wx.
- Complete deployment of Enhanced Weather Information Network Server (WINS) Dissemination (EWD).

Program Plans FY 2015 – Performance Output Goals

- Complete Critical Design Review (CDR) for CSS-Wx.
- Achieve Initial Operating Capability (IOC) for CSS Cloud Computing Infrastructure/service.

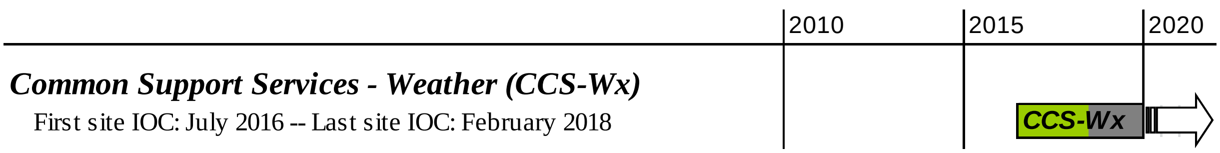
- Complete development of Draft Operational Test and Evaluation (OT&E) Plan for CSS-Wx.
- Complete installation at the FAA's William J. Hughes Technical Center for CSS-Wx.

Program Plans FY 2016 – Performance Output Goals
- Conduct OT&E for CSS-Wx.
- Perform Key Site Installation of CSS-Wx.
- Achieve IOC for CSS-Wx.

Program Plans FY 2017 – Performance Output Goals
- Installation 70% complete for CSS-Wx.
- Complete transition to CSS-Wx and decommissioning of FAA Bulk Weather Telecommunications Gateway (FBWTG) in Weather and Radar Processor (WARP).

Program Plans FY 2018 – Performance Output Goals
- National Deployment completed for CSS-Wx.
- Complete transition to CSS-Wx and decommissioning of the Data Distribution Service in the Corridor Integrated Weather System (CIWS).
- Complete transition to CSS-Wx and decommissioning of WINS in WARP.

System Implementation Schedule



X, System Wide Info Management (SWIM) – Common Support Services Aeronautical Information Management (AIM), G05C.01-07

Program Description

The Aeronautical Information Management (AIM) Common Support Services (CSS) program will transition the Aeronautical Common Service (ACS) from a stand-alone set of web services (i.e., Special Activity Airspace (SAA), Airport data, NOTAMs, and other aeronautical information) to a more integrated environment. ACS was developed using open standards to enable universal access to aeronautical data and information, but the information is not merged. CSS will improve ACS by merging data and information streams including weather, surveillance, and flight data and traffic flow. This approach is made possible by the migration to a common hosted environment through the cloud. It will streamline the set of common support services and make it easier to manage all information in the cloud with a common set of tools for business rules management, identity management, Geographic Information System (GIS) and mapping services. This will include other basic information management services regardless of the content area.

The current approach to information management relies on compartmentalized tools and processes for a given data content which results in duplicated instances of the same functionality implemented across each data set on each system or database with little consistency. In the enterprise environment, where data and information are managed as an enterprise asset in the cloud, services can handle multiple information and data streams given the functionality is largely the same regardless of the content.

Transitioning the AIM data and information web services and establishing the common information management functions as common support services will improve the uniformity and integrity of information management across the data sets. It will standardize information management functionality so that use, development and technology refresh of these capabilities are more efficiently executed and broadly applied for the data and information in the cloud. This migration to a common support service enterprise approach to information management is consistent with the NAS enterprise architecture and supports multiple NextGen improvements including On Demand NAS Information and Collaborative air traffic management.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The AIM CSS program moves the legacy ACS to the NAS cloud environment and consolidates services across content areas to ensure consistency of data and information management. This consolidation and distribution approach will result in increased efficiency and cost effectiveness. This approach recognizes data as an enterprise asset and further expands the FAA's ability to manage data and information in a seamless and coordinated fashion enabling operational improvements such as On Demand NAS Information and Shared Situational Awareness. Cost efficiencies in using the same services to manage multiple data and information content areas along with the common approach to information exchange and business rule enforcement should reduce costs of implementation and maintenance of data and information. It should also provide a flexible, reliable platform for additional content at minimal cost. This program will begin exploring the magnitude of the shortfalls and quantifying costs and benefits as part of the investment analysis planning phase for the common support services acquisition.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

Program Plans FY 2017 – Performance Output Goals

- Complete program Detailed Design Review.

Program Plans FY 2018 – Performance Output Goals

- Complete program Software Release 1 Development and Test.

2A13, AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B) NAS WIDE IMPLEMENTATION*

FY 2014 Request $282.1M

- A, ADS-B NAS Wide Implementation – Segments 1 and 2, G02S.01-01 / X, ADS-B NAS Wide Implementation – Baseline Services & Applications, G02S.03-01
- B, ADS-B NAS Wide Implementation – Additional Service Volumes Gulf Expansion, G02S.03-02
- C, ADS-B NAS Wide Implementation – Additional Applications ADS-B IN, In Trail Procedures, G02S.03-03
- X, ADS-B NAS Wide Implementation – Future Segments, G02S.01-02

A, ADS-B NAS Wide Implementation – Segments 1 and 2, G02S.01-01 / X, ADS-B NAS Wide Implementation – Baseline Services & Applications, G02S.03-01

Program Description

ADS-B is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information. ADS-B is the cornerstone technology for the NextGen. This new system promises to significantly reduce delays and enhance safety by using aircraft broadcasted position based on the aircraft's navigation system calculation using the Global Navigation Satellite System or other navigation inputs, instead of position information from traditional radar.

Aircraft position (longitude, latitude, altitude, and time) is determined using the Global Navigation Satellite System (GNSS), and/or an internal inertial navigational reference system, or other navigation aids. The aircraft's ADS-B equipment processes this position information, along with other flight parameters, (such as identification, indication of climb or descent angle, velocity, next waypoint, and other data that is limited only by the equipment's capability) for a periodic broadcast transmission, typically once a second, to airborne and ground-based ADS-B receivers. The information will be used to display aircraft position on en route and terminal automation systems such as Common Automated Radar Tracking System (CARTS), Standard Terminal Automation Replacement System (STARS), Microprocessor En Route Automated Radar Tracking System (MicroEARTS), En Route Automation Modernization (ERAM), HOST, and Advanced Technologies and Oceanic Procedures (ATOP).

In addition to the ground-based ADS-B receiver, nearby aircraft within range of the broadcast and equipped with ADS-B avionics may receive and process the surveillance information of nearby aircraft for display to the pilot using the aircraft's multifunction display. Finally, ADS-B equipment may be placed on ground vehicles to allow controllers and pilots to locate and identify them on runways or taxiways.

The following capabilities are being implemented: Automatic Dependent Surveillance – Broadcast (ADS-B), Automatic Dependent Surveillance – Rebroadcast (ADS-R), Traffic Information Service – Broadcast (TIS-B), Flight Information Service – Broadcast (FIS-B), and Wide Area Multilateration (WAM). Additional applications are also being developed utilizing the ADS-B capabilities.

ADS-R translates and uplinks ADS-B messages received from aircraft with different data links, making it possible for each aircraft and vehicle to receive the information being transmitted by the other. TIS-B is a surveillance service that derives traffic information from one or more radar-based surveillance sources, Airport Surface Detection Equipment-Model X (ASDE-X) and Wide Area Multilateration (WAM), and uplinks this traffic information to ADS-B-in equipped aircraft. TIS-B enables ADS-B-In equipped aircraft to receive position reports on non-ADS-B-equipped aircraft during the transition period to full ADS-B equipage in the NAS. FIS-B broadcasts non-air traffic control advisory information such as weather and aeronautical information, by use of a cockpit display. WAM surveillance systems have been installed in areas where the installation of radar would be cost prohibitive and/or the traffic density dictates the need for surveillance. WAM utilizes signals from legacy/traditional aircraft transponders. WAM supported surveillance allows for a rapid and cost effective secondary surveillance radar coverage solution.

Applications are being developed which will utilize the ADS-B capability such as Ground-based Interval Management – Spacing (GIM-S) which will provide for improved spacing of aircraft as they fly through the airspace and Surface Advisory Services which will provide better situational awareness and alerting to pilots approaching or operating on the airport surface.

The main ADS-B acquisition has been structured as a multiple year, performance-based service contract under which the vendor will install, own, and maintain the ground-based ADS-B equipment that provides the surveillance information to FAA automation systems.

ADS-B National Implementation – Segments 1 and 2 (G02S.01-01):
Segment 1 developed the standards for operations, the ground equipment and the automation software enhancements to FAA systems. ADS-B was implemented in Segment 1 for the following service volumes: Gulf of Mexico; Louisville, KY; Philadelphia, PA; Juneau AK; and Expansion of Broadcast Services – East Coast, Midwest to North Dakota, Western Arizona through California and Oregon.

Segment 2 continues the development of automation enhancements to enable ADS-B applications and deployment of ADS-B services for the remainder of the NAS. Segment 2 completes NAS-Wide deployment of ADS-B for surveillance and air traffic services supporting En Route, Terminal and Airport Surface operations. Segment 2 also develops applications: Ground-based Interval Management-Spacing (GIM-S) (En Route only); Surface Advisory Services; Flight Deck Based Interval Management-Spacing (FIM-S) flight trials, In-Trail Procedure (ITP) operational evaluation, and Traffic Situational Awareness with Alerts (TSAA) flight tests; and software development for the ATOP automation platform.

The planned completion date for deployment of ADS-B services, including TIS-B and FIS-B, is April 2014. This program ends in FY 2014.

ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
This program provides for continuing ADS-B baseline services and applications. The deployment utilizes performance based service fees for ADS-B infrastructure owned and operated by the prime contractor. It also continues implementation of baseline applications: Ground-based Interval Management (GIM), Traffic Situation Awareness, Airport Traffic Situation Awareness, Enhanced Visual Approach, Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS), Traffic Situation Awareness with Alerts, Weather and NAS Situation Awareness.

Also included in this program is the Colorado WAM project which is operating a Multilateration surveillance service capability. The traditional surveillance coverage provided by exiting ground based radar did not allow coverage below 9,000 feet due to the mountainous terrain. The lack of surveillance forced controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. To provide this surveillance service, receivers / transmitters were placed at multiple locations on the surface to determine the location of aircraft by triangulating the transponder signals broadcast by the radar beacon and Mode S avionics. The aircraft location information is provided to the automation system at Denver ARTCC to allow controllers to provide separation services at the four Colorado airports (Durango, Gunnison, Montrose and Telluride). The increased accuracy of this surveillance technique safely expands the capacity of these airports to allow additional aircraft operations during instrument landing conditions.

The WAM system is being managed by a System Integrator that is responsible for design, development, deployment, operation and maintenance of the surveillance system. After the system is certified by the FAA and is operational, the service provider will charge the FAA an annual service fee to provide the surveillance data. Funding for Colorado WAM MLAT is included in the Surveillance and Broadcast Services (SBS) CIP account G02S.03-01 for fiscal years 2015 and beyond.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

ADS-B is a technology that will allow implementation of new air traffic control procedures based on more accurate aircraft position information that will allow better use of existing airspace. This should result in an increase in capacity and will result in fewer delays and more optimal routing for aircraft. The efficiency benefits include reductions in weather deviations, reduced cancellations resulting from increased access to some Alaskan villages during reduced weather conditions, additional controller automation, and additional aircraft to aircraft applications. The efficiency benefits translate to savings in both aircraft direct operating costs and passenger value of time. The Business Case Analysis Report dated May 15, 2012 shows $3.2B in capacity and efficiency benefits.

Program Plans FY 2014 – Performance Output Goals
ADS-B National Implementation – Segment 1 and 2 (G02S.01-01):
- Achieve IOC of automation upgrades for ATOP automation platform.
- Achieve IOC for MEARTS fusion processing for separation services – fusion processing key site for 3nm separation (Honolulu HCF).
- Achieve IOC for Ground-Based Interval Management – Spacing (GIM-S).
- Achieve En Route ATC separation services IOC at remaining sites (24 cumulative).
- Achieve IOC for Terminal ATC separation services at 11 sites (61 cumulative).
- Achieve IOC of Surface Advisory Services at three sites (35 cumulative). (APB milestone)

- Install Surface Advisory Services at one Airport Surface Surveillance Capability (ASSC) site.
- Achieve IOC at one ASSC site.
- Complete ATC separation services Implementation Service Acceptance Testing (ISAT) at 49 service volumes which completes all 306 service volumes. (APB milestone)
- Establish FAA infrastructure that supports ground vehicle surveillance at Denver (DEN) and Chicago (ORD).

ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
- None.

Program Plans FY 2015 – Performance Output Goals

ADS-B National Implementation – Segment 1 and 2 (G02S.01-01):
- None.

ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
- Provide service at 306 service volumes within specified requirements.
- Achieve IOC for ATC separation/advisory services & pilot advisory services.
- Deploy GIM-S NAS wide.
- Install Surface Advisory Services at one ASSC site.
- Achieve IOC at one ASSC site.
- Pay performance based subscription charges on time.
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.

Program Plans FY 2016 – Performance Output Goals

ADS-B National Implementation – Segment 1 and 2 (G02S.01-01):
- None.

ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
- Provide service at 306 service volumes within specified requirements.
- Install Surface Advisory Services at five ASSC sites.
- Achieve IOC at five ASSC sites.
- Pay performance based subscription charges on time.
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.

Program Plans FY 2017 – Performance Output Goals

ADS-B National Implementation – Segment 1 and 2 (G02S.01-01):
- None.

ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
- Provide service at 306 service volumes within specified requirements.
- Install Surface Advisory Services at two ASSC sites.
- Achieve IOC at two ASSC sites.
- Pay performance based subscription charges on time.
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.

Program Plans FY 2018 – Performance Output Goals

ADS-B National Implementation – Segment 1 and 2 (G02S.01-01):
- None.

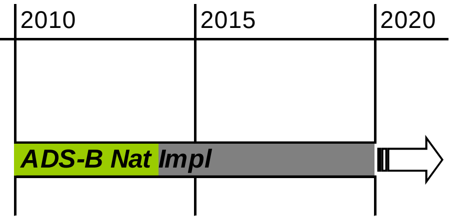
ADS-B National Implementation – Baseline Services and Applications (G02S.03-01):
- Provide service at 306 service volumes within specified requirements.
- Pay performance based subscription charges on time.
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.

System Implementation Schedule

Automatic Dependent Surveillance-Broadcast (ADS-B) National Airspace System (NAS) Wide Implementation

First site IOC: August 28, 2008 -- Last site IOC: December 2013

Expected operational life: 27 years



B, ADS-B NAS Wide Implementation – Additional Service Volumes Gulf Expansion, G02S.03-02

Program Description

Three additional ADS-B radio stations will be provided in Mexico which will provide coverage for all of the Gulf of Mexico (GOMEX). A Memorandum of Agreement (MOA) was signed between United States and Mexico on May 22, 2012. The MOA includes the roles of each entity, describes how the added surveillance will improve situational awareness and enable more efficient air traffic handoffs between the countries, and contains a requirement to build a detailed plan that includes cost share, schedule, and ATC procedures development.

Three additional ADS-B radio stations in Mexico will provide coverage over all of the Gulf of Mexico air traffic routes extending from Houston ARTCC into Mexico. Airlines will use the routes transitioning from North to South, or South to North, and the primary area of expanded coverage is the far south of the US Flight Information Region (FIR). This will allow for reduced separation resulting in greater airspace capacity.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

The SBS baseline surveillance service includes ADS-B coverage for the U.S. portion of the Gulf of Mexico. Adding three ADS-B radio stations in Mexico will provide coverage over all of the Gulf of Mexico air traffic routes extending from U.S. airspace into Mexico, thereby allowing reduced separation for both sides of the border and enabling more efficient handoffs between U.S. and Mexican airspace. Reduced separation will allow for improved on-time arrivals by allowing more volume of traffic to be managed.

Program Plans FY 2014 – Performance Output Goals

- GOMEX: Radio station site selection complete.

Program Plans FY 2015 – Performance Output Goals

- Radio station construction complete.

Program Plans FY 2016 – Performance Output Goals

- Expanded GOMEX services operational at Houston – September 2016. (APB milestone)

Program Plans FY 2017 – Performance Output Goals

- Pay performance based subscription charges on time.

Program Plans FY 2018 – Performance Output Goals

- Pay performance based subscription charges on time.

C, ADS-B NAS Wide Implementation – Additional Applications ADS-B IN, In Trail Procedures, G02S.03-03

Program Description

In Trail Procedures (ITP) allows air traffic control to approve ADS-B equipped aircraft to perform flight level changes when there is less than standard separation. ITP enables flight level change maneuvers that are otherwise not possible using non-ADS-B based oceanic procedural separation standards. ITP allows ATC to approve these flight level change requests between properly equipped aircraft using reduced separation during the maneuver. This will allow aircraft to more easily access more efficient altitudes in oceanic airspace. This program develops the operational standards, provides for operational testing and develops supporting automation software.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

The objective of this application is to enable more frequent approval of flight level requests between properly equipped aircraft using a reduced separation standard in Oceanic Airspace, improving flight efficiency.

Program Plans FY 2014 – Performance Output Goals

- Advanced Technologies and Oceanic Procedures (ATOP) ITP draft modifications completed.

Program Plans FY 2015 – Performance Output Goals

- ATOP ITP modifications completed.

Program Plans FY 2016 – Performance Output Goals

- Oceanic ITP operational at Oakland Center.

Program Plans FY 2017 – Performance Output Goals

- Oceanic ITP operational at New York and Anchorage Centers.

Program Plans FY 2018 – Performance Output Goals

- None.

X, ADS-B NAS Wide Implementation – Future Segments, G02S.01-02

Program Description

The program will develop and implement ADS-B In Applications. Information is sent to aircraft using ADS-B In, which shows all aircraft in the area via a cockpit display, even those not equipped with ADS-B technology, providing improved pilot situational awareness and advisories. Flight safety improves when pilots can determine airborne and airport surface hazards.

The FAA chartered the ADS-B In Aviation Rulemaking Committee (ARC) in June of 2010 to provide a forum for the U.S. aviation community to define a strategy for incorporating ADS-B In technologies into the NAS. The ARC was tasked to provide recommendations that clearly define how the community should proceed with ADS-B In while ensuring compatibility with defined ADS-B Out avionics. In September 2011, the ARC published a report that included a priority listing of ADS-B In applications from a user perspective. Subsequently, in accordance with the FAA Reauthorization Act, Section 211(b), the ARC has been evaluating a variety of equipage implementation strategies to frame a targeted ADS-B-In mandate, and is scheduled to publish their recommendations by 31-Oct-2012.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

In response to the September 2011 ARC recommendations, the FAA SBS program has been evaluating the business case, affordability, and maturity of the various applications. The SBS program is maturing the requirements definition of a suite of Interval Management (IM) applications and will pursue a series of final investment decisions as each application or a set of applications are deemed suitably defined for implementation. These final investment decisions will encompass the work activities and milestones for the Future Segments of the SBS program.

Program Plans FY 2014-2015 – Performance Output Goals
- None.

Program Plans FY 2016 – Performance Output Goals
- Develop program plan for the next set of IM applications to include Interval Management – Spacing (IM-S) No Closer Than, IM-S Arrivals & Approach, and IM-S Cruise.

Program Plans FY 2017 – Performance Output Goals
- Key site automation test for IM-S No Closer Than.
- Achieve operational approval for IM-S No Closer Than.

Program Plans FY 2018 – Performance Output Goals
- Key site automation test for IM-S Arrivals & Approach and Cruise.
- Achieve operational approval for IM-S Arrivals & Approach and Cruise.

2A14, WINDSHEAR DETECTION SERVICE (WDS)
FY 2014 Request $2.0M

Wind Shear Detection Services – Work Package 1, W05.03-01

Program Description

Wind Shear Detection Services (WSDS) Work Package 1 is a portfolio program consisting of legacy several wind shear detection systems currently deployed in the NAS. The program will address obsolescence of the legacy systems Weather Systems Processor (WSP), Low Level Wind Shear Alert System (LLWAS) and Wind Measuring Equipment (WME). The program will sustain existing service levels by upgrading components of existing systems to mitigate safety hazards and to resolve obsolescence/supportability issues of the 34 WSP, 60 WME, and 50 LLWAS systems currently deployed in the NAS.

Alignment of Program to FAA Strategic Goal, Objective, and Performance Target

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Measure 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Target

WSDS WP1 will contribute to the reduction of commercial air carrier fatalities per 100 million persons by preventing aircraft accidents in the terminal environment during take-off and landing. WSDS will accomplish this by providing hazardous wind shear alerts and warnings to Air Traffic Controllers to be passed on to pilots to avoid potential wind shear encounters.

Program Plans FY 2014 – Performance Output Goals
- Award WME integration contract.
- Award Contract for WME Wind Sensors.

Program Plans FY 2015 – Performance Output Goals
- Deliver LLWAS RS Wind Sensors to FAA Logistics Center.
- Award production contract for WSP Radar Video Processors (RVP-7) replacement.

Program Plans FY 2016 – Performance Output Goals
- First WSP site upgrade complete (1 of 34, 3%). (APB milestone)
- First WME site upgrade complete (1 of 62, 2%). (APB milestone)

Program Plans FY 2017 – Performance Output Goals
- Install WSP site upgrade at 19 sites (20 of 34, 59%).
- Install WME site upgrade at 30 sites (31 of 62, 50%).

Program Plans FY 2018 – Performance Output Goals
- Last WME site upgrade complete (62 of 62, 100%). (APB milestone)
- Last WSP site upgrade complete (34 of 34, 100%). (APB milestone)

2A15, WEATHER AND RADAR PROCESSOR (WARP)

FY 2014 Request $0.7M

Weather and Radar Processor (WARP) Sustain, W04.03-01

Program Description

The Weather and Radar Processor (WARP) system provides accurate, reliable, current and forecast weather conditions to air route traffic control center (ARTCC) controllers, traffic management specialists, and center weather service unit meteorologists. This weather data allows the FAA to provide timely weather advisories and sustain safe and efficient air travel. The WARP Program provides accurate weather data to critical NAS systems such as the En Route Automation Modernization (ERAM) and Advanced Technologies and Oceanic Procedures (ATOP). The current WARP system:

- Processes weather radar data so it can be integrated and portrayed on air-traffic controller's displays;
- Provides access to radar mosaics and other key weather information for Area Supervisors and Traffic Management Personnel;
- Accepts data from advanced weather sensors;
- Plots and processes forecasted upper air wind and temperature gridded data, and
- Provides weather data to other NAS systems.

WARP Benefits include:

- Reduced delays and the resulting savings in passenger time and airline direct operating costs;
- Increased safety due to weather advisories that improve pilot awareness of adverse weather conditions and help aircraft with or without onboard radar avoid accidents in convective weather;
- Decreased need for deviations from planned flight paths because more precise information about severe weather is available; and
- Cost Avoidance that result from the elimination of commercial weather service.

The system became fully operational in December 2002 and provides weather information on controller displays. A WARP Maintenance and Sustainment Services (WMSS) Contract was awarded in April 2005 and a subsequent WMSS Contract was awarded in June 2010. WARP systems are operational at all 21 ARTCCs and at the Air Traffic Control System Command Center (ATCSCC), and there are two WARP systems at the William J. Hughes Technical Center (WJHTC) and one system at the vendor's facility (Harris Corporation), in Melbourne, FL. The WMSS contract continues the upgrading of hardware and software necessary to keep this system operational.

Due to the WARP Program's aging hardware and software infrastructure (unsupported operating system and hardware equipment obsolescence) the existing architecture must be sustained and maintained until it is replaced by the NextGen Weather Processor (NWP) and Common Support Services Phase 1 Weather (CSS-Wx) programs. This will ensure that the weather processing and distribution capabilities continue to provide data which supports en route controllers, traffic management specialists, and center weather service unit meteorologists at FAA's en route and oceanic centers ARTCCs.

Some current activities include data format changes and selectable altitude layer for improved stratification of weather information. Data format adaptation changes are associated with the weather information WARP acquires through its interfaces. This task also incorporates National Weather Service (NWS) changes of gridded model data from GRIB1 to GRIB2 (bit-oriented data exchange format). This task ensures WARP doesn't lose weather information for air traffic operations due to a format change. The selectable layer task will continue addressing the stratification of weather information on controller's displays. It will provide weather information that is better correlated with the altitude responsibilities of a controller's sector, and the weather information will have a greater granularity (e.g. 1,000 ft. increments). This task will reduce controller workload by eliminating the need to report weather information which is not applicable to aircraft at its altitudes.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

Accurate weather information presented in an integrated manner in the en route environment gives air traffic controllers a comprehensive picture of where aircraft can safely fly while making the most efficient use of airspace. Sustainment of WARP is required in order to meet the 0.9996 system availability specified for the WARP System Specification Document, FAA-E-2898H. Actual availability since the incremental technology refresh in 2009 is recorded as 0.99993.

Program Plans FY 2014 – Performance Output Goals

- Complete WARP test, implementation, deployment, and disposal phases of the two engineering Change Proposals (ECPs). ECP-01 will provide selectable layer mosaics that have improved resolution and latency. ECP-02 will provide data format adaptation along with a hardware refresh for two subsystems.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

2A16, Collaborative Air Traffic Management Technologies (CATMT)*

FY 2014 Request $29.4M

Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G05A.05-01 / Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G05A.05-02 / X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4, G05A.05-03

Program Description

The Collaborative Air Traffic Management Technologies program provides enhancements to the Traffic Flow Management (TFM) system. The TFM system is the primary automation system used by the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units (TMU) that assist the ATCSCC in management of air traffic flow and throughput and planning for future air traffic demand. The TFM system is the nation's primary source for capturing and disseminating air traffic information and is the key information source for coordinating air traffic in the NAS. TFM hosts the software decision support systems that assist in managing and metering air traffic to reduce delays and make maximum use of system capacity to dynamically balance growing flight demands with NAS capacity. The FAA also uses the information from this system to collaborate with aviation users to develop and implement airspace management programs that reduce delays and ensure smooth and efficient traffic flow which result in significant benefits to passengers and airlines. TFM benefits the airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, industry, and partner countries.

CATMT Work Package 2 (G05A.05-01):

CATMT Work Package 2 (WP2) will provide new enhancements to the TFM decision support tool suite from FY 2010 through FY 2014. The FAA baseline for WP2 includes the following capability enhancements:

- Arrival Uncertainty Management (AUM) – Automates the use of historical data for determining the number of arrival time slots to be reserved for flights outside of the regular schedule, when a Ground Delay Program is generated;
- Weather Integration – Integrates high confidence 2 hour weather predictions onto the primary display used by Traffic Managers and into TFMS for use as constraint information in decision support tools (called Corridor Integrated Weather System (CIWS)). Also locates departure opportunities through impending weather gaps and determines if a flight will encounter weather problems on its projected departure route (called the Route Availability Planning Tool (RAPT) enhancement);
- Collaborative Airspace Constraint Resolution (CACR) – Automated decision support tool that identifies constrained airspace and provides potential solutions for avoiding those constraints. CACR responds to the RTCA Task Force 5 recommendation for automation to negotiate user-preferred routes and alternative trajectories; and
- Airborne Reroute Execution (ABRR) – Provides the ability to electronically send TFM generated airborne reroutes to En Route control facility automation for ATC execution.

CATMT Work Package 3 (G05A.05-02):

CATMT Work Package 3 (WP3) provides enhancements to the TFM from FY 2011 to 2015. The FAA baseline for WP 3 includes the following capability enhancements:

- TFM Remote Site Re-engineering (TRS-R) – Modernizes the software (SW) infrastructure, backbone of the TFM decision support tool suite used by Traffic Managers in the field:
    - Phase 1 – Consolidates three software base codes into one. Allows the airlines to see the same information as the FAA for better situational awareness, collaboration and decision support.
    - Phase 2 – Consolidates software communications, control and data management to one modernized suite. This is the first and fundamental step for future mid-term CATMT capabilities as well as the TFM integrated tool suite and integrated displays planned for future CATMT work packages.
- Collaborative Information Exchange (CIX) – Manages information exchange between the TFM system and external systems through software interfaces:

- Integrates Special Use Airspace (SUA) status information made available through SWIM Segment 1 for use in decision support tools and on the Traffic Situation Display.

CATMT Work Package 4 (G05A.05-03):
CATMT Work Package 4 (WP4), a future segment, that when approved by the FAA Joint Resource Council (JRC) will provide NextGen Midterm TFM/CATM capabilities between FY 2016 through FY 2020. Concept exploration analyses are on-going as one part of the NextGen Collaborative Air Traffic Management (CATM) Solution Set, and will eventually lead to the identification of the possible CATMT Work Package 4 capabilities.

CATMT WP4 Final Investment Decision (FID) is planned for April 2015.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

The CATMT program will support the Delivering Aviation Access through Innovation goal through the use of automated systems that provide more accurate and timely information for all TFM system users, improve operator and passenger access to flight information, and reduce system delays. CATMT will support the Performance Metric for On Time Arrival by providing more accurate forecasting of system capacity and user demand; improving modeling, evaluation and optimization of traffic management initiatives; improving information dissemination, coordination and execution of traffic flow strategies with NAS users; minimizing and equitably distributing delays across airports and users; collecting and processing additional performance data to define metrics and identify trends; and providing greater ease of use to the traffic management users.

Program Plans FY 2014 – Performance Output Goals
CATMT WP2 (G05A.05-01):
- Complete development, test and deployment of CACR.
- Complete Detailed Design Review (DDR) of ABRR.

CATMT WP3 (G05A.05-02):
- Complete test of CIX.
- Develop the 1st incremental software release of TRS-R Phase 2.
- Complete Detailed Design Review (DDR) of 2nd increment of TRS-R Phase 2.

CATMT WP4 (G05A.05-03):
- None.

Program Plans FY 2015 – Performance Output Goals
CATMT WP2 (G05A.05-01):
- Deploy ABRR.

CATMT WP3 (G05A.05-02):
- Deploy CIX.
- Deploy the 2nd incremental software release of TRS-R Phase 2.

CATMT WP4 (G05A.05-03):
- None.

Program Plans FY 2016 – Performance Output Goals
CATMT WP2 (G05A.05-01):
- None.

CATMT WP3 (G05A.05-02):
- Complete CATMT WP3 transition and close-out activities.

<u>CATMT WP4 (G05A.05-03):</u>

- Pending JRC Final Investment Decision and contract award, begin design and development of CATMT Work Package 4.
- Pending JRC Final Investment Decision, award contract for the TFMS/CATMT WP4.

Program Plans FY 2017-2018 – Performance Output Goals

<u>CATMT WP2 (G05A.05-01):</u>

- None.

<u>CATMT WP3 (G05A.05-02):</u>

- None.

<u>CATMT WP4 (G05A.05-03):</u>

- Pending JRC Final Investment Decision and contract award, continue design, development and deployment of CATMT Work Package 4.

System Implementation Schedule

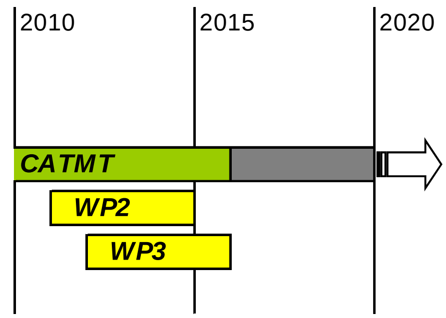
Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, 3 and 4

First Operational Capability (OC): June 2008 -- Last OC: 2019

WP2 First Software Enhancement: 2011 -- Last: 2014

WP3 First Software Enhancement: 2012 -- Last: 2015

WP4 - Pending final investment decision



2A17, COLORADO ADS-B WIDE AREA MULTILATERATION (WAM) COST SHARE*

FY 2014 Request $3.4M

Colorado Wide Area Multilateration (WAM), G08M.03-01

Program Description

Colorado Wide Area Multilateration (WAM) provides surveillance to selected airports in the mountainous areas of Colorado so that more operations can occur during poor weather with very low ceiling and visibility conditions. The seasonal air traffic volume increases for the ski country of Colorado has resulted in an increased number of delays and denied service at mountain airports, especially during bad weather. The FAA has established a reservation system known as the Special Traffic Management Program (STMP) during the peak travel months in an effort to regulate and systematically meter the traffic to the airports. This solution keeps the traffic volume manageable for the Denver Air Route Traffic Control Center (ARTCC), but produces extended delays and, in some cases, diversions or denial of Air Traffic Control (ATC) services.

The Colorado Division of Aeronautics has determined that a lack of surveillance is one of the main reasons behind reduced capacity during Instrument Meteorological Conditions (IMC). The problem is compounded by mountainous terrain, single instrument runway airport configurations and limited ramp space. The base of existing radar coverage is most often at or above 9,000 feet. The lack of more comprehensive surveillance forces controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. This is a safe means of providing the service, but it is not efficient enough to provide for Colorado's air traffic service needs. Normally, many arrivals into Colorado Mountain airports are conducted under Visual Flight Rules (VFR). Operating under IMC reduces acceptance rates for mountain airports from 12-17 flights per hour to 4 per hour. From November to April, when the STMP is in effect, the Colorado DOT estimates 75 aircraft per airport, per day are delayed or diverted, creating daily revenue loss for the state, airlines and local communities. The ADS-B/Multilateration system will enhance public safety, increase capacity of the FAA NAS system, and provide increased services and economic benefit to four Colorado Mountain Communities and their airports: Durango, Gunnison, Montrose and Telluride CO.

In FY 2013, the program completed installation of electronic instrumentation at multiple locations to determine aircraft location by integrating data from several ground sites. The increased accuracy of this surveillance technique will safely expand the capacity of these airports to allow additional aircraft operations during instrument landing conditions. The multilateration component provides 1090/UAT transponder equipped surveillance in the near term until the transition to ADS-B is complete. During the aircraft equipage period to ADS-B compliant avionics (DO-260B), the system will provide surveillance of traditional ATCRBS and Mode S equipped aircraft through Multilateration. For those aircraft that are equipped, ADS-B surveillance is provided. The surveillance data is provided to the automation system at Denver ARTCC from a service provider under contract to the FAA. The baseline surveillance performance of the system will be equal to that of the existing Air Traffic Control Beacon Interrogator – Model 6 (ATCBI-6) currently employed by the FAA in providing En Route Air Traffic separation.

The system is being managed by a System Integrator that is responsible for design, development, deployment, operation and maintenance of the surveillance system and owns the equipment. The System Integrator will integrate ADS-B and multilateration under governmental oversight (FAA and the State of Colorado). After the system is certified by the FAA and is operational, the service provider will charge the FAA an annual service fee to provide the surveillance data.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

ADS-B and Wide Area Multilateration (WAM) are technologies that allow implementation of new air traffic control procedures that make better use of existing airspace. This, in effect, is an increase in capacity and will result in fewer delays and more optimal routing for aircraft. The financial benefits projected from the increase in capacity is approximately $2.4 million per year.

Program Plans FY 2014 – Performance Output Goals

- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the four Colorado airports.

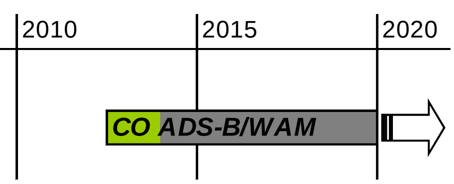
Program Plans FY 2015-2018 – Performance Output Goals

- None, future program plans are included in the CIP program ADS-B National Implementation – Baseline Services & Applications, G02S.03-01.

System Implementation Schedule

Colorado ADS-B/WAM Cost Share

First site IOC: September 2012 -- Last site IOC: June 2013
Expected operational life: 23 years



- Colorado WAM - Initial Operating Capability at Key Site (Montrose) achieved on 9/29/2012.
- Provide separation services in three additional service volumes by June 2013

2A18, TACTICAL FLOW TIME BASED FLOW MANAGEMENT (TBFM)*
FY 2014 Request $10.5M

Trajectory Management – Time Based Flow Management (TBFM) Work Package 2, G02A.01-03 / X, Trajectory Management – Time Based Flow Management (TBFM) Technology Refresh, G02A.01-07

Program Description

TBFM uses Time Based Metering (TBM) to optimize use of NAS capacity. TBM determines specific time of arrival for points in an aircraft's route. This results in a systemic and efficient flow of aircraft to the terminal airspace, starting hundreds of miles away. Aircraft using this technique can arrive properly sequenced and spaced to maximize capacity at the nation's busiest airports.

Currently, the Traffic Management Advisor (TMA) system provides TBM capability daily throughout the NAS. TMA has been field-tested over the past 10 plus years and is installed in the 20 Air Route Traffic Control Centers (ARTCC) with supporting equipment in most of the major airports served by those centers. TBFM will improve upon the TMA system by adding more sophisticated software to implement the Operational Improvements discussed in the NextGen Implementation Plan. TBFM will enhance air traffic operations, by reducing delays and increasing efficiency of airline operations.

<u>TBFM Work Package 2 (G02A.01-03):</u>
TBFM Work Package 2 will improve the management of traffic flow throughout the cruise phase of flight through point-in-space metering or extended metering; resolve the issue of TMA hardware obsolescence; increase airspace capacity utilization through flexible scheduling; share metering data with other tools/stakeholders; enable more efficient trajectory modeling of the Area Navigation/Required Navigation Performance (RNAV/RNP) routes; enable more efficient departure operations with the integrated departure and arrival concept (IDAC); and increase traffic manager awareness of severe weather within their area of responsibility. The design, development and deployment of these concepts will be occurring through the 2014 timeframe. These enhancements support the current NextGen Operational Improvements including:

- Current Tactical Management of Flow in the En Route domain for Arrivals/Departures (NextGen Operational Improvement 104115) – TMA displays are used for organizing traffic flows for tactical flow management of transition from en route to terminal airspace,
- Improved Management of Arrivals/Surface/Departure Flow Operations (NextGen Operational Improvement 104117) – Integrating and automating the departure capability with the TMA system (IDAC),
- Point-in-Space Metering (NextGen Operational Improvement 104120) – Extended Metering – Adding additional meter points for more efficient Time Based Metering, and
- Time-Based Metering Using Area Navigation (RNAV)/Required Navigation Performance (RNP) Route Assignments (NextGen Operational Improvement 104123) – Automating the use of RNAV procedures in the Terminal environment for a more efficient modeling of an aircraft's trajectory.

TBFM WP2 will develop and deliver programs for other operational needs such as flexible scheduling that will take advantage of the partial slots that currently causes a loss of efficiency in capacity constrained areas. Also the system will be re-architected to reduce the space requirements of the TMA system. The system currently consists of two monitors, two keyboards and two mice requiring a significant amount of space which may not be available at all needed airports. The reduction will help to continue installing the TMA system at additional airports and the expansion of Time Based Metering.

Under the TBFM program, Time Based Metering will be deployed to five additional airport sites: Teterboro (TEB), Westchester County White Plains (HPN), Cleveland-Hopkins (CLE), Ronald Reagan Washington National (DCA) and Baltimore/Washington International (BWI)) and five additional Adjacent Center Metering (ACM) Sites that support Washington Dulles International (IAD), Los Angeles International (LAX), San Diego International (SAN), Hartsfield-Jackson Atlanta International (ATL) and San Francisco International (SFO).

TBFM Technology Refresh (G02A.01-07):
TBFM Technology Refresh will replace the equipment that was deployed in 2012 with new modern equipment in the FY 2016-2017 time frame. The current equipment will begin to reach its end of life/end of maintenance by 2017. The TBFM program office, starting in the FY 2015 time frame, will begin the acquisition management process to reach a Final Investment Decision to replace this hardware.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

TBFM will expand time based metering solutions across additional phases of flight. This will increase daily airport capacity and improve flight efficiency by reducing last minute maneuvering of aircraft as they approach their destination airport. This will also improve controller efficiency in organizing the arrival stream for maximum use of that airport capacity. TMA has provided an average of 3-5% increase in throughput at the airports where it is installed.

Program Plans FY 2014 – Performance Output Goals
TBFM WP2 (G02A.01-03):
- Complete development and implementation of NextGen and Operational initiatives such as Integrated Departure and Arrival Capability (IDAC) and Extended Metering.
- Expand TMA to 5 additional facilities.

TBFM Technology Refresh (G02A.01-07):
- None.

Program Plans FY 2015 – Performance Output Goals
TBFM WP2 (G02A.01-03):
- None.

TBFM Technology Refresh (G02A.01-07):
- Develop a plan to conduct the Technology Refresh of the TBFM system.
- Develop documentation and complete coordination necessary to gain the acquisition approval for the Technology Refresh of the TBFM system, such as requirements, market surveys, cost analysis, and architecture artifacts.

Program Plans FY 2016 – Performance Output Goals
TBFM WP2 (G02A.01-03):
- None.

TBFM Technology Refresh (G02A.01-07):
- Complete investment analysis documentation for a Final Investment Decision on TBFM Technology Refresh Program.
- Initiate site surveys, TMA software development to assure system component compatibility, end-to-end test strategies development, documentation updates, and training regime revisions for both user and maintenance personnel.
- Begin phased roll-out of technology refresh components.
- Support the training of air traffic and technical operational personnel.

Program Plans FY 2017 – Performance Output Goals
TBFM WP2 (G02A.01-03):
- None.

TBFM Technology Refresh (G02A.01-07):

- Continue phased roll-out of the TMA Technology Refresh, documentation updates, and training regime revisions.
- Support the training of air traffic and technical operational personnel.

Program Plans FY 2018 – Performance Output Goals

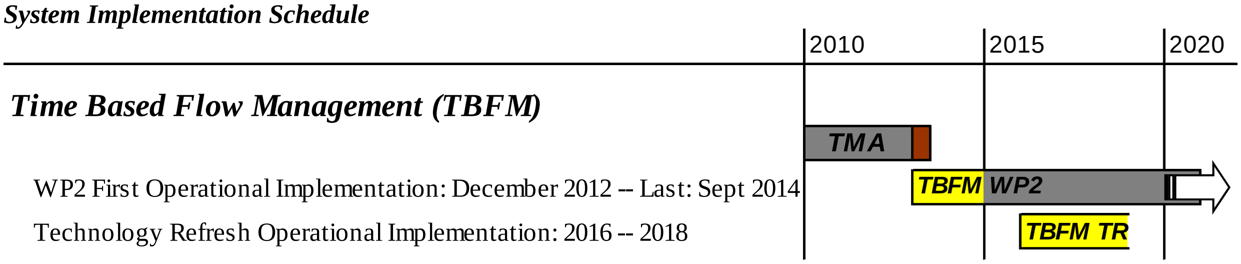
TBFM WP2 (G02A.01-03):

- None.

TBFM Technology Refresh (G02A.01-07):

- Complete phased roll-out of the TMA Technology Refresh.
- Update user and maintenance documentation and revise training documentation.
- Support the training of air traffic and technical operational personnel.

System Implementation Schedule



2A19, ATC Beacon Interrogator (ATCBI) – Technology Refresh

FY 2014 Request $1.0M

ATC Beacon Interrogator (ATCBI) Model 6 – Technology Refresh, S02.03-03

Program Description

The ATCBI-6 Technology Refresh Program will replace and upgrade obsolete ATCBI-6 Original Equipment Manufacturer (OEM) peculiar and Commercial Off-The-Shelf (COTS) hardware and software to ensure the continued reliable and cost effective operation of the radar system through its designated lifecycle. The original ATCBI-6 program procured 139, Monopulse Secondary Surveillance Radar (MSSR) with Selective Interrogation to replace 132 old 4/5's operational beacons, and seven support systems for training, testing, logistics, and operational support. The ATCBI-6 provides air traffic controllers with selective interrogation capability, not available in the older systems, that significantly improves the accuracy of aircraft position and altitude data provided to ATC automation systems. Additionally, the ATCBI-6, in conjunction with a co-located primary Long Range Radar, provides back-up Center Radar Approach (CENRAP) surveillance service to numerous Terminal Radar Approach Control (TRACON) facilities in the event terminal radar services are lost. The ATCBI-6 program commissioned the first system in FY 2002 and commissioned the last system in FY 2013.

The Technology Refresh Program is in the planning and investment analysis phase and the business case analysis will identify parts obsolescence, operational performance deficiencies, and other areas requiring technology refresh to ensure continued reliable and cost effective operation of the radar system through its designated lifecycle. The Investment Analysis Readiness Decision (IARD) is currently planned for 2014 Q3 and the Final Investment Decision (FID) is currently planned for 2015 Q3. This activity will determine the retrofit requirement for the 132 operational ATCBI-6 systems in the FAA inventory with the identified modification kits.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The program is necessary to ensure the continued reliable and cost effective operation of the ATCBI-6 Secondary Surveillance system through its designated lifecycle. A business case analysis will be prepared to identify parts obsolescence, operational performance deficiencies, or other areas requiring technology refresh to ensure continued reliable and cost effective operation of the radar system through its designated lifecycle.

Program Plans FY 2014 – Performance Output Goals
- Achieve Investment Analysis Readiness Decision, Sept 30, 2014.

Program Plans FY 2015-2018 – Performance Output Goals
- None.

2A20, NEXT GENERATION WEATHER PROCESSOR (NWP)*
FY 2014 Request $23.5M

Weather Forecast Improvements – NextGen Weather Processor (NWP), G04W.03-02 / X, Weather Forecast Improvements – NextGen Weather Processor (NWP) Future Segments, G04W.03-03

Program Description

The goal of the NextGen Weather Processor (NWP) program is to establish a common weather processing platform that will functionally replace three of the legacy FAA weather processor systems and host new capabilities. As an input, NWP will use information from the FAA and National Oceanic and Atmospheric Administration (NOAA) radar and sensors and NOAA forecast models. NWP will use sophisticated algorithms to create aviation-specific current and predicted weather information that will not require meteorological interpretation. NWP will create value-added weather information for publishing via Common Support Services-Weather (CSS-Wx). It will perform Weather Translation, which will enable the use of weather information by automated decision-support tools (DST). NWP will also provide aviation safety related windshear, microburst, gust fronts, storm motion and speed products. Altogether, these features will aid in reducing the rising operations and maintenance costs by consolidating the following systems over its lifecycle:

- Corridor Integrated Weather System (CIWS): Provides 0 - 2 hour aviation forecast information to the Traffic Flow Management System (TFMS),
- Weather and Radar Processor (WARP): Provides weather radar information to en route air traffic controllers, and
- Integrated Terminal Weather System (ITWS): Provides weather radar information to terminal air traffic controllers.

Future activities will provide improved aviation weather information and tailored weather data for integration into decision support tools and processes for collaborative and dynamic NAS decision making. This will enhance capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of aircraft routing and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace. Delays in the NAS are primarily attributable to weather. Over the last five-year period, over 70% of delays of 15 minutes or more, on average, were caused by weather, based on Aviation

System Performance Metrics and Operations Network data. Initial estimates of airline and passenger cost savings (including fuel costs, downstream connection delays for passengers, etc.) attributed to these advanced en route weather applications exceed $290M per year.

<u>NWP (G04W.03-02):</u>
NWP will accomplish the following:

- Procuring the NWP processor;
- Rehosting CIWS functionality on the new processor; and
- Implementing the 2 to 8 hour weather forecast on traffic and performing translation of convective weather into weather constraint areas.

A finial investment decision for NWP is planned in FY 2014.

<u>NWP Future Segments (G04W.03-03):</u>
Future Segments will provide NextGen Midterm capabilities such as:

- Rehosting the Integrated Terminal Weather System (ITWS) and Weather and Radar Processor (WARP) functionality on the common weather processor platform.
- Performing translation of weather elements important to aviation (e.g., In-Flight Icing, Turbulence, Ceiling and Visibility).

An investment decision for Future Segments is planned in FY 2019.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 2 – System capacity, performance, and predictability are maintained during adverse weather.*
- *FAA Performance Measure 1 – Improve throughput at core airports during adverse weather by 14% by 2018.*

Relationship to Performance Metric

NWP provides improved weather radar mosaics and forecasts and tailors weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It enhances capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of aircraft routing and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace. Delays in the NAS are primarily attributable to weather. Over the last five-year period, over 70% of delays of 15 minutes or more, on average, were caused by weather, based on Aviation System Performance Metrics and Operations Network data. Initial estimates of airline and passenger cost savings (including fuel costs, downstream connection delays for passengers, etc.) attributed to these advanced en route weather applications exceed $290M per year.

Program Plans FY 2014 – Performance Output Goals
<u>NWP (G04W.03-02):</u>

- Obtain Final Investment Decision.
- Award Contract for NWP.

<u>NWP Future Segment (G04W.03-03):</u>

- None.

Program Plans FY 2015 – Performance Output Goals
<u>NWP (G04W.03-02):</u>

- Complete Critical Design Review.
- Complete Verification and Test Readiness Reviews.

<u>NWP Future Segment (G04W.03-03):</u>

- None.

Program Plans FY 2016 – Performance Output Goals

NWP (G04W.03-02):
- Complete Operational Testing.
- Install NWP at Key Site.
- Achieve Initial Operating Capability.

NWP Future Segment (G04W.03-03):
- None.

Program Plans FY 2017 – Performance Output Goals

NWP (G04W.03-02):
- Deploy at TBD number of NWP sites.
- Achieve Full Operational Capability at TBD number of sites.

NWP Future Segment (G04W.03-03):
- Deliver assessment report for migration of ITWS functionality to NWP.
- Deliver assessment report for translation of in-flight icing information from airborne aircraft.
- Deliver assessment report for translation of turbulence information from airborne aircraft.

Program Plans FY 2018 – Performance Output Goals

NWP (G04W.03-02):
- Deploy at TBD number of NWP sites.
- Achieve Full Operational Capability at TBD number of sites.

NWP Future Segment (G04W.03-03):
- Develop implementation strategy document to complete migration of ITWS functionality to NWP.
- Develop concept of use document for translation of in-flight icing information from airborne aircraft.
- Develop concept of use document for translation of turbulence information from airborne aircraft.

System Implementation Schedule

B: Terminal Programs

2B01, AIRPORT SURFACE DETECTION EQUIPMENT - MODEL X (ASDE-X)

FY 2014 Request $12.1M

- A, ASDE-X – Technology Refresh & Disposition, S09.01-01
- B, Airport Surface Movement Detection – ASDE-3 Service Sustainment, S01.05-01

A, ASDE-X – Technology Refresh & Disposition, S09.01-01

Program Description

ASDE-X is a surface surveillance system that provides air traffic controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors. It improves the controller's ability to maintain awareness of the operational environment and to anticipate conflicts. ASDE-X Safety Logic (AXSL) uses surveillance information from ASDE-X to determine if the current and projected positions and movement characteristics of tracked aircraft and vehicles present a potential collision situation. Visual and audible alerts are provided to air traffic controllers when safety logic predicts a potential collision.

Deployment of the 35 planned ASDE-X systems was completed in FY 2011. The first ASDE-X system was delivered in 2002. Some of the equipment has reached the end of its service life and is no longer supportable. The ASDE-X Technology Refresh program provides for the replacement and upgrade of hardware and software to ensure the continued operation of the surface surveillance system through its designated lifecycle. The ASDE-X program baseline included costs for the periodic replacement of Commercial Off-The-Shelf (COTS) system components; e.g., processors, displays, computer operating systems and Commercially Available Software (CAS).

Funding for ASDE-X Technology Refresh began in FY 2012. A study was completed in September 2012 to determine the equipment/software that needs to be upgraded, updated, or replaced as part of the ASDE-X Technology Refresh effort.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Maintain the rate of serious runway incursions at or below 0.395 events per million operations.*

Relationship to Performance Metric

ASDE-X enables air traffic controllers to track surface movement of aircraft and vehicles. It was developed to aid in preventing surface collisions and in reducing critical Category A and B runway incursions. ASDE-X provides air traffic controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors. It improves the ability of controllers to maintain awareness of the operational environment and to anticipate contingencies to potential runway incursions. ASDE-X Safety Logic enhances the situational awareness for air traffic controllers. It uses surveillance information from ASDE-X to determine if the current and/or projected positions and movement characteristics of tracked aircraft/vehicles present a potential collision situation. Visual and audible alerts are provided to the air traffic controllers when safety logic predicts a collision.

The ASDE-X Technology Refresh Program will ensure the continued operation of ASDE-X systems through its designated lifecycle. Completing the technology refresh effort will keep the number of Category A&B runway incursions at the reduced levels attained during ASDE-X system deployment. Since the program inception in FY 2014, the cumulative number of Category A&B runway incursions at the 35 ASDE-X airports was projected to be 65.87 out through FY 2010 (baseline). This number of runway incursions is a cumulative number over 7 years from FY 2004 through FY 2010. The target was to reduce the cumulative number of Category A&B runway incursions to 53.52 and the actual number determined in FY 2010 was 39.

Program Plans FY 2014 – Performance Output Goals

- Procure a set of the proposed Technology Refresh processors for testing on one of the ASDE-X support systems.
- Install and begin assessing the Technology Refresh processor solution on one of the ASDE-X support systems.

Program Plans FY 2015 – Performance Output Goals

- Complete the Technology Refresh processor solution contract award.
- Complete installation of the ASDE-X Technology Refresh processor solution at two of the 35 airports.

Program Plans FY 2016 – Performance Output Goals

- Complete installation of the ASDE-X Technology Refresh solution at 13 of the 35 airports, 43% complete.

Program Plans FY 2017 – Performance Output Goals

- Complete installation of the ASDE-X Technology Refresh processor solution at the remaining 20 airports, 100% complete. (Prior year funds)

Program Plans FY 2018 – Performance Output Goals

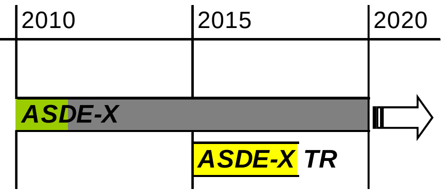
- None.

System Implementation Schedule

Airport Surface Detection Equipment – Model X (ASDE-

First ORD October 2003 – Last ORD: July 2011

First site Delivery: 2015 – Last site Delivery: 2017



B, Airport Surface Movement Detection – ASDE-3 Service Sustainment, S01.05-01

Program Description

The Airport Surface Detection Equipment, Model 3 (ASDE-3) is a primary radar that provides ground surveillance of airport movement areas for use by tower air traffic controllers. The FAA deployed 38 operational ASDE-3 systems to the 32 largest airports and 2 special interest airports [Reagan National Airport (DCA) & Andrews Air Force Base (ADW)] between 1989 and 2003. [Four airports received dual ASDE-3 systems.] All ASDE-3 systems were enhanced with Airport Movement Area Safety System (AMASS), a safety logic system, between 1999 and 2003. AMASS provides visual and aural alerts to controllers when potential runway incursions are detected. Between 2002 and 2005, the FAA completed a Service Life Extension Program (SLEP) for the ASDE-3 system. The purpose of this SLEP was to extend the useful life of the ASDE-3 radars to 2015.

The ASDE-3 radar provides valuable data to several of the ASDE-X systems, which are newer versions of surface surveillance systems. The main difference between ASDE-3/AMASS and ASDE-X is that the ASDE-X system fuses data from multiple sources – the surface surveillance radar, multilateration remote units, and the Airport Surveillance Radar - Model 9 (ASR-9). There are 2 ASDE-X configurations – ASDE-X systems that use the Surface Movement Radar (SMR) and ASDE-X systems that use the ASDE-3 radar. Of the 34 original ASDE-3 sites, 18 have been converted to ASDE-X systems that use the ASDE-3 radar, seven have been replaced by ASDE-X systems that use the SMR, and the remaining nine are scheduled to be replaced with the Airport Surface Surveillance Capability (ASSC) system. Of the 35 ASDE-X sites operational in the NAS, 18 use the ASDE-3 radar as the surface surveillance radar input. Four of these 18 sites have dual ASDE-3 radar inputs. Therefore, there are a total of 22 operational ASDE-3 radars and two support systems that need to be included in the ASDE-3 service sustainment effort.

Many of the ASDE-3 radar components called line replaceable units (LRUs) are no longer supportable. The ASDE-3 Service Sustainment program plans to identify those LRUs that are obsolete, and/or are facing diminishing manufacturing sources, and determine a solution to sustain the ASDE-3 service and improve overall system availability and supportability. This service sustainment would include both modifications to the ASDE-3 receiver/transmitter, and structural modifications such as antenna sail, pedestal, rotary joint and radome repair or replacement as required.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Maintain the rate of serious runway incursions at or below 0.395 events per million operations.*

Relationship to Performance Metric

The ASDE-3 Service Sustainment Program will ensure the continued operation of ASDE-3 radars and extend their designated lifecycle. As a critical input to the ASDE-X system, the ASDE-3 service sustainment effort will also ensure the continued operation of the ASDE-X system. It will help to keep the number of Category A&B runway incursions at the reduced levels attained during ASDE-X system deployments. Since program inception in FY 2004, the cumulative number of Category A&B runway incursions at the 35 ASDE-X airports was projected to be 65.87 out through FY 2010 (baseline). This number of runway incursions is a cumulative number over 7 years from FY 2004 through FY 2010. The target was to reduce the cumulative number of Category A&B runway incursions to 53.52 and the actual number determined in FY 2010 was 39.

Program Plans FY 2014 – Performance Output Goals
- Achieve Initial Investment Decision.

Program Plans FY 2015 – Performance Output Goals
- Achieve Final Investment Decision.

Program Plans FY 2016-2018 – Performance Output Goals
- None.

2B02, TERMINAL DOPPLER WEATHER RADAR (TDWR) – PROVIDE
FY 2014 Request $3.6M

Terminal Doppler Weather Radar (TDWR) – Service Life Extension Program (SLEP) – Phase 1, W03.03-01 / Terminal Doppler Weather Radar (TDWR) – Service Life Extension Program (SLEP) – Phase 2, W03.03-02

Program Description

The primary mission of the TDWR is to enhance the safety of air travel through timely detection and reporting of hazardous weather conditions including wind-shear events, microburst, gust fronts, and thunderstorms in and near an airport's terminal approach and departure zones. TDWRs are installed at higher-density airports with high occurrences of thunderstorms, and provide controllers current information on severe weather so that they can issue warnings to pilots. There have been no wind shear accidents at any TDWR-protected airport since its TDWR was commissioned. TDWRs are operational at 46 airports. TDWR weather data is transmitted to FAA automation systems and to 34 National Weather Service forecast offices.

The TDWR is an important component of the Federal Aviation Administration (FAA) and National Weather Service (NWS) weather information, alerting and forecasting family of monitoring and predicting systems. The current system has been in service since 1994 and is facing serious obsolescence issues and must be updated.

Terminal Doppler Weather Radar – Service Life Extension Program (SLEP) Phase 1 (W03.03-01):
The TDWRs were installed in the late 1990s and operate with a substantial number of proprietary software and hardware components, and many have become obsolete and present significant supportability problems that worsen with time. The planned upgrades in this first phase of the TDWR's service life extension program are scheduled to be completed no later than 2017. Although program funding ends in 2014, installations by FAA personnel will continue after that time. The Phase 1 TDWR SLEP program replaces Elevation Antenna Drives, Radar Product Generator (RPG) Uninterruptible Power Source (UPS), Transmitter Control Circuit Cards, Radio Frequency (RF) Filter Amplifier, Radar Data Acquisition (RDA), RPG Computer, Radomes, Facility Air Conditioners, and Antenna Drive Motor with Slip-ring.

Terminal Doppler Weather Radar – Service Life Extension Program (SLEP) Phase 2 (W03.03-02):
TDWR SLEP Phase 2 will address other TDWR systems that have deteriorated due to aging, and have become obsolete or unsupportable. An investment analysis/business case will be prepared which includes the Diminishing Manufacturing Sources and Material Shortages (DMSMS) study. This effort will review the logistics supportability, Reliability, Maintainability, and Availability (RMA) analysis, site survey to check the integrity of radar equipment facilities/shelters and grounding systems, and cost-benefit analysis in preparation for the Investment Analysis Readiness Decision (IARD).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The TDWR's required inherent availability (not including any logistics or administrative delays) is 99.967%. Since October 2008 (considering both scheduled and unscheduled outages), the TDWR has been in service about only 96.7% of the time. Even with a small portion of that time being due to logistics and administrative delays, it is clear that significant improvement in the TDWR's reliability and availability are still required.

Program Plans FY 2014 – Performance Output Goals

<u>Terminal Doppler Weather Radar – Service Life Extension Program (SLEP) Phase 1 (W03.03-01):</u>

- Install the Antenna Drive Motor modification at nine sites.
- Install the RDA modification at 11 sites.
- Complete RPG Computer evaluation and software development and make production decision.
- Install the Transmitter Sustainment modification at 47 sites, July 2014 (APB milestone).
- Install the air conditioners at the last eight sites, July 2014 (APB milestone).
- Install new radomes at 20 sites.

<u>Terminal Doppler Weather Radar – Service Life Extension Program (SLEP) Phase 2 (W03.03-02):</u>

- Complete business case for future SLEP activities.
- Achieve IARD.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

2B03, STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS) (TAMR PHASE 1)

FY 2014 Request $45.5M

- A, Standard Terminal Automation Replacement System – Technology Refresh (TAMR Phase 1), A04.01-01
- B, STARS – FTI Upgrade, A04.01-04

A, Standard Terminal Automation Replacement System – Technology Refresh (TAMR Phase 1), A04.01-01

Program Description

The Standard Terminal Automation Replacement System (STARS) is a joint Department of Defense and Department of Transportation (FAA) program to modernize terminal air traffic control automation systems. The STARS is a digital processing and display system that replaces the aging air traffic control equipment at our Automated Radar Terminal System (ARTS) IIIA and other high activity Terminal Radar Approach Control (TRACON) facilities and airport traffic control towers. Air traffic controllers use the STARS automation and displays to ensure the safe separation of aircraft (both military and civilian) within the nation's airspace.

The 48 STARS baseline deployments are complete, and STARS is in the hardware technology refresh phase of its life cycle. This investment is part of a phased approach to modernizing our terminal air traffic control equipment. The program updates existing TRACONs and towers with state-of-the-art systems featuring high-resolution LCD color displays, processors, storage devices, and enhanced memory. Communications lines are upgraded to accommodate the increased data requirements as a result of the upgrade and system performance requirements. The system is expandable to accommodate future air traffic growth and new hardware. TAMR Phase 1 technology refresh is necessary to address technology, mobility, and security gaps with the existing systems. Planning for technology refresh enables identification and qualification of affected components before they become inoperable due to obsolescence. For example, the processor currently used in STARS is no longer available from the manufacturer. The consequences of obsolescence have collateral implications in the areas of engineering, training, maintenance and many other disciplines.

Technology refresh is needed to address changes in hardware and to support the STARS upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Enhancements are needed for the continuation of STARS software enhancements which will include system performance, efficiency, safety, corrective/perfective changes and security modifications to the software baseline and to continue to provide for program and system engineering, technical support, and operational/suitability testing of software and system enhancements.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

During FY 2011, STARS had an overall system availability (software/hardware) of 99.9993% at all operational sites (Source: Web NAS Performance Analysis System (WebNASPAS), through March 2012). STARS is fully operational at 18 core airports. In addition to high availability, STARS has an improved controller data display and data manipulation capabilities, enabling controllers to control increased numbers of aircraft without compromising safety. This program will modernize the STARS equipment to sustain this high level of availability. The STARS equipment is a Commercial Off the Shelf (COTS) product that has a life expectancy of 10 to 15 years. The current STARS equipment has been in the NAS since 1999 and is in need of equipment upgrades. This equipment is also reaching end of maintenance.

Program Plans FY 2014 – Performance Output Goals
- Procure processors for upgrades from G1 to G4 configuration at three operational sites.
- Procure flat panel displays for upgrades at three operational sites.
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives.
- Complete IOC at 2nd site (2 of 48). (APB milestone)

Program Plans FY 2015 – Performance Output Goals
- Procure processors for upgrades from G1 to G4 configuration at six operational sites.
- Procure flat panel displays for upgrades at six operational sites.
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Program Plans FY 2016 – Performance Output Goals
- Procure processors for upgrades from G1 to G4 configuration at 12 operational sites.
- Procure flat panel displays for upgrades at 12 operational sites.
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

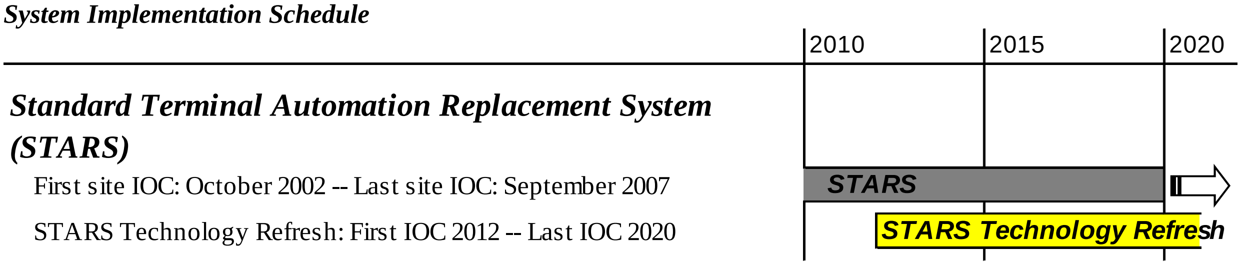
Program Plans FY 2017 – Performance Output Goals

- Procure processors for upgrades from G1 to G4 configuration at 11 operational sites.
- Procure flat panel displays for upgrades at 11 operational sites.
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Program Plans FY 2018 – Performance Output Goals

- Procure processor for upgrades from G1 to G4 configuration at seven operational sites.
- Procure flat displays for upgrades at seven operational sites.
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives.
- Complete IOC at 26th site (26 of 48). (APB milestone)

System Implementation Schedule



B, STARS – FTI Upgrade, A04.01-04

Program Description

This program will provide a more robust telecommunications network to ensure system survivability in case of unforeseeable events (the network already provides a high degree of reliability). As the FAA moves toward systems and technology that use Internet Protocol (IP), the survivability of the NAS operations IP infrastructure becomes essential. It is critical that FAA ensure the continuity of systems, applications and operations using this infrastructure. Although the current operational telecomm IP infrastructure is redundant and reliable with high availability, unforeseeable events have caused impacts to Air Traffic operations. This program will establish a diverse and redundant core IP infrastructure across the telecommunications backbone that will significantly reduce the impacts of any unforeseeable events. The goal is to strengthen the communications infrastructure to ensure survivability for system communications so that there will be little or no loss of service. This survivability and reliability is essential for a number of the NAS critical applications.

The FTI Upgrade program will improve the telecommunications system by providing an additional backbone core network that mirrors the current backbone system. This will require the service provider to install additional routers and connections.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

NAS Operational survivability will be improved by providing a more robust telecommunications system that will be able to survive unforeseeable events and will allow system maintenance without interruptions. Most FAA systems depend on reliable telecommunications; therefore, operational availability is dependent on this system.

Program Plans FY 2014 – Performance Output Goals
- Award contract for system upgrades.

Program Plans FY 2015-2018 – Performance Output Goals
- None.

2B04, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 3)

FY 2014 Request $136.6M

- A, Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 1, A04.07-01
- B, Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 2, A04.07-02

A, Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 1, A04.07-01

Program Description

The TAMR program employs a three-phased approach to modernizing the air traffic control systems that controllers use to control traffic approaching or leaving the nation's major airports. The first phase of the program – TAMR Phase 1 – replaced the automated radar processing and display systems at Terminal Radar Approach Control (TRACON) facilities, and their associated airport traffic control towers. Phase 1 deployed Standard Terminal Automation Replacement System (STARS) to 47 sites. TAMR Phase 2 involved the replacement of automation systems at five additional TRACONs and the modernization of air traffic controller displays and system processors at four large TRACONs, including Denver and Chicago. The final phase of the program, Phase 3 will address the remaining 108 sites.

On April 21, 2010 the JRC divided the TAMR Phase 3 program into two segments to better address short-term versus long-term planning objectives. TAMR Phase 3 Segment 1 program will address infrastructure improvements essential for the adoption of Automatic Dependent Surveillance-Broadcast (ADS-B) at 11 Common Automated Radar Tracking (CARTS) IIIE sites. TAMR Phase 3 Segment 2 will address the remaining 97 Automated Radar Terminal System (ARTS) sites. On December 21, 2011, the JRC approved the Final Investment Decision for Segment 1.

TAMR Phase 3 Segment 1 will replace 11 existing CARTS IIIE facilities with STARS hardware and software components. In particular, TAMR Phase 3 Segment 1 will:
- Begin convergence to a single Terminal Automation hardware and software platform by replacing the IIIE facility with STARS at Dallas (D10) by 2013.
- Replace remaining 10 IIIE facilities with STARS by 2017 to complete the convergence of the IIIE’s to a single Terminal Automation hardware and software baseline (Northern California (NCT), Atlanta (A80), Southern California TRACON (SCT), Potomac TRACON (PCT), Louisville (SDF), Denver (D01), Minneapolis (M98), St Louis (T75), Chicago (C90) and New York (N90)).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Improvements to the NAS can reduce flight delays and any resulting decrease in system efficiency. The TAMR Phase 3 Segment 1 Program provides a platform to modernize the 11 IIIE facilities in alignment with near-term NextGen requirements such as support for ADS-B.

Program Plans FY 2014 – Performance Output Goals

- Complete IOC on second build at key site, September 2014. (APB milestone)
- STARS equipment installation at two sites.
- Start site prep activities at last three sites.
- Purchase of STARS hardware for two sites.

Program Plans FY 2015 – Performance Output Goals

- Complete ORD at Dallas (D10) on second software build, May 2015. (APB milestone)
- STARS equipment installation at two sites.
- Complete site prep activities at last three sites.
- Purchase of STARS hardware for three sites.

Program Plans FY 2016 – Performance Output Goals

- Complete IOC at Minneapolis (M98), October 2015. (Prior year funds)
- Complete IOC at New York (N90). (Prior year funds)

Program Plans FY 2017 – Performance Output Goals

- Complete last IOC. (APB milestone) (Prior year funds)
- Complete ORD at last site (11th site). (APB milestone) (Prior year funds)

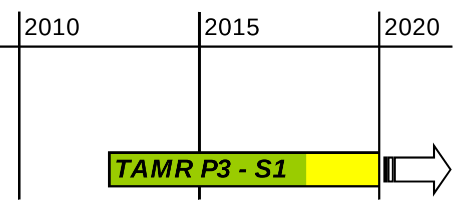
Program Plans FY 2018 – Performance Output Goals

- None.

System Implementation Schedule

Terminal Automation Modernization/Replacement (TAMR) Phase 3 - Segment 1

First site IOC: October 2012 -- Last site IOC: 2017



- JRC Decision – Authorization to Proceed – December 2010.
- Final Investment Decision for Segment 1 – December 2011.
- Contract Definitization – July 2012.

B, Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 2, A04.07-02

Program Description

The TAMR program employs a three-phased approach to modernizing the air traffic control systems that controllers use to control traffic approaching or leaving the nation's major airports. The first phase of the program – TAMR Phase 1 – replaced the automated radar processing and display systems at Terminal Radar Approach Control (TRACON) facilities, and their associated airport traffic control towers. Phase 1 deployed Standard Terminal Automation Replacement System (STARS) to 47 sites. TAMR Phase 2 involved the replacement of automation systems at five additional TRACONs and the modernization of air traffic controller displays and system processors at four large TRACONs, including Denver and Chicago. The final phase of the program, Phase 3, will address the remaining 108 sites.

TAMR Phase 3 Segment 2 will replace 91 Automated Radar Terminal System (ARTS) IIE systems Terminal Radar Approach Control (TRACONs) and their associated Air Traffic Control Towers (ATCTs), and six ARTS IE systems (stand-alone ATCT display systems), with Standard Terminal Automation Replacement System (STARS) hardware, software, and displays. TAMR Phase 3 Segment 2 will deploy a scaled STARS system, known as STARS Enhanced Local Integrated Tower Equipment (ELITE), to the ARTS IIE facilities and STARS Local Integrated Tower Equipment (LITE) to the ARTS IE facilities. The STARS automation system is a fully digital system capable of tracking all aircraft within the defined terminal airspace using available FAA and U.S. Department of Defense (DoD) surveillance systems.

This approach for TAMR Phase 3 Segment 2 provides the FAA with a strategy to support ADS-B requirements and continue with the FAA's original plan for terminal convergence to one automation platform originally established under the Standard Terminal Automation Replacement System (STARS) contract. Once executed, terminal convergence will eliminate a redundant need to sustain both STARS and Common Automated Radar Terminal System (CARTS) and eliminate the need to continue with redundant software development activities. The Final Investment Decision (FID) for Segment 1 was approved in December 2011 and the FID for Segment 2 was approved in September 2012.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

TAMR Phase 3 Segment 2 will replace the 91 IIE and six IE systems with modern technology that provides faster and more reliable data processing and communication capabilities. As part of the transition from one technology platform to another, the FAA will upgrade the processor and display capabilities. The upgrade to current technology will support ADS-B implementation and data management requirements associated with improving air traffic control management, which can increase and improve the airspace capacity. The new equipment will provide the ability to increase the number of aircraft tracked from 256 to 1350 unique aircraft and the number of surveillance sensors that can be connected from 1 to 12. These improvements will increase system capacity.

Program Plans FY 2014 – Performance Output Goals
- Complete STARS ELITE OT&E. (APB milestone)
- Achieve IOC at the first ARTS IIE site. (APB milestone)
- Achieve IOC at two additional ARTS IIE sites.
- Begin site preparation activities at 10 sites.
- Deliver hardware to 13 sites.
- Procure 18 systems.

Program Plans FY 2015 – Performance Output Goals
- Procure 37 systems.
- Deliver hardware to 18 sites.
- Achieve IOC at five sites.

Program Plans FY 2016 – Performance Output Goals
- Procure 34 systems.
- Deliver 43 systems.
- Complete IOC at 12th ARTS IIE site. (APB milestone)

Program Plans FY 2017 – Performance Output Goals

- Procure 18 systems.
- Deliver 28 systems.
- Complete IOC at 34th ARTS IIE site. (APB milestone)

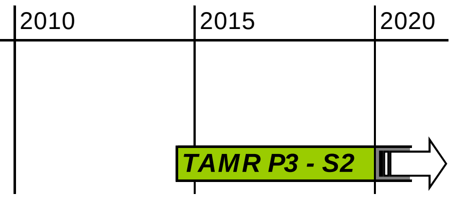
Program Plans FY 2018 – Performance Output Goals

- Deliver 13 systems.
- Complete IOC at 65th ARTS IIE site. (APB milestone)

System Implementation Schedule

Terminal Automation Modernization/Replacement (TAMR) Phase 3 - Segment 2

First site IOC: August 2014 -- Last site IOC: August 2019



Final Investment Decision for Segment 2 was approved September 2012.

2B05, TERMINAL AUTOMATION PROGRAM

FY 2014 Request $2.6M

Flight Data Input/Output (FDIO) Replacement, A01.11-01

Program Description

The FDIO system provides standardized flight plan data, weather information, safety related data, and other information to air traffic controllers at more than 650 Terminal NAS facilities. The FDIO system interfaces to the En route automation system, both the Host Computer System (HOST) and the En Route Automation Modernization (ERAM) system, and provides flight data information to NAS Terminal facilities. The FDIO system retrieves the flight data from the HOST/ERAM and prints this information on paper strips for controllers at FAA (TRACON, ATCT, and Radar Approach Control (RAPCON)) facilities. This information assists controllers in tracking aircraft and anticipating the arrival of aircraft in the sector under their control. The FDIO system also receives data from the TRACON, ATCT, and RAPCON facilities and relays this data back to the HOST/ERAM.

The FDIO Replacement program replaces the end-of–life/obsolete FDIO equipment with fully compatible (form/fit/function) COTS and modified COTS equipment. The FDIO system is mainly comprised of computers, servers, monitors, keyboards, printers, and circuit cards that are commercially available. The program is based on a 5 year replacement cycle for the various components in order to maintain system operational availability. Individual components are procured and replaced as they reach their end of life.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The FDIO program replaces end-of–life, obsolete FDIO equipment with modern COTS and modified COTS equipment, thereby reducing potential outages and delays. Reports indicate FDIO equipment has an average operational availability of 99.875% from 2007 through 2010.

Program Plans FY 2014 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, and monitor) at 100 FAA and DoD ATC facilities.
- Contract Awarded for Thermal Flight Strip Printer replacement, September 30, 2014.

Program Plans FY 2015 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, printer and monitor) at approximately 100 FAA and DoD ATC facilities.

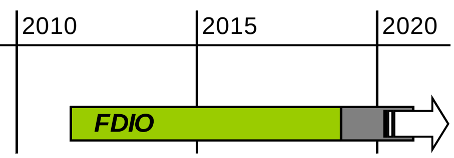
Program Plans FY 2016 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, printer and monitor) at approximately 100 FAA and DoD ATC facilities.

Program Plans FY 2017 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, printer and monitor) at approximately 100 FAA and DoD ATC facilities.

Program Plans FY 2018 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, printer and monitor) at approximately 100 FAA and DoD ATC facilities.

System Implementation Schedule

Flight Data Input/Output (FDIO)
First site IOC: September 2011 -- Last site IOC: September 2018



2B06, TERMINAL AIR TRAFFIC CONTROL FACILITIES - REPLACE
FY 2014 Request $72.0M

ATCT/TRACON Replacement, F01.02-00

Program Description
The ATCT/TRACON Replacement program replaces towers and TRACONs that no longer meet operational and sustainability requirements. The FAA provides air traffic control services from more than 500 Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities and replaces these buildings to ensure an acceptable level of air traffic control services and to meet current and future operational requirements. The average age of control towers is approximately 30 years, and some are 60 years old. As the volume and complexity of terminal air traffic control increases, so does the need to have additional positions in the ATCT/TRACON facilities (i.e., helicopter positions, Visual Flight Rule traffic advisories, runway monitors, etc.). Control towers built more than 20 years ago often do not meet today's operational requirements. In addition, some terminal facilities must be upgraded to conform to current building codes and design standards.

The Capital Programming Guide A-11 requires full funding for useful segments or a project. For this program, projects are funded in five useful segments and are scheduled based on Agency's priorities. The five segments are: Advance Requirements and Other Direct Costs; Facility Design; Construction Award; Equipment and Utilities Installation; and Disposition, Demolition, and Decommissioning. A project typically spans a period of 5-10 years from inception to completion depending on the size of the project. Each segment of a project is fully funded in the year requested but it may take more than one year to complete that segment and costs for that segment may exceed the original estimate.

The ATO is re-evaluating and strengthening its process for selecting the towers and TRACONs that need to be replaced. It includes an economic analysis and operational considerations to ensure that the facilities proposed for replacement each year are the facilities in greatest need of replacement.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The Terminal Air Traffic Control Facilities program contributes to the FAA goal of Delivering Aviation Access through Innovation by replacing ATCTs and TRACONs to meet current and future operational requirements. Some replacements are required to accommodate growth in air traffic; others are needed to provide added space for new equipment; and, in some cases, the tower must be replaced to ensure that controllers have an unobstructed view of the runways and taxiways, or new ATCTs must be constructed due to airport expansion. As volume and complexity of terminal air traffic control increases, so does the requirement for additional positions in ATCT/TRACON facilities. This program will ensure facilities are prepared to meet current and future levels of air traffic control services while supporting the performance metric of maintaining operational availability of the NAS.

Program Plans FY 2014 – Performance Output Goals

- Award construction contract at one site.
- Award contracts for equipment procurement/installation at two sites.
- Complete Disposition, Demolition, and Decommissioning at five sites.

Program Plans FY 2015 – Performance Output Goals

- Award construction contracts at three sites.
- Award contracts for equipment procurement/installation at three sites.
- Complete Disposition, Demolition, and Decommissioning at three sites.

Program Plans FY 2016 – Performance Output Goals

- Award construction contracts at three sites.
- Award contracts for equipment procurement and installation at three sites.
- Complete Disposition, Demolition and Decommissioning at three sites.

Program Plans FY 2017 – Performance Output Goals

- Award construction contracts at three sites.
- Award contracts for equipment procurement and installation at three sites.
- Complete Disposition, Demolition and Decommissioning at three sites.

Program Plans FY 2018 – Performance Output Goals

- Award construction contracts at three sites.
- Award contracts for equipment procurement and installation at three sites.
- Complete Disposition, Demolition and Decommissioning at three sites.

2B07, ATCT/TERMINAL RADAR APPROACH CONTROL (TRACON) FACILITIES - IMPROVE

FY 2014 Request $53.2M

ATCT/TRACON Modernization, F01.01-00

Program Description

The ATCT/TRACON Modernization program upgrades towers and TRACONs to meet operational and safety requirements. The FAA must continually upgrade and improve terminal facilities and equipment to provide an acceptable level of service and to meet current and future operational requirements. Improvements include replacing facility components that are deteriorating such as: roofs, air conditioners and tower cab consoles. In addition to the renovation projects, modernization includes facility upgrades such as adding operating positions for controllers including training positions, rehabilitating administrative and equipment space to accommodate facility expansion, and expanding base-buildings to support current and future demand.

ATCT/TRACON facilities have also had to be modernized to address operational and safety issues, including upgrading visibility of the entire airport surface, improving accessibility, removing hazardous materials and upgrading structures to meet seismic standards that didn't exist when they were constructed. Facility improvements must be completed with minimal impact on existing operations. An initial evaluation by the U.S. Army Corps of Engineers found that a number of FAA ATCT/TRACON facilities do not meet current seismic code criteria. This program has initiated building improvements to bring the facilities up to a level to withstand a seismic event by complying with the Interagency Committee on Seismic Safety in Construction standards and the "DOT Policy for Seismic Safety of New and Existing DOT Owned or Leased Buildings".

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The ATCT/TRACON Modernization program upgrades and improves facilities to support the NAS. This program will enable facilities to meet current operational, environmental, seismic and safety needs more economically than replacing or relocating the entire facility. This effort will result in a smooth and orderly transition of new equipment into FAA terminal facilities, minimizing disruption of the operating system. This program will also improve the operational efficiency and environmental systems of obsolete and deteriorated ATCT/TRACON facilities. The improvements to facility infrastructure such as electrical distribution systems, heating and air-conditioning, and structural problems will extend the service life of facilities and minimize outages that would delay air traffic. Facility Condition Index (FCI) values are based on independent facility assessments or extrapolations. The FAA utilizes the FCI to gain insight into the physical plant condition of our facilities and to help us prioritize facility sustainment, modernize and replacement efforts. In FY2011, FCI ranged from 74 percent to 100 percent for towers and TRACONs.

Program Plans FY 2014 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Award contracts for an average of 70 modernization projects per year.

Program Plans FY 2015 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Award contracts for an average of 50 modernization projects per year.

Program Plans FY 2016 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Award contracts for an average of 50 modernization projects per year.

Program Plans FY 2017 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Award contracts for an average of 50 modernization projects per year.

Program Plans FY 2018 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Award contracts for an average of 50 modernization projects per year.

2B08, Terminal Voice Switch Replacement (TVSR)

FY 2014 Request $5.0M

Voice Switches – Terminal Voice Switch Replacement (TVSR) II, C05.02-00

Program Description

The ongoing TVSR program involves replacing the aging, obsolete voice switches in the Air Traffic Control Towers (ATCT) and Terminal Radar Approach Control facilities (TRACON). Voice switches enable air traffic controllers to select lines to communicate with pilots as well as other air traffic control facilities. The TVSR program ensures that controllers continue to have reliable voice communications in the terminal environment. The program consists of several multiyear equipment contracts for voice switches, including: Small Tower Voice Switches, Enhanced Terminal Voice Switches, Rapid Deployment Voice Switches model IIA, Voice Switch Bypass System, and Interim Voice Switch Replacement. The program also provides contract vehicles for the FAA to procure voice switch equipment for new or modernized terminal facilities.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The TVSR program supports the Performance Metric of maintain operational availability of the NAS by replacing aging electronic switches with modern digital equipment to improve system reliability of terminal voice communications. This reduces outages and prevents delays.

Program Plans FY 2014 – Performance Output Goals

- Deliver five terminal voice switches to various FAA facilities.
- Complete refurbishment of two terminal voice switch systems.

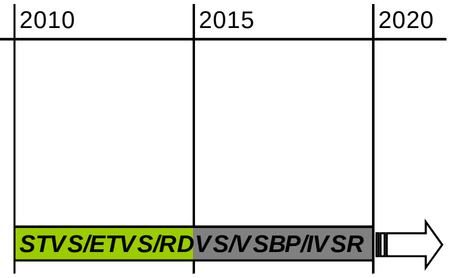
Program Plans FY 2015-2018 – Performance Output Goals

- None.

System Implementation Schedule

Small-Tower Voice Switches (STVS), Enhanced Terminal Voice Switches (ETVS), Rapid Deployment Voice Switches (RDVS) model IIA, Voice Switch Bypass Systems (VSBP), and Interim Voice Switch Replacement (IVSR).

First site IOC: 1994 (2006) -- Last site ORD: TBD



2B09, NAS FACILITIES OSHA AND ENVIRONMENTAL STANDARDS COMPLIANCE

FY 2014 Request $26.0M

NAS Facilities OSHA & Environmental Standards Compliance, F13.03-00

Program Description

Implement an Environmental and Occupation Safety and Health Program that ensures the health and safety of all ATO employees by complying with Federal, state, and local regulations and bargaining unit agreements.

OSHA & Environmental Standards Compliance:
This program develops comprehensive ATO-wide environmental, occupational safety and health management initiatives to meet Occupational Safety and Health Administration (OSHA) & Federal Environmental Standards, state, and local legal requirements in addition to negotiated agreements with employees. Environment and Occupational Safety & Health (EOSH) Services is the lead organization within ATO charged with the protection of employee well-being and the environment. Through the development and completion of policy guidance, technical assistance, employee training, job hazard assessments, compliance monitoring, and corrective actions, EOSH Services designs and manages national compliance programs that integrate risk management into each level of the ATO infrastructure lifecycle from system and facility design, through infrastructure management, to decommissioning.

Tower Fire Life Safety:
The Fire Life Safety program manages the implementation of projects to upgrade Air Traffic Control Towers (ATCTs) and other critical NAS facilities to meet current regulatory and industry standards for conducting employee evacuation and designing fire suppression consistent with the requirements of negotiated agreements. To date, the program has completed projects in 296 of the 377 towers requiring upgrades. In addition to physical infrastructure upgrading, the program is responsible for developing policy and guidance, fire prevention and emergency action plans, and training tower occupants, resident engineers, maintenance technicians, and employees on maintenance requirements for new systems. Effective support and protection of employees and the air traffic control environment is essential to limiting the impacts of fire, explosion, or related events on NAS operations and facilities.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice.*
- *FAA Outcome 2 – FAA is widely recognized as a workplace of choice.*
- *FAA Performance Metric 1 – The FAA is rated in the top 25 percent of places to work in the federal government by employees.*

Relationship to Performance Metric

The NAS Facilities OSHA and Environmental Standards Compliance program supports the FAA's Strategic Goal of Workplace of Choice by continuing to improve the safety of the FAA's workplaces through the implementation of such critical programs as fall protection, electrical safety, indoor air quality, including mold, fire life safety, training and workplace inspections and abatement of safety hazards. The implementation of these programs results in making the FAA a healthful place in which to work and ranking the FAA in the top 25 percent of places to work in the federal government by employees. For example, the FAA ensures that 100% of all staffed and at least 95% of all unstaffed Air Traffic Organization (ATO) workplaces listed in the Workplace Inspection Tool and as required by FAA policy and Federal regulations, are inspected annually.

The ATO Workplace Inspections Program is responsible for overseeing the annual EOSH inspection of over 11,400 separate facilities nationwide. During these inspections, ATO workplaces are evaluated for both Occupational Safety and Health and Environmental compliance and deficiencies are noted as workplace hazards. Workplace hazards are recorded in the FAA Workplace Inspection Tool (WIT) database, along with a risk assessment and an estimated cost to correct each individual hazard. The ATO Hazard Abatement Program then tracks the identified hazards until they are completely abated. As of FY 2012 the FAA WIT is tracking 123,071 individually identified workplace hazards, of which 113,231 (92.0%) have been completely abated.

Program Plans FY 2014 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 130 fall protection systems
- Provide fall protection training to 1200 employees.
- Conduct four Arc-flash analyses at large facilities
- Provide first aid/CPR training to 2000 Air Traffic System Specialists (ATSSs) and volunteer responders.
- Conduct OSH Evaluations at six locations.
- Provide ATO Environmental Management System General Awareness training to at least 50% of ATO employees.
- Complete annual inspection for 100% of designated staffed workplaces by end of FY 2014.

Tower Fire Life Safety:

- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2015 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems.
- Provide first aid/CPR training to 2000 ATSSs and volunteer responders.
- Provide fall protection training to 1000 employees.
- Conduct four Arc-flash analyses at large facilities
- Conduct OSH Evaluations at six locations.
- Provide ATO Environmental Management System General Awareness training to all 100% ATO employees.
- Complete annual inspection for 100% of designated staffed workplaces by end of FY 2015.

Tower Fire Life Safety:

- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2016 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems
- Provide first aid/CPR training to 2000 ATSSs and volunteer responders.
- Provide fall protection training to 1000 employees.
- Conduct four Arc-flash analyses at large facilities
- Conduct OSH Evaluations at six locations.
- Provide ATO Environmental Management System General Awareness training to all ATO employees.
- Complete annual inspection for 100% of designated staffed workplaces by end of FY 2016.

Tower Fire Life Safety:

- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2017 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems
- Provide fall protection training to 1000 employees.

- Conduct four Arc-flash analyses at large facilities
- Conduct OSH Evaluations at six locations.
- Provide ATO Environmental Management System General Awareness training to all ATO employees.
- Complete annual inspection for 100% of designated staffed workplaces by end of FY 2017.

Tower Fire Life Safety:

- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2018 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems
- Provide first aid/CPR training to 2000 ATSSs and volunteer responders.
- Provide fall protection training to 1000 employees.
- Conduct four Arc-flash analyses at large facilities
- Conduct OSH Evaluations at six locations.
- Provide ATO Environmental Management System General Awareness training to all ATO employees.
- Complete annual inspection for 100% of designated staffed workplaces by end of FY 2018.

Tower Fire Life Safety:

- Complete 20 ATCT fire life safety upgrades.

2B10, AIRPORT SURVEILLANCE RADAR (ASR-9) SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2014 Request $10.9M

Terminal Radar (ASR) Program – ASR-9 SLEP, Phase 2, S03.01-09

Program Description

ASR-9 systems provide aircraft detection and weather information to air traffic controllers at the highest activity airports. The ASR-9 tracks all aircraft within its range and provides those tracks, as well as six-level weather intensity information, to terminal automation systems. Air traffic controllers utilize this information to safely and efficiently separate aircraft in the terminal environment. The ASR-9 also provides data to AMASS and ASDE-X to aid in the prevention of accidents resulting from runway incursions.

Without modifications to the ASR-9, the system will continue to experience decreasing reliability and availability over time. The supportability of the ASR-9 system is at risk due to the lack of commercial availability of some components. The cost of technology refresh has been deemed more cost-effective than acquiring full replacement systems, because the current performance is effective in meeting both the safety and capacity needs of the nation's air traffic system at major airports. The benefits of this service life extension program will lower O&M costs associated with the ASR-9 beginning in 2016.

The program will continue studies to address obsolescence and supportability issues of system components within the ASR-9 system. JRC approved the Final Investment Decision (FID) for the Phase 2 program on June 27, 2012 with the following projects:

- Digital Remote Surveillance Communication Interface Processor Replacement (DRSR).
- Spectrum Analyzer and Power Meter.
- Transmitter Backplane.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

ASR-9 terminal service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers' information that allows closer aircraft operations and increases air traffic arrival and departure operations. This program, ASR-9 Service Life Extension Program Phase 2, reduces the risk of unscheduled outages and ensures the continuation of service capabilities. Currently ASR-9 systems are functioning at an operational availability of 99.4 percent, which is below the FAA performance metric of 99.7 percent. Without modifications to the ASR-9, the system will continue to experience decreasing reliability and availability over time. The intent of this program is to maintain operational availability of the ASR-9 system.

Program Plans FY 2014 – Performance Output Goals

- Complete Operational Test Quick Look Report for Transmitter Backplane.
- Complete Operational Test Quick Look Report for Digital Remote Surveillance Communication Interface Processor Replacement (DRSR).

Program Plans FY 2015 – Performance Output Goals

- Award contract for Digital Remote Surveillance Communication Interface Processor Replacement Materials.
- Award Contract for Transmitter Backplane Materials.
- Installation at first site completed (APB milestone).
- Operational Test and Evaluation (OT&E) completed for all projects (APB milestone).

Program Plans FY 2016 – Performance Output Goals

- Complete Installation of Digital Remote Surveillance Communication Interface Processor Replacement at 25% of ASR-9 sites.
- Complete Installation of Transmitter Backplane at 25% of ASR-9 sites.

Program Plans FY 2017 – Performance Output Goals

- Complete installation of Digital Remote Surveillance Communication Interface Processor Replacement at 75% of ASR-9 sites.
- Complete installations of Transmitter Backplane at 75% of ASR-9 sites.

Program Plans FY 2018 – Performance Output Goals

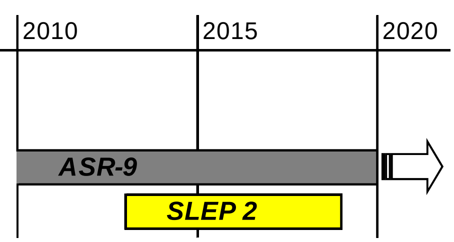
- Complete installation of DRSR at 100% of ASR-9 sites.
- Complete installation of Transmitter Backplane at 100% of ASR-9 sites.

System Implementation Schedule

Airport Surveillance Radar-Model 9 (ASR-9) Service Life Extension Program (SLEP) Phase 2

Phase 1: Implementation 2005 -- 2010

Phase 2: First Site Install: 2014 -- Last Site Install: 2018



2B11, TERMINAL DIGITAL RADAR (ASR-11) TECHNOLOGY REFRESH AND MOBILE AIRPORT SURVEILLANCE RADAR (MASR)

FY 2014 Request $19.4M

- A, Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 1, S03.02-04
- B, Terminal Radar (ASR) Program – ASR-11 – Mobile Airport Surveillance Radar (MASR), S03.02-06
- C, Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 2, S03.02-05

A, Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 1, S03.02-04

Program Description

The ASR-11 Technology Refresh program replaces and upgrades obsolete ASR-11 Commercial Off-The-Shelf (COTS) hardware and software to ensure the continued reliable and cost effective operation of the radar system through its designated lifecycle. This is an ongoing program to address obsolescence and maintenance issues and will be accomplished in separate sequential 5-year segments.

The ASR-11 Technology Refresh Segment 1 is well defined and provides increased functionality by replacing existing Signal Data Processors (SDP's) with an Advanced Signal Data Processor (ASDP). The existing SDPs are 1980's technology, and are no longer in production. These SDPs do not have spare processor or memory capacity and no possibility for expanding their capacity. By coupling the ASDP modification with software improvements, four necessary ASR-11 upgrades identified during the In-Service Decision (ISD) on the technology refresh are completed.

The major objectives of the ASR-11 Technology Refresh Segment 1 are:

- Install production ready, form-fit function replacement kits for the SDP and eliminate the Low Overhead Array Processors.
- Use scalable hardware and software architecture to permit easy future growth with minimal cost and effort.
- Address ASR-11 system In-Service Decision recommended actions including increasing memory and processing capacity.

The ASR-11 Technology Refresh Segment 1 was approved in October 2008 and an In-Service Decision was made in January 2010. The funding will support the continued installation of these upgrades through FY 2014; and this activity will retrofit 68 systems in the FAA inventory with the ASDP modification kits. FY 2014 is the last year of funding for Technology Refresh Segment 1.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The ASR-11 Technology Refresh Segment 1 ASDP design reduces the total number of Line Replaceable Units (LRU's) required in the system. It will eliminate the need for four LRUs: pulse compressor, synchronizer Low Overhead Array Processors, and beam/ Sensitivity Time Constant cards. The ASDP design also reduces the total number of supported electronic cards for signal data processing in the ASR-11 system from 14 to 3, and the new architecture eliminates the proprietary custom backplane that constrained connectivity to the system. By reducing the number of LRUs, future Operation and Maintenance (O&M) costs are reduced. Additionally, the entire architecture is scalable and it will accommodate any future software modifications.

Program Plans FY 2014 – Performance Output Goals

- Complete installation of ASR-11 retrofit kits at five sites by March 31, 2014.
- Last site certified for operational use, 100% complete (68 sites). (APB milestone)

Program Plans FY 2015-2018 – Performance Output Goals

- None.

System Implementation Schedule

	2010	2015	2020
Airport Surveillance Radar - Model 11 (ASR-11) Technology Refresh - Segment 1 First site Delivery: September 2009 -- Last site Delivery: March 2014	***ASR-11 TR 1***		

B, Terminal Radar (ASR) Program – ASR-11 – Mobile Airport Surveillance Radar (MASR), S03.02-06

Program Description

The Mobile Airport Surveillance Radar (MASR) is a terminal surveillance radar capability that can be moved from site to site to support radar relocations, temporary planned outages to accommodate installation of upgrades to an existing radar, and emergency operations when existing systems are damaged. This system includes both primary and secondary radar systems and will have the performance capabilities of existing systems. The program will be refurbishing two ASR-9 and two Mode S systems and will procure two mobile ASR-11 systems.

The MASR can be deployed quickly within known, short-duration timeframes and be compatible with all air traffic control towers (ATCT), Terminal Radar Approach Controls (TRACON), Air Route Traffic Control Centers (ARTCC), and their associated automation systems.

The MASR system architecture will support a reusable, service-oriented capability with an emphasis on providing the terminal surveillance service efficiently and quickly. The system will have interfaces for power, mechanical, data, and remote monitoring and control. It will be designed to function as an existing ASR-8, ASR-9 or ASR-11 terminal radar as needed and be interoperable with each of their associated automation interfaces.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The MASR investment will provide a capability that can be installed quickly to maintain operational availability at the goal levels during periods of planned or unplanned outages of terminal surveillance radars.

Program Plans FY 2014 – Performance Output Goals

- Issue Delivery Order for Mobile ASR-11 production by September 30, 2014.
- Critical Design Review (CDR) completed by December 2013. (APB milestone)
- Complete Refurbishment of first ASR-9/Mode-S System by March 2014. (APB milestone)

Program Plans FY 2015 – Performance Output Goals

- Complete Refurbishment of second ASR-9/Mode-S System by March 2015. (APB milestone)
- Mobile ASR-11 System #1 Factory Acceptance Test (FAT) completed by March 2015. (APB milestone)
- Mobile ASR-11 System #1 delivered to test and evaluation site by June 2015. (APB milestone)

Program Plans FY 2016 – Performance Output Goals

- Development, test and evaluation (DT&E) completed by March 2016. (APB milestone)
- Operation test and evaluation (OT&E) completed by September 2016. (APB milestone)

Program Plans FY 2017 – Performance Output Goals

- In Service Decision for Mobile ASR-11 by December 2016. (APB milestone)

Program Plans FY 2018 – Performance Output Goals

- None.

C, Terminal Radar (ASR) Program – ASR-11 – Technology Refresh, Segment 2, S03.02-05

Program Description

The ASR-11 Technology Refresh program replaces and upgrades obsolete ASR-11 Commercial Off-The-Shelf (COTS) hardware and software to ensure the continued reliable and cost effective operation of the radar system through its designated lifecycle. This is an ongoing program to address obsolescence and maintenance issues and will be accomplished in separate sequential 5-year segments.

The ASR-11 Technology Refresh Segment 2 is being structured to address the following shortfalls identified in the approved ASR-11 Technology Refresh Segment 2 Shortfall Analysis Report:

1. Site Control Data Interface (SCDI) /Operator Maintenance Terminal (OMT) obsolescence.
2. Fault Monitoring/Fault Isolation (FM/FI) reliability.
3. System Stability performance.
4. Uninterruptible Power Supply (UPS) capacitor at end of life expectancy.

The objective of the Segment 2 program is to insure continued reliable and cost effective operation of the radar system through its designated lifecycle. The Segment 2 Investment Analysis Readiness Decision (IARD) was approved in November 2012 and the Final Investment Decision (FID) is planned for December 2013.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The ASR-11 Technology Refresh Segment 2 will continue upgrading the components and functionality of the ASR-11 to reduce operating costs and improve operational efficiency.

Program Plans FY 2014 – Performance Output Goals

- Complete modification to Inter-Agency Agreement (IAA) by June 30, 2014.
- Achieve a JRC Final Investment Decision (FID) by December 2013.
- Additional activities will be established at the FID.

Program Plans FY 2015-2018 – Performance Output Goals

- Future activities will be established at the FID.

System Implementation Schedule

	2010	2015	2020
Airport Surveillance Radar - Model 11 (ASR-11) Technology Refresh - Segment 2 First site Delivery: TBD -- Last site Delivery: TBD		ASR-11 TR 2	

2B12, Runway Status Lights (RWSL)

FY 2014 Request $35.3M

Runway Status Lights (RWSL) – Implementation, S11.01-02

Program Description

The RWSL system integrates runway lighting equipment with approach and surface surveillance systems to provide a visual signal to pilots and vehicle operators indicating that it is unsafe to enter/cross or begin takeoff on the runway. The system is fully automated based on inputs from surface and terminal surveillance systems. Airport surveillance sensor inputs are processed through light control logic that commands in-pavement lights to illuminate red when there is traffic on or approaching the runway. Runway Entrance Lights (REL) provides this signal to aircraft planning to cross or enter a runway from an intersecting taxiway. Takeoff Hold Lights (THL) provide a signal to aircraft in position for takeoff. The RWSL program received a Final investment Decision in 2010 from the JRC for 23 operational and three support sites.

Due to cost growth the program is returning to the JRC in the third quarter of 2013 for a baseline change decision.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Maintain the rate of serious runway incursions at or below 0.395 events per million operations.*

Relationship to Performance Metric

Runway incursions are a significant safety issue and installations of RWSL will contribute toward reducing the rate of runway incursions by indicating to pilots and vehicle operators the existence or forecast of a conflict if they cross the hold line for a runway. The RWSL also warn pilots or vehicles to stop at the hold line if an aircraft on the runway begins its takeoff. The FY 2014 RWSL projected benefits include a reduction in cumulative A&B runway incursions at the 23 RWSL airports by ~17% (from 9.68 in baseline to 8.02 with RWSL); and a reduction in cumulative runway incursions caused by Pilot Deviations by ~22% (from 41.03 in baseline to 32.17 with RWSL).

Program Plans FY 2014 – Performance Output Goals

- Start construction at two of 23 operational sites.
- Achieve IOC at two of 23 (60%) operational sites.

Program Plans FY 2015 – Performance Output Goals

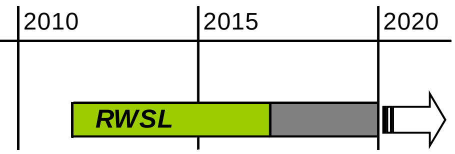
- Start construction at seven of 23 operational sites.
- Complete installation at six of 23 operational sites.
- Achieve IOC at two of 23 (70%) operational sites.

Program Plans FY 2016 – Performance Output Goals
- Complete installation at one of 23 operational sites.
- Achieve IOC at seven of 23 (100%) operational sites.
- Achieve last site ORD at 23rd airport, September 2016. (APB milestone)

Program Plans FY 2017-2018 – Performance Output Goals
- None.

System Implementation Schedule

Runway Status Lights (RWSL)
First site IOC: July 2011 -- Last site IOC: August 2016



2B13, NATIONAL AIRSPACE SYSTEM VOICE SYSTEM (NVS)*
FY 2014 Request $16.0M

Networked Facility – NAS Voice System – Segment 1, G03C.01-01

Program Description

The NAS Voice System (NVS) will replace current voice switches in both center and terminal facilities. It will be a real-time, critical part of the ATC infrastructure that provides the connectivity for efficient communications among air traffic controllers, pilots and ground personnel. It connects incoming and out-going communication lines to the controller's workstation. The controller uses a panel on his workstation to select the lines needed to communicate with pilots, other controllers and other facilities.

The current voice system technology deployed in the NAS will not support the expected future NextGen concept of operations for capabilities such as networked facilities, dynamic re-sectorization (expanding or contracting a controller's volume of airspace electronically), and off-loading selected sector control to other facilities during non-peak operations. These capabilities require that lines connected to a controller's workstation panel be electronically changed to add or eliminate lines as the geographical boundaries of the sector change. The NVS will have the capacity to support current and forecasted future ATC operations.

NVS will replace the service that is currently provided by 13 different voice switch configurations including Terminal Voice Switch Replacement (TVSR) and Voice Switching and Control System (VSCS). The focus will be on designing a replacement system that can be scaled to facility size with standardized components that will reduce maintenance and parts inventory costs.

The NVS contract was awarded in August 2012, and it will be implemented in two segments. This approach is intended to achieve program objectives, minimize risk, and align to agency priorities and constraints. Segment 1 will focus on the demonstration of NextGen capabilities. Segment 2 will focus on the establishment of a production system that is capable of meeting the requirements of various size facilities. The program will request a Final Investment Decision prior to the beginning of Segment 2. The NVS contract addresses both the demonstration and production systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The NVS program supports the average daily airport capacity by providing an architecture that can handle future growth and load-sharing within a flexible network. NVS will support the NextGen concept of operations for networked facilities, dynamic re-sectorization and off-loading selected sector control to other facilities during non-peak operations. These capabilities will increase capacity by improving operational efficiency and by better balancing workload in response to demand changes.

Program Plans FY 2014 – Performance Output Goals

- Complete demonstration of NextGen capabilities using three demonstration systems.
- Achieve Final Investment Decision (FID) from Joint Resources Council (JRC).
- Order first article test system for the William J. Hughes Technical Center (WJHTC).

Program Plans FY 2015 – Performance Output Goals

- Deliver first article test system to the William J. Hughes Technical Center (WJHTC).
- Deliver second article test system to the Mike Monroney Aeronautical Center (MMAC).
- Order two key site Voice Enterprise Systems.

Program Plans FY 2016 – Performance Output Goals

- Deliver two key site Voice Enterprise Systems.

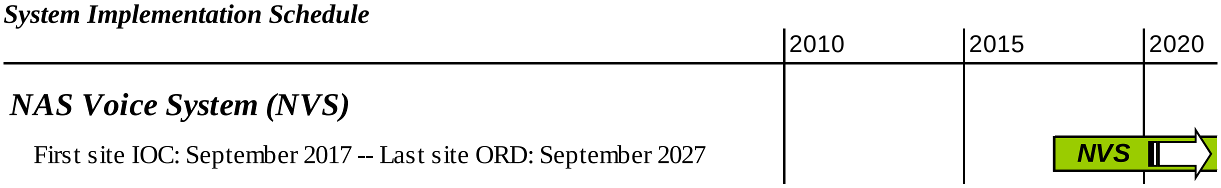
Program Plans FY 2017 – Performance Output Goals

- Achieve first site Initial Operating Capability (IOC).

Program Plans FY 2018 – Performance Output Goals

- Achieve In-Service Decision (ISD).
- Deliver systems; quantity to be determined at FID.

System Implementation Schedule



2B14, INTEGRATED DISPLAY SYSTEM (IDS)

FY 2014 Request $4.1M

Integrated Display Systems (IDS) – Replacement, A03.05-01 / X, Integrated Display Systems (IDS) – Replacement – Technology Refresh, A03.05-02

Program Description

The Integrated Display Systems (IDS) program provides rapid retrieval and display of a wide range of weather, operational support, and administrative information to air traffic controllers and other required users in the terminal environment. Integrated Display Systems consolidate operational information to provide a tool to exchange information that impacts the control of air traffic. The presentation of multiple sources of data on a single display, allows for decision making by controllers thus increasing efficiency of operations. The FAA began regional procurements in 1990 and currently has 2,230 IDS-4 workstations located at approximately 390 FAA facilities nationwide. Recent obsolescence issues and loss of proprietary software support make it necessary to replace this system to sustain its functionality.

IDS Replacement (A03.05-01):
The IDS Replacement program modernizes the IDS-4 system with current technology at 71 existing IDS-4 networks, including 1,944 IDS-4 workstations, at 256 sites. (Instead of replacing systems at some smaller sites, existing systems at larger sites will be repurposed to the smaller sites.) The prime contract was awarded in May 2010 and design efforts were completed in late 2011. The program was rebaselined in March 2013. Deployment will occur from 2013 to 2017. By the end of 2013, 6 networks will have been installed.

IDS Replacement – Technology Refresh (A03.05-02):
The IDS-4 will be replaced with a state-of-the-art system comprised mainly of Commercial-Off-The-Shelf (COTS) components. As in any COTS based system, a technology refresh of the replacement components is absolutely essential to sustain system services. Therefore, the FAA plans to perform a system analysis in FY 2016 (approximately 5 years after original COTS system components are acquired) to identify affected components before they become inoperable due to obsolescence. Based on the system analysis, components will then be acquired to replace obsolete components.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The IDS-4 is experiencing supportability issues with the existing stock levels of motherboards within the IDS-4 computers. The current beyond economic repair (BER) rate for motherboards returned to the FAA Logistics Center for repair is 21%. Commercial sources for IDS-4 compatible computers/motherboards for long term support are not available. By replacing the legacy IDS-4 systems with state-of-the-art equipment, outages are reduced, thereby reducing delays at the 390 FAA facilities nationwide, including the 30 core airports.

Program Plans FY 2014 – Performance Output Goals
IDS Replacement (A03.05-01):
- Achieve Initial Operating Capability (IOC) at 16 networks by end of FY 2014.

IDS Replacement – Technology Refresh (A03.05-02):
- None.

Program Plans FY 2015 – Performance Output Goals
IDS Replacement (A03.05-01):
- Achieve Initial Operating Capability (IOC) at 21 networks by end of FY 2015.

IDS Replacement – Technology Refresh (A03.05-02):
- None.

Program Plans FY 2016 – Performance Output Goals
IDS Replacement (A03.05-01):
- Achieve Initial Operating Capability (IOC) at 21 networks by end of FY 2016.

IDS Replacement – Technology Refresh (A03.05-02):
- None.

Program Plans FY 2017 – Performance Output Goals
IDS Replacement (A03.05-01):
- Achieve Initial Operating Capability (IOC) at 7 networks by end of FY 2017.
- Last Site ORD. (APB milestone)

IDS Replacement – Technology Refresh (A03.05-02):
- Award contract for Technology Refresh.
- Complete system analysis for technology refresh of hardware to replace obsolete components.

Program Plans FY 2018 – Performance Output Goals

IDS Replacement (A03.05-01):

- None.

IDS Replacement – Technology Refresh (A03.05-02):

- Install technology refresh upgrades at 51 networks.

System Implementation Schedule

2B15, Remote Monitoring and Logging System (RMLS) Technology Refresh

FY 2014 Request $1.0M

- A, Automated Maintenance Management System (AMMS), M07.05-01
- X, Remote Monitoring and Logging System (RMLS) – Technology Refresh, M07.04-02

A, Automated Maintenance Management System (AMMS), M07.05-01

Program Description

AMMS will provide more efficient data input and improved access to information relating to the operation and maintenance of FAA NAS systems. Currently FAA technicians who maintain the NAS use multiple stand-alone systems to perform their tasks. AMMS will reduce technician's time to perform these tasks plus provide them the information to make more effective decisions. Examples of some of the existing information sharing shortfalls that AMMS will address:

- Technicians do not have easy access to the Logistics Inventory in order to determine the availability of replacement parts and to order needed parts.
- Technicians are needed to support flight inspection activities but do not have direct access to the inspection schedules.
- Technicians have to prepare hand written forms for Notices to Airmen to document a system out of operation. This input is untimely and inefficient.
- Technicians do not have near-real time information on the status of systems and their ability to proactively respond to critical system issues is limited.

AMMS will be the foundation of an open system interface to automate and integrate legacy systems, web-based systems, and future NextGen systems in a secure net-centric environment. AMMS will integrate information from several current and planned systems being considered as program candidates and provide that information to technicians in a useable format.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The AMMS will support the FAA performance metric to maintain operational availability for the NAS by:

- Improved Infrastructure Management,
- Improved Situational Awareness,
- Improved Event Management,
- Improved Supply Chain Management – Automating and integrating maintenance and logistic services, and
- Reliability Centered Maintenance (RCM) – Increasing NAS availability by providing the best available data from multiple sources to enhance predictive analysis.

Program Plans FY 2014 – Performance Output Goals
- Complete AMMS Investment Analysis requirements for Final Investment Decision (FID) by June 2014.
- Award Contract to implement beta services for the planned Logistics Center Support System (LCSS) / 2-Dimensional Bar Coding (2DBC) system interface candidates.

Program Plans FY 2015-2018 – Performance Output Goals
- Activities will be established at the FID.

X, Remote Monitoring and Logging System (RMLS) – Technology Refresh, M07.04-02

Program Description

The RMLS technology refresh project covers future activities required to extend the service life of RMLS hardware and software located at the National Operations Control Center (NOCC), Atlantic Operations Control Center (AOCC), Mid-States Operations Control Center (MOCC), Pacific Operations Control Center (POCC), Southern California TRACON (SCT), the William J. Hughes Technical Center (WJHTC), Air Route Traffic Control Centers (ARTCCs), and the Combined Center Radar Approach Control (CERAP) in Hawaii. Technology refresh is scheduled to begin in FY 2015 and be completed in FY 2022. RMLS Technology Refresh replaces the commercial off the shelf (COTS) logical components of the RMLS.

The RMLS technology refresh will improve the effectiveness of Technical Operations Services (Tech Ops) maintenance processes and practices. The RMLS functions as a single system across the FAA's Technical Operations enterprise and oversees the entire event management life cycle, from generation of the initial event through assignment, updates, and event closure. In addition, RMLS is responsible for routing status messages to field operators, as well as routing commands to NAS devices. RMLS consists of the National Logging Network (NLN) and the National Remote Maintenance Monitoring (RMM) Network (NRN).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The RMLS Technology Refresh supports the FAA operational availability performance metric by upgrading the systems used for generating, quantifying, analyzing, measuring, and reporting maintenance information to determine operational availability. It also reports error levels, maintenance responsiveness, and utilization of NAS components, systems, and services for the NAS as a whole. The RMLS maintenance information is used by the FAA to analyze trends and improve performance; make investment decisions and support budget requests for replacement, relocation, or modification of existing equipment; detect supportability problems; evaluate the efficiency and effectiveness of the overall maintenance program; and provide reports to Congress and FAA management.

Program Plans FY 2014 – Performance Output Goals

- None.

Program Plans FY 2015 – Performance Output Goals

- Lifecycle RMLS National Logging Network (NLN) hardware refresh of the database servers at two sites, NOCC and WJHTC (two systems – Operational Testing (OT) and Integration Testing (IT)).
- Lifecycle RMLS National Remote Monitoring Network (NRN) hardware refresh of the database servers at two sites, POCC and WJHTC (two systems – OT&IT).

Program Plans FY 2016 – Performance Output Goals

- Lifecycle RMLS NLN hardware refresh of the database servers at three sites, MOCC, AOCC and POCC.
- Lifecycle RMLS NRN hardware refresh of the database servers at two sites, AOCC and MOCC.

Program Plans FY 2017 – Performance Output Goals

- Lifecycle RMLS NLN hardware refresh of the servers for the Operations Data Repository at Potomac Consolidated TRACON (PCT).
- Lifecycle RMLS NRN hardware refresh of the Protocol Converter Box (PCB) equipment at six ARTCCs, Southern California TRACON and the WJHTC

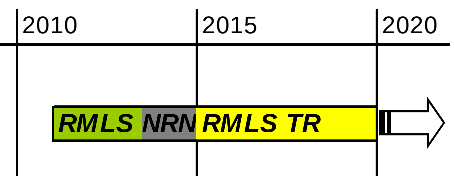
Program Plans FY 2018 – Performance Output Goals

- Lifecycle RMLS NLN hardware refresh of the network support equipment at two sites, NOCC and WJHTC (two systems - OT&IT).
- Lifecycle RMLS NRN hardware refresh of the Protocol Converter Box (PCB) equipment at eight ARTCCs.

System Implementation Schedule

Remote Monitoring Logging System (RMLS)

RMLS NRN Key Site Operational (IOC): April 2011
RMLS NRN Final Operational Capability: March 2013
RMLS Technology Refresh: FY15 and beyond



2B16, MODE S SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2014 Request $7.3M

- A, Terminal Radar (ASR) Program – Mode S SLEP – Phase 2, S03.01-08
- B, Terminal Radar (ASR) Program – ASR-9 and Mode S SLEP – Phase 3 Planning, S03.01-11

A, Terminal Radar (ASR) Program – Mode S SLEP – Phase 2, S03.01-08

Program Description

The Mode S is a secondary surveillance radar system that provides beacon or secondary aircraft surveillance in en route and terminal airspace. The Mode S uses selective beacon detection technology to provide target data as digital formatted messages to automation and display systems. The Mode S is integrated with collocated Airport Surveillance Radar Model 9 (ASR-9) and ASR-8, and Air Route Surveillance Radar Model 1E (ARSR-1E) and ARSR-2. The Mode S system is capable of providing correlated radar and beacon reports and weather map reports to NAS en route and terminal automation, U.S. Department of Defense (DoD), and other users. Digital data is provided in ASR-9/Common Digitizer (ASR/CD) format to FAA automation systems at Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) facilities, DoD, and other external organizations.

The Mode S SLEP Phase 2 will implement modifications to the Mode S system to sustain secondary surveillance in terminal airspace through 2025. The components that process radar data and the Beacon Video Reconstitutors (BVR) will be replaced with more modern components and antennas will be purchased to address obsolescence and supply/support issues. The sustainment of the Mode S system is a component of the Surveillance and Broadcast Services (SBS) Automatic Dependent Surveillance - Broadcast (ADS-B) back-up strategy. JRC approved the Final Investment Decision (FID) for the Phase 2 program on June 27, 2012 with the following projects:

- Beacon Video Reconstitutor (BVR)
- High Gain Open Planar Array (HGOPA) Antenna

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

Mode S terminal and en route service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions, the radar provides air traffic controllers information that allows closer aircraft operations and increases air traffic arrival and departure operations. Providing for the Mode S service life extension modifications reduces the risk of unscheduled outages and ensures the continuation of service capabilities. Currently Mode S systems are functioning at an operational availability of 99.3 percent, which is below the FAA performance metric of 99.7 percent. Without modifications to the Mode S, the system will continue to experience decreasing reliability and availability over time. The intent of this program is to maintain operational availability of the Mode S system.

Program Plans FY 2014 – Performance Output Goals
- Complete Draft Operational Test Report for BVR.
- Deliver BVR to Key Site.

Program Plans FY 2015 – Performance Output Goals
- BVR installation at first site completed, March 2015. (APB Milestone)
- Complete installations of BVR at 11 operational sites.
- Operational Test and Evaluation (OT&E) completed for all projects (APB milestone).
- Award contract to vendor for High Gain Open Planar Array (HGOPA) Antenna.
- Start production of two HGOPA and delivery to FAA Logistics Center.

Program Plans FY 2016 – Performance Output Goals
- Production of 12 HGOPA and delivery to FAA Logistics Center.

Program Plans FY 2017 – Performance Output Goals
- Production of 18 HGOPA and delivery to FAA Logistics Center.

Program Plans FY 2018 – Performance Output Goals
- Production of 18 HGOPA and delivery to FAA Logistics Center.

B, Terminal Radar (ASR) Program – ASR-9 and Mode S SLEP – Phase 3 Planning, S03.01-11

Program Description

This program will perform engineering studies to determine the scope of the future ASR-9 and Mode S SLEP Phase 3 programs. There are components of these radar systems that may not be supportable through 2025 and these analyses will determine the extent of re-engineering and system modifications needed. An investment decision for Phase 3 is planned for 2015.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

Currently ASR-9 and Mode S systems are functioning at an operational availability of 99.4 and 99.3 percent respectively, which is below the FAA performance metric of 99.7 percent. Without modifications to the ASR-9 and Mode S, these systems will continue to experience decreasing reliability and availability over time. The intent of this program is to maintain and improve operational availability of the ASR-9 and Mode S systems.

Program Plans FY 2014 – Performance Output Goals
- Complete supportability analysis studies to support the investment analysis process.

Program Plans FY 2015 – Performance Output Goals
- Complete investment analysis documents in support of a Final Investment Decision (FID).

Program Plans FY 2016 – Performance Output Goals
- Complete the FID.
- Additional activities will be established at the FID.

Program Plans FY 2017-2018 – Performance Output Goals
- Activities will be established at the FID.

2B17, SURVEILLANCE INTERFACE MODERNIZATION (SIM)
FY 2014 Request $6.0M

Surveillance Interface Modernization (SIM), S13.01-01

Program Description

The Surveillance Interface Modernization (SIM) program will provide more cost efficient and improved communication of expanded radar data to multiple air traffic control facilities. SIM will provide greater flexibility with the ability to select additional radar information from a wider range of radars to portray aircraft position on Air Traffic Control automation systems. This is achieved by converting the radar and automation systems, from rigid (point to point) serial interfaces using limited Common Digitizer model 2 (CD2) message formats, to flexible (IP) internet addressable interfaces over a secure network with expandable ASTERIX message formats. Changing from serial to IP format will allow transition, from the inefficient approach of managing multiple specialized circuits, to a standardized Local Area Network (LAN) management function. As a result, of establishing this architecture, the distribution of all available radar system data, to both the FAA and external users, will be made more effective, efficient, and information security measures can be applied more consistently.

SIM will simplify radar data sharing, on the border, between the United States and Canadian radar systems that already have ASTERIX/IP capability. The ASTERIX format enables extensive data, which can only be determined at the radar sensor, to be delivered to the automation platform. This includes the distinct 24-bit aircraft address, time stamp associated with the aircraft position, enhanced Mode S registers and additional resolution bits resulting in a more accurate determination of aircraft position. SIM will simplify the calculation for fusion tracking (consolidating an aircraft's position data from more than one source) in the automation system, add increased range resolution and enable enhanced Mode S altitude intent for the en route and core airport airspace. Access to additional radar data will provide performance enhancement for ATC automation systems, and allow (in the longer-term) more robust support of future operational improvements (OIs), future facilities, as well as providing improved backup capabilities when ADS-B surveillance transitions as a primary data source.

Compliance with SIM protocols will be required for radar sites and air traffic control facilities, and it will reduce the cost of yearly maintenance for existing and future systems. To achieve SIM compliance requires improvements, to legacy radar (48/ASR-8, 135/ASR-9, 73/ASR-11, 136/Mode-S, 129/ATCBI-6, 61/ATCBI-5) and automation systems (166/STARS, 21/ERAM, 6/MEARTS, 3/ATOP).

An Initial Investment Decision is planned for 3Q FY 2013 and Final Investment decision 4Q FY 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

As part of NextGen, existing surveillance systems will be required to serve as backup to ADS-B surveillance, and to provide surveillance data critical to other government agency missions (e.g. Department of Defense, Homeland Security). In order to support the transfer and distribution of legacy radar data, these systems must be modernized to incorporate modern interface requirements. To align with future NextGen requirements legacy systems will be required to provide data distribution other than point-to-point via modern networking techniques and transition to standard interface message formats with higher reporting precision which also provide additional target information to support future operational improvements (OIs). This program will implement a common industry standard communications architecture and format.

Program Plans FY 2014 – Performance Output Goals

- Complete development of a Business Case Analysis Report to support the Final Investment Decision.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

2B18, TERMINAL FLIGHT DATA MANAGER (TFDM)*
FY 2014 Request $23.5M

Flexible Terminal Environment – Terminal Flight Data Manager (TFDM), G06A.03-01

Program Description

The TFDM program is an integrated approach to maximize the efficient collection, distribution, and update of data in the terminal area (airspace around an airport and airport surface data) and to improve access to information necessary for the safe and efficient control of air traffic. TFDM will be a NextGen automation system that will provide tower air traffic controllers with decision support capabilities and integrated flight, surveillance, and traffic management information. This will allow tower controllers to maintain an integrated view of the air traffic environment, improving their situational awareness of the airport operations. The decision support capabilities will also provide more efficient and safe airport operations, in particular management of airport surface traffic sequencing and scheduling. TFDM will automate the manual flight data processes to enable enhanced data sharing between the Tower ATC and the En Route ATC, Approach Control ATC, Traffic Flow Management (TFM), and Flight/Airline Operations domains.

Initial deployment of TFDM will be comprised of the following Core functions:

- Migration to electronic flight data exchange, including enhanced tower/TRACON data exchange,
- Integration of surface surveillance data with flight data,
- TFDM scheduler/sequencer, including Traffic Flow Management System (TFMS)/Time Based Flow Management (TBFM) integration and Surface Collaborative Decision Making (CDM) implementation,
- Limited implementation of Surface CDM in advance of the full TFDM Core system, and
- Enhanced data exchange with flight operators and other airport stakeholders.

A key component of TFDM Core is the transition from paper flight strips to electronic flight data representation and exchange. This will facilitate enhanced flight data exchange between controllers within the tower facility, between Air Traffic Control facilities and between Traffic Flow Management systems. This will also facilitate data exchange with aviation partners such as the airlines Flight Operations Centers and airport operators to support collaborative decision making. Providing flight data in electronic format eliminates the necessity of physical exchange of flight data, reduces telephone exchange of data between facilities, and reduces manual re-entry of data among multiple ATC systems.

Another key component of TFDM Core is the introduction of a scheduler/sequencer capability that will provide the basis for efficient management of traffic flows on the surface at U.S. airports by transitioning the performance of airport surface operations from a “first come, first served” model to a more strategic model that allocates taxi clearances to minimize taxi distance and time.

Initial investment decision is planned for FY 2013 and the scope of the program will be determined at that time. Final investment decision is planned for FY 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

TFDM will automate manual processes; integrate existing terminal flight data systems and decision support tools, and provide new decision support capabilities. This will improve Air Traffic Control coordination and decision making to facilitate more efficient operations and increased airport capacity. The capabilities provided by TFDM will provide multiple NAS benefits, such as reduced surface delay, taxi time and fuel burn (with improved operational and environmental performance); better performance and airport capacity utilization during severe weather and other off-nominal conditions; improved usability and situational awareness and enhanced safety.

Program Plans FY 2014 – Performance Output Goals

- Release TFDM Core Screening Information Request (SIR).
- Complete Final Investment Decision (FID) for TFDM Core.
- Complete contract award for TFDM Core.

Program Plans FY 2015 – Performance Output Goals
- Conduct System Requirements Review.
- Conduct Preliminary Design Review (PDR).
- Deployment of initial surface CDM capability.

Program Plans FY 2016 – Performance Output Goals
- Conduct Critical Design Review (CDR).
- Begin hardware unit testing and incremental software development testing of TFDM Core system.

Program Plans FY 2017 – Performance Output Goals
- Deployment of initial Electronic Flight Data capability.
- Complete hardware unit testing and incremental software development testing of TFDM Core.
- Complete TFDM Core Key Site installation and checkout.

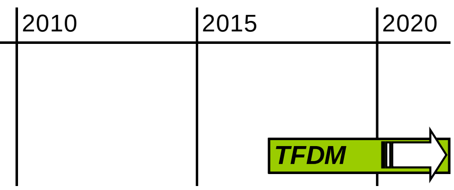
Program Plans FY 2018 – Performance Output Goals
- Complete TFDM System Government Acceptance (GA) Test.
- Complete TFDM Core Key Site operational test.

System Implementation Schedule

Terminal Flight Data Manager (TFDM)

Initial Surface CDM Capability: 2015

Core Capability: First site IOC: 2019 -- Last site IOC: TBD



2B19, VOICE RECORDER REPLACEMENT PROGRAM (VRRP)

FY 2014 Request $6.2M

- A, Next Generation Recorders – Voice Recorder Replacement Program, C23.01-00
- B, Voice Recorder Replacement Program – New Requirements Safety & Audit, C23.01-01

A, Next Generation Recorders – Voice Recorder Replacement Program, C23.01-00

Program Description

Next Generation Voice Recorder Replacement Program will complete installation of the Digital Audio Legal Recorders (DALR). Air-to-ground (A/G) and ground-to-ground (G/G) communications at FAA facilities are required to be recorded and stored for later retrieval. This applies to all ATC domains, including ATCT, TRACON facilities, ARTCC, AFSS, and the FAA's ATCSCC. The voice recorder provides the legally accepted recording capability for conversations between air traffic controllers, pilots, and ground-based air traffic facilities, and the recording is used in the investigation of accidents and incidents and routine evaluation of ATC operations. As the voice recorder technology has continued to evolve, early digital voice recorders have experienced obsolescence and supportability issues. These digital recording systems are reaching the end of their service life and they use obsolete operating systems and parts that are no longer manufactured. The Next Generation Voice Recorder Replacement Program (NG VRRP) is replacing the obsolete digital voice recorders and any remaining analog recorders and provides digital voice recording functionality at new facilities. The replacement of aging voice recorders will reduce operational costs.

DALR provides a "next generation" voice recorder, as a technically updated and more capable version of the computer based digital recording system previously distributed to field sites as the Digital Voice Recording System (DVRS) and DVR2. Major improvements are:
- Elimination of Digital Audio Tape (DAT) drives and DAT tapes,

- Capability to copy recordings directly to CD/DVD, thumb drives or transfer files via encrypted .*wav* files,
- Larger hard drive capable of storing recordings for a configurable period in one day increments (currently up to 45 days for FAA),
- Capability for automatic erasure after a defined retention period,
- Capability to move recordings to quarantined storage,
- Hot swappable components,
- Enhanced security controls to improve information system security,
- Sophisticated password protection, and
- Security audit log.

Funding in FY 2014 will provide for delivery and installation of the remaining 21 systems and provide for depot spares and logistics. The program ends in FY 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The NG VRRP voice recording system will support the goal of maintaining operational availability by replacing aging and obsolete equipment currently in the field. System outages and downtime for repair will be significantly reduced due to the higher availability and improved operational technology of the next generation of voice recorders.

Program Plans FY 2014 – Performance Output Goals

- Deliver and install remaining 21 Digital Audio Legal Recorder (DALR) systems.

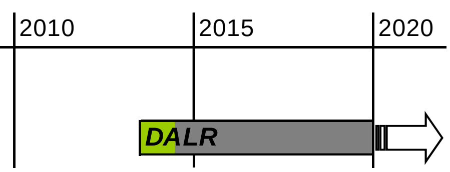
Program Plans FY 2015-2018 – Performance Output Goals

- None.

System Implementation Schedule

Digital Audio Legal Recorder (DALR)

First site IOC: October 2013 -- Last site ORD: May 2014



B, Voice Recorder Replacement Program – New Requirements Safety & Audit, C23.01-01

Program Description

Voice Recorder Replacement Program – New Requirements Safety and Audit will provide the capability for improved remote voice recorder access. Voice recorders provide the legally accepted recording capability for conversations between air traffic controllers, pilots and ground-based air traffic facilities in all ATC domains. Voice recordings are used in the investigation of accidents and incidents and routine evaluation of ATC operations.

New and updated FAA Safety orders are creating additional requirements for reporting that are dependent on access to voice data stored on the Digital Audio Legal Recorder (DALR) systems throughout the NAS. These orders contain provisions that require safety related data, including recorded voice be captured regularly and analyzed for trends or hazards. The analyses are used to change NAS systems or procedures to reduce or eliminate risks that potentially have a safety impact.

These new requirements include:

- New capability for remote access and download – Traffic Analysis and Review Program (TARP)/ Comprehensive Electronic Data Analysis and Reporting (CEDAR),
- Unique data transfer requirements for the NTSB, and
- Ability to accommodate increased number of users.

The Voice Recorder Safety and Audit initiative will procure Application Program Interface (API) software licenses. This will enable implementation of an off-site and centralized remote voice retrieval capability for up to 489 existing systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

The upgrade to the DALR system will provide a system that will comply with the Safety Management System (SMS) and the associated new/updated FAA Safety orders. This will support efforts to reduce air carrier fatalities.

Program Plans FY 2014 – Performance Output Goals

- Final Requirements Document approved January 2014.
- Conduct Final Investment Decision, May 2014.
- Achieve Product Demonstration Decision, June 2014.
- Complete first site Acceptance Testing, July 2014.

Program Plans FY 2015-2018 – Performance Output Goals

- None; Program Ends in FY 2014.

2B20, PRECISION RUNWAY MONITOR REPLACEMENT (PRMR) – MULTILATERATION TECHNOLOGY UPGRADE
FY 2014 Request $5.0M

Precision Runway Monitor (PRM) – Replacement (PRMR), S08.01-02

Program Description

The purpose of the Precision Runway Monitor Replacement (PRMR) program is to identify the most cost effective solution for maintaining the PRM service at San Francisco International Airport (SFO) and Hartsfield-Jackson Atlanta International Airport (ATL). The PRM service is currently provided by the legacy PRM Electronic Scan Radar (PRM-E). The PRM-E, first installed in 1999, has exceeded its planned 10-year life cycle and is experiencing increased obsolescence and other support issues. Repair times have increased significantly, in some cases in excess of 26 weeks, due to a limited availability of critical spare parts, and a diminishing sub-vendor repair base, making current and long-term support exceedingly challenging. In addition, cannibalization of the Cleveland Hopkins International Airport (CLE) system has taken place in order to keep the more critical ATL and SFO systems operational.

The three alternatives evaluated to satisfy the PRM-R program requirements include:

- PRM-E Service Life Extension Program (SLEP)

- PRM Multilateration (MLAT)
- Automatic Dependent Surveillance – Broadcast (ADS-B) Out (with Augmentation)
  - Space-Based Augmentation System (SBAS)
  - Ground-Based Augmentation System (GBAS)

The PRM-R program received Joint Resource Council (JRC) initial investment decision (IID) approval on September 26, 2012 to proceed into a final investment decision (FID) for the preferred PRM MLAT alternative. A FID is scheduled for December 2013.

The Precision Runway Monitor (PRM) is a high update-rate surveillance radar specifically designed for use during inclement weather and reduced visibility conditions. The PRM monitors closely-spaced-parallel-approaches (CSPA) in order to sustain or increase capacity, as measured by an Airport's Arrival Rate (AAR), during Instrument Meteorological Conditions (IMC). During IMC, air traffic separation standards require greater distance between aircraft, thus reducing the AAR below the number of aircraft arrivals an airport is capable of accepting each hour during good visibility conditions. The system also incorporates alert algorithms to predict and warn controllers of aircraft deviations from their nominal approach course. A PRM system must be used to conduct independent simultaneous instrument approaches to side-by-side runways spaced less than 4300 feet apart. When used with the appropriate air traffic procedures, the PRM enables operations in which aircraft fly with reduced separation distances than otherwise permitted, thus increasing normal IMC airport capacity.[1] Without the PRM technology, airports would be required to conduct dependent simultaneous approaches, significantly reducing the airport's arrival rate (AAR)/capacity. For example, ATL's and SFO's AAR increased approximately 23% (81-100/hr) and 17% (29-34/hr) respectively during ILS conditions when using PRM.

At present, there are two different PRM configurations deployed within the NAS: The PRM Electronic Scan (PRM-E) radar, the original PRM system developed by Allied Signal/Raytheon Company, and the newer PRM Alternate (PRM-A) system, a Saab Sensis Corporation product, that utilizes the Airport Surface Detection Equipment, Model X (ASDE-X) multilateration (MLAT) technology to perform the PRM service. The PRM-E systems are currently deployed at five airports throughout the NAS; ATL, SFO, CLE, Lambert-St. Louis International Airport (STL), and Philadelphia International Airport (PHL). The current PRM-E systems were installed and commissioned between 1999 and 2007. The PRM-A is a single site system, installed and commissioned at Detroit's Metro Wayne County Airport (DTW) in June 2009. Both the PRM-E and PRM-A were congressionally mandated programs.

Due to changing airport conditions, and a subsequent reduction in traffic volume, the need for PRM service at CLE, PHL and STL has been essentially eliminated. These airports are able to maintain an acceptable AAR level during IMC without the use of the PRM-E. Therefore, the PRM-E systems at CLE, STL and PHL are planned for decommissioning and will be returned to the FAA Logistics Center (FAALC) for use as spare parts to support the needed SFO and ATL PRM systems until replaced by the PRM-R. The plan to decommission these systems is in process.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The PRM replacement solution will ensure the continued operation of PRM service offering the most efficient use of airport capacity at ATL and SFO. The selected PRM MLAT solution resolves the obsolescence and supportability issues, thus improving overall system maintainability, reliability and availability

Program Plans FY 2014 – Performance Output Goals

[1] NAS-Wide Precision Runway Monitoring Alternatives Analysis Final Report, September 9, 2004

- Pending JRC Final Investment Decision approval in December 2013, procure one system and begin environmental and real estate activities at Atlanta (ATL) and San Francisco (SFO).

Program Plans FY 2015 – Performance Output Goals
- Start site preparation and construction at ATL.

Program Plans FY 2016 – Performance Output Goals
- Install the ATL PRM-R system.

Program Plans FY 2017 – Performance Output Goals
- Start site preparation and construction at SFO.
- Purchase the SFO system.

Program Plans FY 2018 – Performance Output Goals
- Install the SFO PRM-R system.

2B21, INTEGRATED TERMINAL WEATHER SYSTEM (ITWS)

FY 2014 Request $1.3M

ITWS – Technology Refresh & Disposition, W07.01-02

Program Description

The Integrated Terminal Weather System (ITWS) is an air traffic management tool that provides air traffic managers with graphic, full-color displays of essential weather information at major U.S. airports. ITWS was developed to fill the need of air traffic managers, controllers, and airlines for a tool that integrated weather data from a number of sources and provided customers a single, easily used and understood display of support products. ITWS depicts the current weather and short-term forecasts of terminal weather through the integration of data from FAA and National Weather Service sensors and systems, as well as from aircraft in flight. ITWS weather information is immediately useable by air traffic controllers and managers without further meteorological interpretation. 34 ITWS sites provide weather product information to a total of 75 airports.

Technology Refresh of ITWS will include the systematic replacement of the ITWS Commercial Off-The-Shelf (COTS) system components; e.g., processors, displays, computer operating systems, and commercially available software, to assure continued supportability over the service life of the system. According to a supportability study conducted in 2010, the FAA will be unable to sustain the generation of ITWS Weather Products after 2015, which are vital to the needs of the ATC user community, without technology refresh. In addition, the FAA will not be able to interconnect ITWS with the NextGen Weather Processor (NWP) and Common Support Services – Weather (CSS-Wx) systems and those of other NAS “internal” and “external” users (e.g., airport authorities, airlines, etc.) to permit seamless interoperability and common situational awareness in support of collaborative decision-making.

In response to recommendations in the 2010 supportability study, prototype development was planned for FY 2014 and deployment was scheduled to begin in FY 2015. This schedule mitigated the risks of hardware obsolescence issues that were forecasted to begin in FY 2015. The current schedule plans to develop the prototype during FY 2014 and FY 2015, which will allow deployment beginning in FY 2016, and extend the deployment schedule one year to FY 2018.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

ITWS Technology Refresh will support the Performance Metric for operational availability by replacing unsupportable equipment. The ITWS Requirements Specification (FAA-E-2900F) states: "The ITWS shall have an inherent availability of at least 0.999815" (i.e., 99.98% availability). ITWS has maintained this level of operational availability at all commissioned sites, including the 30 core airports where ITWS is currently installed, but the technology refresh is necessary to provide this availability in future years.

Program Plans FY 2014 – Performance Output Goals
- Complete ITWS Technology Refresh Engineering Study.

Program Plans FY 2015 – Performance Output Goals
- Develop ITWS Technology Refresh Hardware and Software prototype.

Program Plans FY 2016 – Performance Output Goals
- Complete ITWS Technology Refresh deployment and associated activities at three ITWS sites (9% of total program complete).

Program Plans FY 2017 – Performance Output Goals
- Complete ITWS Technology Refresh deployment and associated activities at 14 ITWS sites (50% complete).

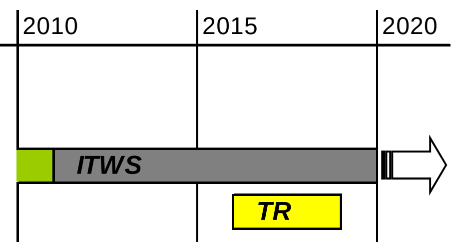
Program Plans FY 2018 – Performance Output Goals
- Complete ITWS Technology Refresh deployment and associated activities at the final 17 ITWS sites (100% complete).

System Implementation Schedule

Integrated Terminal Weather System (ITWS) - Technology Refresh

First ORD: April 2003 -- Last ORD: August 2010 (34th Unit)

Tech Refresh: First site Deployment: 2016 -- Last site: 2018



C: Flight Service Programs

2C01, AVIATION SURFACE WEATHER OBSERVATION SYSTEM
FY 2014 Request $10.0M

Aviation Surface Weather Observation Network (ASWON) – Technology Refresh, W01.03-01

Program Description

The Aviation Surface Weather Observation Network (ASWON) is a portfolio program that consists of the following surface weather sensor systems: the Automated Surface Observing System (ASOS), Automated Weather Observation System (AWOS), Automated Weather Sensor Systems (AWSS), Stand Alone Weather Sensors (SAWS), Digital Altimeter Setting Indicator (DASI), F-420 Wind Sensor, and AWOS Data Acquisition System (ADAS).

These systems, except the ADAS, are located at airports and measure and report weather conditions such as temperature, barometric pressure, visibility, precipitation type and amount, cloud height and coverage, and wind speed and direction. The ADAS, located in FAA En Route centers, accepts weather data from ASOS, AWSS, and AWOS and retransmits the data to weather processor systems like Integrated Terminal Weather System (ITWS) and Weather and Radar Processor (WARP).

The ASWON Technology Refresh program will provide compatible technology upgrades and/or replacements to five legacy ASWON systems (ASOS, AWOS, AWSS, DASI, F-420) experiencing obsolescence, supportability, and maintainability issues. This sustainment effort will enable these systems to continue their role of providing weather information to allow safe operation of the NAS. Successful implementation will also result in a common hardware platform and software baseline -- this will reduce development costs; logistics support costs, and software maintenance costs/effort.

Alignment of Program to FAA Strategic Goal, Objective, and Performance Target

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Objective 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Target

ASWON Technology Refresh contributes to maintaining operational availability by replacing obsolete unsupportable equipment experiencing increasing failure rates. Continued failures of weather sensing equipment will result in a loss of ASWON services and subsequent inability to maintain current operational availability levels.

Program Plans FY 2014 – Performance Output Goals
- Award system integration contract.
- Install AWOS Technology Refresh mods at 15 sites (15 of 187, 8%).
- Install AWSS Technology Refresh mods at key site (1 of 44, 2%).

Program Plans FY 2015 – Performance Output Goals
- Install AWOS Technology Refresh mods at 40 additional sites (65 of 187, 35%).
- Install AWSS Technology Refresh mods at 20 additional sites (21 of 44, 48%).
- Install DASI Technology Refresh mods at key site (1 of 180).
- Install F-420 Technology Refresh mods at key site (1 of 210).

Program Plans FY 2016 – Performance Output Goals
- Install AWSS Technology Refresh at 23 remaining sites (44 of 44, 100%).
- Install AWOS Technology Refresh mods at 50 additional sites (115 of 187, 61%).
- Install F-420 Technology Refresh mods at 30 additional sites (31 of 210, 15%).
- Install DASI Technology Refresh mods at 40 additional sites (41 of 180, 23%).
- Begin ASOS Software Operational Test and Evaluation (OT&E) at key site.

Program Plans FY 2017 – Performance Output Goals
- Install AWOS Technology Refresh at remaining 72 sites (187 of 187, 100%).
- Install ASOS Technology Refresh mods at 50 sites (50 of 517, 10%).
- Install DASI Technology Refresh mod at 40 sites (81 of 180, 45%).
- Install F-420 Technology Refresh mods at 40 sites (81 of 210, 40%).

Program Plans FY 2018 – Performance Output Goals
- Install DASI Technology Refresh mods at 40 additional sites (121 of 180, 67%).
- Install ASOS Technology Refresh mods at 100 additional sites (151 of 571, 30%).
- Install F-420 Technology Refresh mods at 60 additional sites (141 of 210, 67%).

System Implementation Schedule

Aviation Surface Weather Observation Network (ASWON) – Technology Refresh

First site 2014 -- Last site 2020

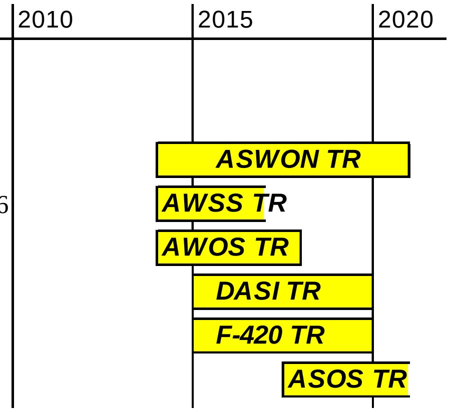
AWSS Technology Refresh: First site 2014 -- Last site September 2016

AWOS Technology Refresh: First site 2014 -- Last site September

DASI Technology Refresh: First site 2015 -- Last site September 2019

F-420 Technology Refresh: First site 2015 -- Last site September 2019

ASOS Technology Refresh: First site 2017 -- Last site September 2020



2C02, FUTURE FLIGHT SERVICES PROGRAM (FFSP)

FY 2014 Request $3.0M

Future Flight Service Program, A34.01-01

Program Description

Current Flight Service automation is provided by three separate contracts: Direct User Access Terminal System (DUAT/S); Automated Flight Service Station (AFSS) Flight Service 21; and Operational and Supportability Implementation System (OASIS)). FFSP's goal is to integrate all Flight Service contracts into a single service entity.

The Alaska automation system (OASIS) is contractor owned and FAA personnel provide the services. In the lower 48 states, contractor personnel use a proprietary system (AFSS CONUS) to provide Flight Services. The DUATS is a web-based service that allows authorized pilots to access weather and aeronautical data and file a flight plan, eliminating the need to talk to a flight service specialist.

The objective for FFSP is to integrate these contracts into a single contractual vehicle and to provide the opportunity for innovation of the services. The alternatives being examined concern when and how the system in Alaska and the web-portal will be integrated. Some of the possibilities for innovation are:

- Integrating graphical and text-based weather products and other aeronautical information for use in pilot briefings;
- Integrating aeronautical data updates with NOTAM and flight plan data on the displays of FFSP automation systems; and
- The development of a web portal that will provide both flight service specialists and aviation community users with access to the same data, improving access to consistent and accurate flight service information.

In addition there will be consideration of an automatic capability to provide pilots with critical updates that occur after having received preflight briefings, and to monitor VFR aircraft in order to be more proactive in search and rescue efforts.

The strategy for FFSP is to move the primary delivery of Flight Services from the more expensive human delivery through telephone and radio contact to the more cost effective electronic delivery. The means by which this will be accomplished will be through performance incentives and the restructuring of the existing contract vehicles as those contracts become amendable or expire.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

FFSP anticipates that the new system will foster better safety awareness for pilots by providing critical updates on changing weather conditions, which will allow pilots to make decisions to avoid hazardous weather based on near real time information. FFSP anticipates that the new system, once selected, will provide through, vendor innovation, a more timely Search and Rescue (SAR) response based on conformance with flight plan information.

Program Plans FY 2014 – Performance Output Goals
- Implement initial phase of FFSP through expansion of web portal DUATS contract award.
- Complete analysis documentation of tiered service approach for FFSP.

Program Plans FY 2015 – Performance Output Goals
- Begin reduced reliance on human delivery of Flight Service through extension of AFSS contract.
- Achieve FFSP Initial Investment Decision (IID).

Program Plans FY 2016 – Performance Output Goals
- Further reductions in human delivery of Flight Services through integration of technology and contracts.
- Develop Request For Proposal (RFP)/Screening Information Request (SIR) for FFSP.

Program Plans FY 2017 – Performance Output Goals
- Achieve FFSP Final Investment Decision (FID).
- Finalize Lower 48 implementation of FFSP.

Program Plans FY 2018 – Performance Output Goals
- Integration of Alaska into FFSP.

2C03, Alaska Flight Service Facility Modernization (AFSFM)
FY 2014 Request $2.9M

Alaska Flight Service Facility Modernization (AFSFM), F05.04-02

Program Description

The Alaska Flight Service Facility Modernization (AFSFM) program modernizes or replaces the Flight Service facilities in Alaska to ensure the security and sustainment of Flight Services, and develop the infrastructure for continuity of operations. Over 1/3 of the 17 Alaska Flight Service facilities were constructed in the 1970's and require extensive renovations to meet current building codes, fire life safety, Architectural Barriers Act Accessibility Standard (ABAAS) and electrical standards. Specifically, Flight Service buildings will be updated to meet Occupational Safety and Health Administration (OSHA) and Americans with Disabilities Act (ADA) requirements, and the electrical and safety systems will be upgraded to ensure they meet standards. Notably, the Dillingham Flight Service Station (FSS) is currently not compliant with FAA Standards, current local building codes, and current fire/life safety regulations. After years of continuous and constant operations in a harsh, maritime climate, the facility has far exceeded its expected useful service life. Construction of a new Dillingham FSS began in August 2012 and is scheduled for completion in summer 2013. A Flight Services Delivery Study is underway to analyze facility locations, areas of service demand, conditions of existing facilities and quality of life issues, and identify cost effective and efficient means of delivering flight services in Alaska.

In coordination with Alaska Technical Operations and the Western Service Center, plans are developed to maintain and sustain Alaskan Flight Services facilities.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The AFSFM program will directly contribute to the FAA's Aviation Access goal by increasing operational availability and capabilities by providing facilities upgrades and addressing quality of life issues in existing Alaska Flight Services Facilities.

Program Plans FY 2014 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the Corporate Work Plan (CWP) prior to their beginning:

- Decommission the old Cold Bay FSS building.
- Refurbish/upgrade building interior (break room, pilot briefing room, rest rooms, etc) at Fairbanks FSS, Juneau FSS, Kenai FSS, Northway FSS, and Talkeetna FSS.

Program Plans FY 2015 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the CWP prior to their beginning:

- Decommission old Nome FSS building.
- Refurbish/upgrade building interior (break room, pilot briefing room, rest rooms, etc) at Deadhorse FSS, Iliamna FSS, Palmer FSS, McGrath FSS, and Sitka FSS.
- Refurbish equipment room and rest rooms at Ketchikan FSS.

Program Plans FY 2016 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the CWP prior to their beginning:

- Decommission the old Kotzebue FSS building.
- Refurbish/upgrade building interior (break room, pilot briefing room, rest rooms, etc) at Barrow FSS and Nome FSS.
- Complete roof replacement at Fairbanks AFSS.
- Complete refurbishment of the Heating, Ventilation, and Air Conditioning (HVAC) System at Juneau AFSS.

Program Plans FY 2017 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the CWP prior to their beginning:

- Complete roof replacement at Kenai FSS.
- Complete roof replacement at Juneau FSS.
- Complete refurbishment of the Heating, Ventilation, and Air Conditioning (HVAC) system at Talkeetna FSS.

Program Plans FY 2018 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the CWP prior to their beginning:

- Complete roof replacement at Ketchikan FSS.
- Complete roof replacement at Talkeetna FSS.
- Complete refurbishment of the Heating, Ventilation, and Air Conditioning (HVAC) system at Palmer FSS and Northway FSS.

2C04, WEATHER CAMERA PROGRAM

FY 2014 Request $1.2M

Weather Camera Program – Segment 1, M08.31-01 / X, Weather Camera Program – Future Segments, M08.31-02

Program Description

The Weather Camera Program provides and installs cameras at airports and strategic enroute locations to provide pilots and flight service station specialists with real-time video weather information.

Between 1990 and 2006, there were 1497 commuter and air taxi crashes in the United States. Of these accidents, 520 occurred in Alaska (35% of the total). Historically, the National Transportation Safety Board (NTSB) has stated that on a national average, 22.6% of all accidents are in some way weather related. For the State of Alaska, this would translate into an average of 7.3 weather related accidents per year within the 1990-2006 time frames. Two of the Weather Camera Program's, internal goals are to help reduce weather related accidents in Alaska. The first goal is to reduce the En Route or Approach and Landing Low visibility related accident rate per 100,000 operations for Non-IFR capable commercial and general aviation aircraft within the state of Alaska. The second goal is to reduce the number of unnecessary flight hours caused by lack of weather information.

In the state of Alaska, flying is equivalent to driving in the contiguous US, making the use of small aircraft essential to everyday life. Many times flying is the only means to get children to/from school activities; to transport service providers such as clergy, doctors, dentists, and nurses; to deliver patients to medical facilities; and to supply the communities with groceries, fuel, and mail. Even though flying is essential, the rapidly changing weather presents challenges that affect the accident rate in Alaska. FAA data indicates accident rates in Alaska have been nearly 400 percent above the national average.

Limited weather information in Alaska contributes to a higher risk of accidents and can result in flight inefficiencies. Without weather information about their destination airport and route of flight, pilots cannot make informed decisions on whether it is safe to fly or continue their flight. This can lead to accidents or unnecessary fuel costs, caused by the need to circumvent bad weather or, in some cases, to land at an alternate airport. The NTSB Safety Study: Aviation Safety in Alaska, November 1995, recommended that the FAA assist the National Weather Service (NWS) with an evaluation of the technical feasibility and aviation safety benefits of remote color video weather observing systems in Alaska. There is a need for pictorial views of current weather conditions accessible to the aviation community in Alaska, and the FAA Weather Camera Program has installed aviation weather cameras as an aid to Visual Flight Rule (VFR) pilots operating in Alaska.

The weather cameras are installed at airports and strategic en route locations, and provide pilots, dispatchers and flight service station specialists with enhanced situational awareness, preflight planning and en route weather briefing data. Images are updated every 10 minutes and stored for six hours to be used in a loop function for weather trending analysis by pilots. These images are made available through a user-friendly, web-enabled application: http://avcams.faa.gov. In addition to improving aviation safety benefits, the cameras improve operator efficiency by reducing unnecessary flight time caused by weather-related in-flight interruptions. Over the life cycle of the Weather Camera Program, this saves millions of dollars of fuel expenses and reduces the overall carbon footprint. To date, and according to the Post Implementation Review, the Weather Camera Program is exceeding its expected performance metrics in Alaska by reducing weather-related aviation accidents from 0.28 accidents per 100,000 operations to 0.13 accidents (53% reduction) and by improving aviation efficiency in flight time and fuel savings by 63%. This data justifies the continued installation of weather camera sites to provide near-real-time weather images to pilots.

Weather Camera Program – Segment 1 (M08.31-01):
The program funds procurement and installation of weather camera sites in Alaska. Segment 1 of this program is intended to fund the implementation of 221 camera sites through FY 2014.

Weather Camera Program – Future Segments (M08.31-02):
The Future Segments program funds the renovation and/or rebuilding of structures that house the camera systems and replacement of the equipment that allows the transmission of weather images to FAA facilities. Some of these facilities are located in high mountain passes. They are powered by solar/wind power plants and use satellite communications to transfer data. These sites must be refurbished periodically due to extreme high altitude conditions. This is an ongoing need due to the effects of severe weather in Alaska on these sites. The program will also replace the legacy system server in Anchorage and allow the periodic replacement of failing camera systems and other necessary site improvements at remote locations through 2017.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

The FAA will continue to enhance aviation safety throughout the state of Alaska by supplying visual meteorological information to pilots and expanding the use of weather cameras. The FAA's Alaska region has established a supporting safety goal/metric for this effort, and it is to reduce weather related accidents from the baseline level of 0.28 to no more than 0.15 accidents per 100,000 operations within the State of Alaska.

Program Plans FY 2014 – Performance Output Goals
Weather Camera Program – Segment 1 (M08.31-01):
- Complete the installation and make operational the final six camera sites for a total of 221 sites by September 30, 2014. (APB milestone)
- Conduct implementation closeout activities.

Weather Camera Program – Future Segment (M08.31-02):
- None.

Program Plans FY 2015 – Performance Output Goals
Weather Camera Program – Segment 1 (M08.31-01):
- None.

Weather Camera Program – Future Segment (M08.31-02):
- Replace the Camera System Central Server at the Anchorage Regional Operations Center (ROC).
- Replace legacy and failing cameras/routers at five sites.

Program Plans FY 2016 – Performance Output Goals
Weather Camera Program – Segment 1 (M08.31-01):
- None.

Weather Camera Program – Future Segment (M08.31-02):
- Replace legacy and failing cameras/routers at five sites.
- Refurbish or Relocate mountain pass high-sites at: Merrill Pass High and Merrill Pass Low.

Program Plans FY 2017 – Performance Output Goals
Weather Camera Program – Segment 1 (M08.31-01):
- None.

Weather Camera Program – Future Segment (M08.31-02):
- Replace legacy and failing cameras/routers at five sites.
- Refurbish mountain pass high-sites at: Lake Clark Pass East, Lake Clark Pass West and Misty Fiords.

Program Plans FY 2018 – Performance Output Goals
Weather Camera Program – Segment 1 (M08.31-01):
- None.

Weather Camera Program – Future Segment (M08.31-02):

- Replace legacy and failing cameras/routers at five sites.
- Refurbish remote powered camera sites: Grave Point, Cape Fanshaw, Skwentna and Summit.

D: Landing and Navigation Aids Programs

2D01, VHF OMNIDIRECTIONAL RADIO RANGE (VOR) WITH DISTANCE MEASURING EQUIPMENT (DME)

FY 2014 Request $8.3M

- A, Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC), N06.00-00
- B, VORTAC – Minimum Operating Network Implementation Program, N06.01-01

A, Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC), N06.00-00

Program Description

This program replaces, relocates, or converts VOR and VORTAC facilities to improve NAS efficiency and capacity. VOR, Tactical Air Navigation (TACAN) and VORTAC (combination VOR and TACAN) systems provide navigational guidance for civilian and military aircraft in both the en route and terminal areas. The FAA navigation roadmap indicates that decisions will be made in the future regarding whether VOR or TACAN systems will remain in service or be shut down. If they are retained, they will serve as a backup to satellite navigation and continue to define VOR routes and procedures for legacy users. Until that transition is complete, VORTACs must remain in service and may be relocated, technologically refreshed, or replaced. Currently 60% of the VORTAC systems are beyond their estimated service life. It is projected that within 10-15 years all existing VORTAC systems will be beyond their estimated service life.

There are over 1,000 VORTACs or VORs with DME currently operating in the United States. These radio aids to navigation help pilots accurately determine their location in all weather conditions. They are used by many pilots as a primary navigation aid, and direct lines between VORs are used to define established air routes.

This program also procures and installs Doppler VOR (DVOR) electronic kits and DVOR antenna kits to dopplerize a conventional VOR. There are numerous VORs that have restrictions due to encroachment of the VOR sighting criteria caused by natural and manmade obstacles. These restrictions are having a serious impact on both en-route and arrival and departure procedures. The main natural encroachment comes from the growth of vegetation, mostly trees, which are located outside the sighting restriction area but are now tall enough to cause electromagnetic interference. Many manmade obstacles cause the same electromagnetic interference, resulting from the construction of tall buildings, new industrial parks with their high concentration of metal buildings, transmission lines, radio/TV/cell towers and most recently, wind farms. Dopplerizing a VOR eliminates most of these restrictions.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The service life of the VOR/VORTAC facilities is either near or past the designed useful life of these systems. Sustaining, relocating, or dopplerizing these facilities maintains their operational availability at or above 99.7% in the short term. Extending the service life of the VOR/VORTACs will ensure the availability is maintained in the mid-term.

Program Plans FY 2014 – Performance Output Goals

- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.
- Procure two DVOR Electronic Kits.
- Procure 10 DVOR Hardware Antenna Kits.
- Conduct Analysis and new DVOR technology prototype development.

Program Plans FY 2015 – Performance Output Goals

- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.
- Procure 10 DVOR Hardware Antenna Kits.

Program Plans FY 2016 – Performance Output Goals

- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.
- Procure 10 DVOR Hardware Antenna Kits.

Program Plans FY 2017 – Performance Output Goals

- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.
- Procure 10 DVOR Hardware Antenna Kits.

Program Plans FY 2018 – Performance Output Goals

- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.
- Procure 10 DVOR Hardware Antenna Kits.

B, VORTAC – Minimum Operating Network Implementation Program, N06.01-01

Program Description

In order to provide navigation services that more efficiently meet the goals of the NextGen, a transition from the use of VHF Omni-directional Range (VOR) defined route structures as the primary means of navigation to that of Performance-Based Navigation (PBN), using Area Navigation (RNAV) and Required Navigation Performance (RNP), supporting satellite navigation (SATNAV), is necessary. The current process for defining airways, routes, and developing procedures using VORs will transition to a more efficient means of air navigation that provides improved accuracy, availability, integrity, and continuity to support PBN. This transition strategy is described in the Federal Register Notice (FRN), which was briefed at the October 31, 2011 NextGen Management Board (NMB) and approved for public release in December 2011.

The VOR Minimum Operational Network (MON) implementation program will prepare the analyses, documentation and implementation plan for downsizing the VOR network to the minimum required as a backup navigation system for VOR equipped aircraft. It would allow these aircraft to navigate and/or land safely under IFR in the event of an unplanned Global Positioning System (GPS) outage; however, the planned backup capability will be less robust than the current VOR network. Sufficient facilities will be retained so that navigation and landing can be accomplished without the necessity of using radar vectors, thus reducing the reliance on air traffic controllers, who may incur a high workload when dealing with the effects of a GPS outage. This Program will transition the legacy network of approximately 967 VORs to a MON of approximately 500 VORs by a target date of Jan 1, 2020. Downsizing the VOR network to the minimum required for a backup navigation system has a significant cost savings over the life of the MON.

The Program is currently in the Concept and Requirements Definition (CRD) Phase. It is scheduled for an Investment Analysis Readiness Decision (IARD) during June 2013.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services*
- *FAA Performance Metric 1 – Optimize airspace and Performance Based Navigation (PBN) procedures to improve efficiency an average of 10% across core airports by 2018.*

Relationship to Performance Metric

The use of the GPS for aircraft navigation has increasingly reduced the need for ground based navigation aids for most domestic en route and terminal flights under instrument flight rules. The result of development and deployment of satellite navigation is that many aviation users no longer use Very High Frequency (VHF) Omni Ranges (VORs) for normal navigation and could potentially navigate safely using augmented GPS. However, the risk of outages of GPS and other GNSS systems is well known, both from scheduled interference (e.g., Department of Defense [DoD] testing and exercises) or unscheduled events. Accordingly, the FAA is planning to maintain a backup navigation capability to provide service in case of a GPS outage.

Program Plans FY 2014 – Performance Output Goals

- Finalize the national discontinuance criteria and process document.
- Complete the Program Safety Plan (PSP) and Safety Risk Management Document (SRMD).
- Provide analysis documentation for expansion of the VOR service volume from 40 nautical miles (nmi) to 77 nmi.
- Prioritize the VOR Minimum Operational Network (MON) List to establish a MON Goal.
- Discontinue 4% of the candidate VORs using discontinuance criteria and processes.
- Provide white paper of recommendations for national policy updates for air traffic and airspace procedures relating to VOR MON.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

2D02, INSTRUMENT LANDING SYSTEMS (ILS) – ESTABLISH
FY 2014 Request $7.0M

Instrument Landing Systems (ILS), N03.01-00

Program Description

The Instrument Landing System (ILS) program procures and installs partial and full Category I, II, and III precision approach systems at qualified airports. An ILS system has several components (a localizer for horizontal guidance, a glide slope for vertical guidance, and markers to determine horizontal distance from the runway). The program will replace existing ILSs at core airports and upgrade selected locations with equipment necessary for CAT II/III operations. These systems enable aircraft to land in weather conditions where visibility is very limited. The ILS provides vertical and horizontal guidance information to the pilot to allow safe landings through touchdown and rollout. Approach lighting systems provide visual cues for the pilot to see the runway, once the ILS minimum altitude (normally 200 feet above the runway for a Category I approach and lower for Category II and III) is reached. The ILS along with required Approach Lighting Systems (i.e., High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) and Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)), improve both system safety and capacity at equipped runways by providing precision approach capability for aircraft landing in adverse weather conditions.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Establishing ILS precision approach capability allows lower minimums for landings and helps to maximize NAS use. Lowering minimums allows operations in poor weather conditions, which, in effect, is the same as an increase in airport capacity.

Program Plans FY 2014 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2015 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2016 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2017 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2018 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

2D03, WIDE AREA AUGMENTATION SYSTEM (WAAS) FOR GPS

FY 2014 Request $109.0M

- A, Wide Area Augmentation System (WAAS), N12.01-00
- B, Wide Area Augmentation System (WAAS) – Surveys, N12.01-06

A, Wide Area Augmentation System (WAAS), N12.01-00

Program Description

WAAS augments the Global Positioning System (GPS) to provide precise navigation and landing guidance to equipped aircraft in all weather conditions, over the entire NAS. WAAS is able to provide service to all eligible airports within the service area, overcoming ground-based navigation system limitations due to signal blockage or other siting issues. WAAS results in safety and capacity improvements in the NAS and can reduce FAA operations costs by enabling the removal of some of the legacy ground-based navigation infrastructure.

WAAS became operational July 10, 2003. Following commissioning, WAAS began the Full Localizer Performance with Vertical guidance (LPV) segment (Phase II) which involved development, modernization, technology refresh and enhancement of WAAS.

WAAS is currently in Phase III of the program, which allows Full LPV-200 Performance (precision approach guidance to within 200 feet vertically of the runway). Phase IV, Dual Frequency Operations, will begin in 2014 to leverage the improvements the Department of Defense (DoD) will make as part of its GPS modernization program.

WAAS uses a network of precisely located ground reference stations across the U.S., Canada, and Mexico to monitor GPS satellite signals. This information is processed and sent to user receivers via leased navigation transponders on geostationary earth orbiting (GEO) satellites. The WAAS-provided messages improve the accuracy, availability, and safety of GPS-derived position information.

WAAS addresses the following performance gaps:

- Lack of precise navigation capabilities,
- Lack of stable vertical guidance for approaches to airports not equipped with ILS, and
- Need to replace aging navigation systems that are expensive to maintain.

WAAS is a critical enabling technology for NextGen and supports the following solution sets: Trajectory Based Operations, High Density Airports, and Flexible Terminal and Airports.

The WAAS program is developing 500 LPV/Localizer Performance (LP) procedures per year enabling more low visibility access into airports. WAAS supports the redesign of airspace to establish RNAV T and Q routes. These more direct routes will increase efficiency and capacity to support the solution sets; Initiate Trajectory Based Operations, Increase Flexibility in the Terminal Environment and Increase Arrivals and Departures at High Density Airports.

In Alaska, WAAS enables users to operate under Instrument Flight Rules (IFR) on routes currently classified as uncontrolled airspace due to lack of radar coverage. WAAS enabled routes improve operator efficiency, access and safety. This expansion of services supports the solution sets of Initiate Trajectory Based Operations and Increase Flexibility in the Terminal Environment.

WAAS is currently supporting near-term demonstrations/validations of operational improvements for vertical flight aircraft, business/regional jets, and legacy air carriers that are made possible by airspace redesign and WAAS LPV approaches.

In 2013, the WAAS program will seek a final investment decision for Phase IV, Dual Frequency Operations that will extend through 2028. In 2008, the DoD notified the GPS user community through a Federal Register Notice (Vol. 73, NO. 96) that the accessibility of the L2 P(Y) signal cannot be assured beyond December 2020. The FAA intends to replace the use of L2 P(Y) by WAAS with the second civil frequency (L5). As a civilian signal, L5 can be used by civilian receivers and provides improved accuracy for civil users of GPS. Users who equip with new dual frequency (L1/L5) avionics will be able to process inputs from both GPS frequencies to internally calculate ionospheric corrections providing a more robust LPV-200 signal for dual frequency users. The expectation is that users will equip with dual frequency (L1/L5) avionics when the upgraded system is operational. For those users who do not upgrade avionics, WAAS will continue to support single frequency users during Phase IV. There will be a continuing need to acquire replacement GEOs throughout the WAAS lifecycle to ensure the current and future WAAS signal in space remains available.

The program funds the following activities:

- GEO Satellites: Satellite leases for GEO #3, GEO #4, Gap Filler GEO, as well as the development of the 5th, 6th and 7th future GEO payloads;
- Technology Refresh: Development efforts in the transition to a second civil frequency (L5), GIII receiver, safety computer, terrestrial communication system (TCS) upgrades and fielding new Safety Computers;
- NAS Implementation: Development of 500 approach procedures, additional survey costs due to modifications in survey development criteria, as well as associated flight inspections. Additionally, this includes data collection by operators, benefits analysis, and development of WAAS-specific procedures within the NAS;

- Technology Evolution: Threat model assessments, ionospheric effects analysis, safety analysis, and GNSS evolutionary architecture studies support in cooperation with DoD GPS Modernization efforts; and
- Program Management/Technical Support: Technical assistance contracts to support program management, planning, software and hardware development, software and safety assurance, finance, system performance assessment, logistics, training, test and evaluation, reliability-maintainability-availability (RMA) analysis, quality assurance (QA), human factors (HF), earned-value management (EVM), security, safety engineering, and specialty engineering.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction in the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

WAAS provides vertical and horizontal guidance enabling pilots to make stable, vertically guided approaches to all qualified runway ends in the continental United States and most of Alaska, in all meteorological conditions. The WAAS navigation signal allows pilots to fly with reduced position uncertainty regardless of location within the NAS, enhancing safety. In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an 8 fold reduction in approach accident rates (53 per million for non-precision approaches vs. 7 per million for precision approaches) when precision vs. non-precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year time period and saving over 250 lives when using WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. Currently, ILS provides precision vertically guided approaches at only 1,231 of the nation's 19,000 runway ends. WAAS is able to provide the same level of precision at over 2,941 runway ends (as of August 23, 2012).

Program Plans FY 2014 – Performance Output Goals

NAS Implementation:

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.

GEO Satellites:

- Provide funding for three WAAS geostationary satellite leases.

Technology Refresh:

- Dual Frequency Operations (DFO): Establish L5 Development Phase Test and Development Environment.
- Implement WAAS TCS Upgrades for GIII receiver.
- Complete government acceptance of Safety Computer – production version.

Program Plans FY 2015 – Performance Output Goals

NAS Implementation:

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.

GEO Satellites:

- Provide funding for three WAAS geostationary satellite leases.

Technology Refresh:

- Release 5 – DFO: Implement Processor Upgrades.
- Develop and complete GEO 5 Signal Generator Subsystem-Type (SGS-T) installation.
- Complete G-III Reference receiver fielding into WAAS.
- Complete GEO 5 Milestone 1 – GEO integration and testing.

Program Plans FY 2016 – Performance Output Goals

NAS Implementation:

- Develop and publish remaining WAAS LPV/LP approach procedures to reach goal of 5,218 procedures published by FY2016.

GEO Satellites:

- Provide funding for three WAAS geostationary satellite leases.

Technology Refresh:

- Complete Safety Computer Upgrade and integration into WAAS.
- Develop and complete GEO 6 Signal Generator Subsystem-Type (SGS-T) installation.
- Release 6 – DFO: Implement new GIII rate group structure.
- Complete GEO 6 Milestone 1 – GEO integration and testing.

Program Plans FY 2017 – Performance Output Goals

GEO Satellites:

- Provide funding for three WAAS geostationary satellite leases.

Technology Refresh:

- Release 7 – DFO: Field new Safety Computer.
- Prototype Dual Frequency Algorithms.
- Release 8 – DFO: Integrate GEO 5 into Operational WAAS.

Program Plans FY 2018 – Performance Output Goals

GEO Satellites:

- Provide funding for three WAAS geostationary satellite leases.

Technology Refresh:

- Release 9 – DFO: Integrate GEO 6 into Operational WAAS.
- Validate Dual Frequency algorithms.

B, Wide Area Augmentation System (WAAS) – Surveys, N12.01-06

Program Description

WAAS Surveys provide information about existing obstructions at an airport so that LPV approach procedures can be developed. Developing a Localizer Performance with Vertical guidance (LPV) Instrument approach procedure requires an accurate airport obstruction survey. This survey is specific to the approach and provides detailed obstacle information used to ensure safe aircraft separation from the obstructions, and it establishes minimum altitudes allowed for specific segments while flying that LPV approach. The survey information can also be used for other purposes such as development of other instrument approach procedures (Required Navigation Performance (RNP), Lateral Navigation/Vertical Navigation (LNAV/VNAV), Lateral Navigation (LNAV), as well as Localizer Performance (LP), etc.).

Survey data is essential in ensuring information about the existing obstructions surrounding an airport are fully reflected in the published approach. Historical data suggests the number of surveys required to meet procedure publication goals is larger than the number of approach procedures published due to approximately 30% of surveyed airport approaches not meeting the required obstruction separation to allow an LPV approach to be used. It is likely this percentage will be higher in future years because the airports most likely to support a LPV approach are selected first, and the remaining airports are likely to have more issues. Airport runway ends that do not qualify for an LPV procedure due to obstacles or terrain may qualify for an LP (Localizer Performance) approach procedure, which provides horizontal guidance to the pilot. LP approaches will utilize WAAS, and they will benefit the user by offering potentially lower minimums than other non-precision approaches.

Based on historical data, it is estimated that 650-700 approach surveys will be required each year to support this number of usable procedures. LPV and LP procedures developed in a current fiscal year require surveys conducted two years prior. Hence, surveys contracted in FY 2012 will be delivered in 2013 and used to support procedure development in FY 2014.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an 8 fold reduction in approach accident rates (53 per million for non-precision approaches versus 7 per million for precision approaches) when precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year period and save over 250 lives if we develop procedures that use WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. WAAS provides vertical and horizontal guidance which improves safety by enabling pilots to make stable, vertically guided approaches to all qualifying runway ends in the continental United States and most of Alaska that have a published approach procedure.

Program Plans FY 2014 – Performance Output Goals

- Develop remaining airport surveys for any newly qualified airports or any airports for which surveys were delayed due to construction, in order to complete development and publication of 5,218 WAAS LPV/LP approach procedures by FY2016.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

2D04, Runway Visual Range (RVR) & Enhanced Low Visibility Operations (ELVO) Program

FY 2014 Request $6.0M

- A, Runway Visual Range (RVR) – Replacement/Establishment, N08.02-00
- B, Enhanced Low Visibility Operations (ELVO), N08.03-01

A, Runway Visual Range (RVR) – Replacement/Establishment, N08.02-00

Program Description

The Runway Visual Range (RVR) system provides pilots and air traffic controllers with a measurement of the visibility at key points along a runway. That data is used to decide whether it is safe to take off or land during limited visibility conditions. During reduced visibility weather conditions, RVR system measurements are used by Air Traffic to establish airport operating categories; thus, properly equipped aircraft with a trained crew may continue operations under reduced visibility Category I and Category II/III conditions. The RVR decreases diversions and delays at an airport by providing an accurate measure of the runway visibility. The RVR information affects airline scheduling decisions and air traffic management decisions regarding whether flight plans should be approved for an aircraft to fly to or take off from an airport with low visibility. There are 280 airports in the NAS that have RVR systems.

The new-generation RVR and PC-based RVR are safer than the older systems because the equipment is mounted on frangible, low-impact-resistant structures that break away if hit by aircraft during take off or landing. Replacement decisions are prioritized based on the level of activity at the airport, equipment age and life-cycle issues, such as: Reliability, Availability and Maintainability. This program also provides the equipment for sites that have recently qualified for an upgrade from a Category I to a Category II/III precision approach.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

Older RVR systems are maintenance intensive, resulting in excessive downtime. This negatively affects airport capacity and reduces adjusted operational availability. The replacement or upgraded equipment requires less maintenance and repair time, which reduces system downtime, and supports the performance measure to maintain operational availability of the NAS.

Program Plans FY 2014 – Performance Output Goals
- Install RVR systems at 14 locations.

Program Plans FY 2015 – Performance Output Goals
- Install RVR systems at 10 locations.

Program Plans FY 2016 – Performance Output Goals
- Procure eight RVR systems.
- Install RVR systems at eight locations.

Program Plans FY 2017 – Performance Output Goals
- Procure eight RVR systems.
- Install RVR systems at eight locations.

Program Plans FY 2018 – Performance Output Goals
- Procure eight RVR systems.
- Install RVR systems at eight locations.

B, Enhanced Low Visibility Operations (ELVO), N08.03-01

Program Description

The Enhanced Low Visibility Operations (ELVO) Program provides the equipment and procedures to reduce the minimum visibility requirements for landing and takeoff during periods of low visibility operations at selected airports. With ELVO, aircraft operators may conduct reduced visibility approach and landing operations with properly equipped avionics, procedures and training. An ELVO will allow RVR minima for Category (CAT) I landing to be reduced from 2400 feet to 1800 feet visibility. A new ELVO for Special Authorization (SA) CAT I further reduces RVR minima to 1400 feet along with a reduced decision height from 200 feet to 150 feet. Finally a new ELVO for SA CAT II allows operations at a runway with a lower standard approach lighting system, this does not change RVR minima from 1200 feet visibility and 100 feet decision height. This program also allows lower takeoff minima to be reduced from 1600 feet to as low as 500 ft visibility. This is important because early morning operations at many airports are mostly takeoffs when fog may be present.

To implement ELVO, an airport runway will need to have the appropriate RVR and ground navigation/lighting equipment. This program will provide procedure development and the ground equipment as necessary (such as additional RVR and ILS upgrades). Using ELVO also requires specified avionics onboard the aircraft. A summary of the avionics required for each of the enhanced operations are identified in the table below.

Enhanced Low Visibility Operations (ELVO) – Lower RVR Minimums			
Flight Operation	**Minimums**	**Decision Height (DH) / Decision Altitude (DA)**	**Required Avionics**
CAT I	1800 RVR	200 ft DA	Flight Director; or Head-Up Display (HUD); or Autopilot
Special Authorization (SA) CAT I	1400 RVR	150 ft DH	HUD
SA CAT II	1200 RVR	100 ft DH	Autoland (AL) or HUD

Examples of operational benefits realized from ELVO implementations:

- Portland International Airport (PDX) avoided diversion of 58 arrivals with ~3,700 passengers on Christmas Eve, 2009 using SA CAT I;
- Operations continued at Boston Logan International when the primary runway was out of service and SA CAT II was implemented on the cross wind runway. This resulted in an estimated $5.7M in avoided delay costs while the primary runway was out of service. A recurring annual benefit of $530,000 is expected by providing an alternative runway when winds and visibility are unfavorable; and
- San Francisco has experienced a 22-25% increase in throughput through implementation of lower take off minima.

The program is baselined to provide ELVO capabilities at a minimum of 15 sites. Airports have been identified which are in need of ELVO and where a mix of installed ground equipment combined with aircraft equipage affords the optimal cost-benefit. From this suite of potential sites, the program schedule and key milestones will be updated annually.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

Enhanced low visibility operations support the capacity metric by enabling an:

- Increased number of arrivals and/or departures during Instrument Meteorological Conditions (IMC);
- Decreased number of flight delays, cancellations, and/or diversions that occur during IMC conditions;
- Ability for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan);
- Airports needing CAT II level of service can be provided SA CAT II more cost effectively and rapidly deployed than Standard CAT II; and
- Airports that have only one CAT II/III runway can cost effectively add SA CAT II capability on an additional runway providing back up service.

Program Plans FY 2014 – Performance Output Goals

- Initiate new low visibility capability actions at a minimum of 2 locations.
- Attain 2 additional low visibility service capabilities for the NAS.

Program Plans FY 2015 – Performance Output Goals

- Initiate new low visibility capability actions at a minimum of 2 locations.
- Attain 2 additional low visibility service capabilities for the NAS.

Program Plans FY 2016 – Performance Output Goals

- Initiate new low visibility capability actions at a minimum of 2 locations.
- Attain SA CAT II Service Availability at White Plains, NY, and Islip, NY, in the New York/New Jersey (NY/NJ) region. (APB Milestone)
- Attain SA CAT II Service Availability at San Jose. (APB milestone)
- Attain 3 additional low visibility service capabilities for the NAS.

Program Plans FY 2017 – Performance Output Goals

- Initiate new low visibility capability actions at a minimum of 2 locations.
- Attain 3 additional low visibility service capabilities for the NAS.

Program Plans FY 2018 – Performance Output Goals

- None.

2D05, Approach Lighting System Improvement Program (ALSIP)

FY 2014 Request $3.0M

Visual Navaids – ALSIP Continuation, N04.03-00

Program Description

The Approach Lighting System Improvement Program (ALSIP) improves approach lighting systems built before 1975. It upgrades the equipment to current standards and reduces the potential severity of take-off and landing accidents by replacing rigid structures with lightweight and low-impact resistant structures that collapse or break apart upon impact. The entire approach lighting system is replaced when existing non-frangible structures are replaced. The High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) provides visual information on whether the pilot is aligned with the runway centerline, the aircraft's height above the runway plane, roll guidance, and horizontal reference for Category II and III Precision Approaches. The Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) provides the pilot with visual information on whether the aircraft is aligned with the runway, height perception with reference to the glideslope, roll guidance, and horizontal references for Category I Precision Approaches.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

The ALSIP replaces rigid approach lighting structures with lightweight and low-impact resistant structures that collapse or break apart upon impact. This reduces damage to aircraft that inadvertently descend below the minimum recommended altitudes and risk striking these structures during departure or landing. Reducing the impact and damage aircraft sustain when striking these lightweight and low-impact resistant structures diminishes the probability of fatal accidents if these structures are hit.

Program Plans FY 2014 – Performance Output Goals

- Procure eight Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at two locations.

Program Plans FY 2015 – Performance Output Goals

- Procure four Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.
- Replace the High Intensity Approach Lighting System with Sequenced Flashing Lights at one location.

Program Plans FY 2016 – Performance Output Goals

- Procure four Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.

Program Plans FY 2017 – Performance Output Goals

- Procure four Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.

Program Plans FY 2018 – Performance Output Goals

- Procure four Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.

2D06, DISTANCE MEASURING EQUIPMENT (DME)

FY 2014 Request $4.0M

Sustain Distance Measuring Equipment (DME), N09.00-00

Program Description

DME is a radio navigation aid that is used by pilots to determine the aircraft's slant distance from the DME location. The program is procuring state-of-the-art DME systems to support requirements for Commercial Aviation Safety Team (CAST), renovation of DMEs that have exceeded their 20 year service life expectancy, replacement of ILS markers, critical new DME requirements, and RNP requirements.

To support the Commercial Aviation Safety Team (CAST) recommendations, the DME program is procuring and installing DME systems at 90 recommended sites. These systems will support the reduction of controlled-flight-into-terrain (CFIT) accidents at the most vulnerable locations in the NAS. There are 451 identified CAST DME sites. However, the FAA recommends installing DME at 177 locations; as of 2012 91 DMEs have been installed. This number would cover 80 percent of all operations. For safety reasons, the industry wants to discontinue using step-down or "dive-and-drive" non-precision approach procedures, in which the pilot descends to the minimum allowable altitude to try to see the runway. Using DME minimizes the need for these types of approaches because the continuous ranging information from a DME allows procedure designers more flexibility in terms of where step down fixes are placed and how many are needed, leading to better specification/control over the vertical descent profile thus reducing CFIT risks.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Maintain an average daily airport capacity for the Core Airports of 86,835 arrivals and departures through 2016.*

Relationship to Performance Metric

The state-of-the-art DME can provide distance information to more than 250 interrogators simultaneously, compared to less than 100 interrogators for the existing DME systems, thus increasing the number of aircraft that can simultaneously interrogate a single DME. Reliability of the state-of-the-art DME is 300% greater than that of the existing DME systems. Implementation of both these factors has a positive impact on daily airport capacity.

The DME meets all users' operational needs, while increasing capacity, efficiency, and predictability, and while enhancing safety, mitigating environmental impacts, and operating in a seamless global environment by:

- Increasing capacity by 150%
- Improving reliability by 300%
- Increasing availability
- Reducing maintenance cost
- Eliminating the need for step-down non-precision approach procedures
- Reducing the need for off-airport facilities
- Providing a world-wide standard for navigation equipage

Program Plans FY 2014 – Performance Output Goals

- Procure 35 DME systems.
- Attain service availability 35 DME locations.

Program Plans FY 2015 – Performance Output Goals

- Procure 25 DME systems.
- Attain service availability 25 DME locations.

Program Plans FY 2016 – Performance Output Goals

- Procure 25 DME systems.
- Attain service availability 25 DME locations.

Program Plans FY 2017 – Performance Output Goals

- Procure 25 DME systems.
- Attain service availability 25 DME locations.

Program Plans FY 2018 – Performance Output Goals

- Procure 25 DME systems.
- Attain service availability 25 DME locations.

2D07, VISUAL NAVAIDS - ESTABLISH/EXPAND

FY 2014 Request $2.5M

Visual Navaids – Visual Navaids for New Qualifiers, N04.01-00

Program Description

This program supports the procurement, installation, and commissioning of Precision Approach Path Indicator (PAPI) systems and Runway End Identification Light (REIL) systems. A PAPI provides visual approach glide slope information to pilots and enables them to make a stabilized descent with a safe margin of approach clearance over obstructions. The PAPI consists of four lamp housing assemblies arranged perpendicular to the edge of the runway. The PAPI projects a pattern of red and white lights along the desired glide slope so a pilot can tell whether they are on the glide slope and how to correct their rate of descent if they are above or below it. A REIL is a visual aid that provides the pilot with a rapid and positive identification of the approach end of a runway. The REIL system consists of two simultaneously flashing white lights, one on each side of the runway landing threshold.

The implementation of PAPI systems satisfies Commercial Aviation Safety Team (CAST) recommendations and air carrier requirements for Land and Hold Short Operations (LAHSO).

- The FAA plans to implement the 170 highest priority CAST PAPI installations. This number would cover 80% of commercial airline operations. (Thirty four of those 170 remain to be done.)
- LAHSO is an air traffic control tool used to increase airport capacity by allowing simultaneous approaches on intersecting runways. Vertical guidance is required for air carrier operations on the hold short runway. This is satisfied with a visual glide slope indicator (PAPI or existing VASI).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

Installing PAPI lights at both CAST and non-CAST locations enhances system safety by reducing the probability of a Controlled Flight into Terrain accident during approach and landing. Installing the REIL system reduces accidents because the system clearly identifies the runway end to the pilot, especially in the presence of multiple lights in the runway environment.

Program Plans FY 2014 – Performance Output Goals

- Install CAST PAPI systems at 17 locations.

Program Plans FY 2015 – Performance Output Goals

- Install CAST PAPI systems at 17 locations.

Program Plans FY 2016 – Performance Output Goals

- Procure seven PAPI systems.
- Install CAST PAPI systems at seven locations.

Program Plans FY 2017 – Performance Output Goals

- Procure seven PAPI systems.
- Install CAST PAPI systems at seven locations.

Program Plans FY 2018 – Performance Output Goals

- Procure seven PAPI systems.
- Install CAST PAPI systems at seven locations.

2D08, INSTRUMENT FLIGHT PROCEDURES AUTOMATION (IFPA)
FY 2014 Request $4.5M

Instrument Flight Procedures Automation (IFPA) – Technology Refresh, Segment 1, A14.02-02 / X, Instrument Flight Procedures Automation (IFPA) – Technology Refresh, Segment 2, A14.02-03

Program Description

IFPA is a suite of Information Technology tools, consisting of the Instrument Procedure Development System (IPDS), Instrument Flight Procedures (IFP) database, Airports and Navigations Aids database (AirNav), Obstacle Evaluation (OE) system, and the Automated Process Tracking System (APTS). These tools are used to develop and publish new and revised instrument flight procedures.

FAA's Aeronautical Products directorate maintains more than 21,000 instrument flight procedures in use at over 4,000 paved airport runways. These procedures are printed in booklets and used by pilots to determine the safe altitudes, appropriate headings and other information to successfully fly precision and non-precision approaches and departures into and out of airports. As additional runways are equipped to handle instrument operations, new and revised instrument flight procedures must be developed and published. In addition, new approach and departure procedures are being developed to take advantage of Required Navigation Performance (RNP) capabilities and GPS assisted approaches. These procedures can reduce the distance flown before landing or after takeoff.

The existing Instrument Approach Procedures Automation (IAPA) system, which provides the basis for instrument flight procedure development and maintenance, does not meet all of today's functional or integration requirements. The current IAPA system is barely able to support the existing inventory of 21,000 instrument flight procedures. A modern integrated system is being installed to accommodate the expected growth of the NAS. IAPA is being replaced to increase functional capabilities, and increase the organization's ability to meet current and expected future demand for instrument flight procedures within the NAS. The new Instrument Flight Procedures Automation (IFPA) system will be more efficient and comprehensive in supporting instrument flight procedures development. It will include functionality for developing approaches, missed approaches, circling approaches, airways and departures. In addition, IFPA will contain an integrated obstacle evaluation application, replacing a mostly manual process. Along with development of the new IFPA tools, integration of systems will be accomplished between the Aeronautical Products organization and the Flight Inspections Services organizations, eliminating manual effort and duplication of data. Transition to IFPA will be completed by July 2013.

A technology refresh of the equipment and software will be accomplished in 2 segments.

<u>IFPA – Technology Refresh, Segment 1 (A14.02-02):</u>
In November 2010, the IFPA Technology Refresh Segment 1 cost and schedule baseline was approved by the Joint Resources Council (JRC). Beginning in FY 2012, the legacy APTS workflow software will be upgraded with Business Process Management (BPM) Commercial-Off-The-Shelf (COTS) software. The APTS system will be upgraded in 3 phases. Phase 1 will complete replacement of the core workflow processes which flow and meter new IFP development requests, IFP amendments, IFP NOTAMs, and IFP Obstacle Evaluations (OE's). Phase 2 will provide new workflow processes associated with IPDS enhancements and military workflow requirements. Phase 3 will provide a new management productivity suite of tools. Beginning in FY 2013, the IPDS software tool will be upgraded for COTS architecture changes, including conversion for the Windows-7 operating system. Computer servers used to host the IFPA tool suite will be due for Technology Refresh.

<u>IFPA – Technology Refresh, Segment 2 (A14.02-03):</u>
A study will begin in early FY15 to determine the type of computer equipment and associated software tools that will be included in the IFPA Technology Refresh Segment 2 effort and to develop a schedule with milestones for that segment.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The IFPA system ensures continued progress toward increasing instrument flight procedures development and maintenance productivity. Productivity gains of 32% were achieved by FY 2011. It has and continues to improve the quality of products through process re-engineering and elimination of manual processes. IFPA provides the ability to produce 350+ Performance Based Navigation (PBN) IFP's annually, 3,000+ IFP amendments annually, perform 60,000+ obstacle evaluations annually, and maintain a 1% production error rate, while maintaining ISO-9000 compliance.

Program Plans FY 2014 – Performance Output Goals

IFPA – Technology Refresh, Segment 1 (A14.02-02):

- Complete APTS upgrades with COTS BPM Workflow Software Replacement Phase 1.
- Complete IFPA COTS Server replacement (7 servers).
- Complete IPDS COTS Hardware Technology Refresh (340 high-end personal computers).
- Complete IPDS COTS Software Technology Refresh – Phase 1.

IFPA – Technology Refresh, Segment 2 (A14.02-03):

- None.

Program Plans FY 2015 – Performance Output Goals

IFPA – Technology Refresh, Segment 1 (A14.02-02):

- Complete APTS upgrades with COTS BPM Workflow Software Replacement Phase 2.

IFPA – Technology Refresh, Segment 2 (A14.02-03):

- None.

Program Plans FY 2016 – Performance Output Goals

IFPA – Technology Refresh, Segment 1 (A14.02-02):

- Complete APTS upgrades with COTS BPM Workflow Software Replacement Phase 3.
- Complete IPDS COTS Software Technology Refresh – Phase 2.

IFPA – Technology Refresh, Segment 2 (A14.02-03):

- None.

Program Plans FY 2017 – Performance Output Goals

IFPA – Technology Refresh, Segment 1 (A14.02-02):

- None.

IFPA – Technology Refresh, Segment 2 (A14.02-03):

- Milestones will be determined after Technology Refresh Segment 2 Investment Analysis and finalized in the Approved Program Baseline (APB) at Final Investment Decision (FID).

Program Plans FY 2018 – Performance Output Goals

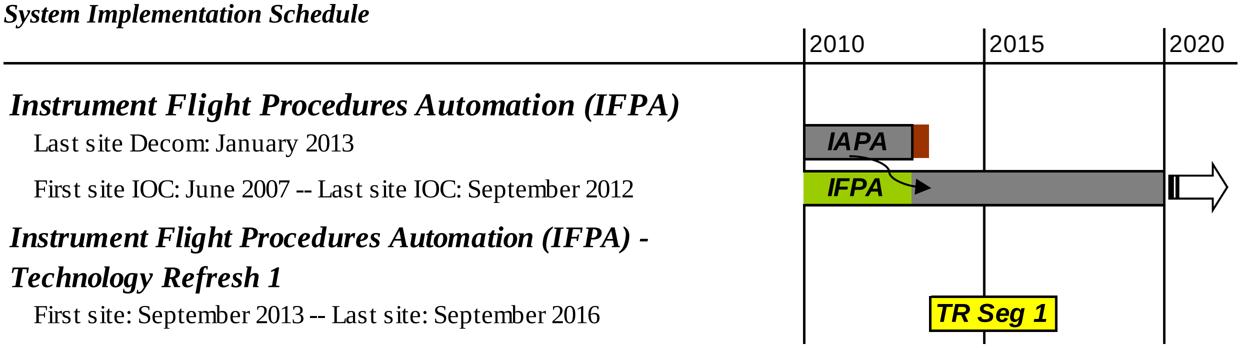
IFPA – Technology Refresh, Segment 1 (A14.02-02):

- None.

IFPA – Technology Refresh, Segment 2 (A14.02-03):

- Deliver software and/or hardware technology refresh according to approved Segment 2 Approved Program Baseline (APB) milestones.

System Implementation Schedule



2D09, NAVIGATION AND LANDING AIDS – SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2014 Request $3.0M

Navaids – Sustain, Replace, Relocate, N04.04-00

Program Description

This program renovates or replaces airport approach lighting systems at sites where there is a high risk for failure of these systems and where failure would result in denying use of the primary precision approach. The approach lighting systems include:

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) for Category I approaches,
- High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) for Category II/III approaches, and
- Runway End Identifier Lights (REIL).

This program also replaces or renovates Instrument Landing Systems (ILS) at non-Core Airports which are more likely to have the older systems and the least redundancy. ILS components include electronic devices such as localizers, glide slopes and marker beacons. In some cases ILS's (Mark 1F) removed from Core Airports are reinstalled at lower activity airports to replace existing Mark 1D and Mark 1E ILS.

This program includes various other efforts that are related to the replacement of supporting structures and other components of navigation equipment, such as: replace guide wires that support a light station, replace cable between light stations, replace aluminum light towers, replace DME antenna pedestal, convert antenna arrays, re-cable localizer antenna, equipment relocate, replace glideslope wooden tower, replace localizer antenna platform, repair pier with navigation or lighting equipment, undertake new technology initiatives, and provide engineering and technical services support.

Service life extension for some ALSF-2 (CAT II/III systems) is accomplished by replacing the constant current regulators, installing an improved monitoring system and replacing electrical cables at some locations. These changes have successfully increased the system's adjusted operational availability from 98.4 to 98.7.

This program supports product improvements, modifications, and technology upgrades to visual lighting system components. Ongoing efforts include:

- Improve approach lighting system semi-flush fixtures.
- Replace existing MALSR green threshold and white steady burning lights with LED lights.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The older electronic guidance systems and lighting systems are maintenance intensive, resulting in excessive downtime, which negatively impacts airport capacity. The replacement or upgraded equipment will require less maintenance and repair time, which reduces system downtime and contributes to maintaining operational availability of the NAS.

Program Plans FY 2014 – Performance Output Goals
- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

Program Plans FY 2015 – Performance Output Goals
- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

Program Plans FY 2016 – Performance Output Goals
- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

Program Plans FY 2017 – Performance Output Goals
- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

Program Plans FY 2018 – Performance Output Goals
- Install ILS at approximately two Non-Core Airport locations.
- Initiate replacement MALSRs projects at approximately 2 locations.
- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

2D10, VASI Replacement – Replace with Precision Approach Path Indicator

FY 2014 Request $2.5M

Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI), N04.02-00

Program Description

The International Civil Aviation Organization (ICAO) has recommended that all International airports replace the Visual Approach Slope Indicator (VASI) lights with Precision Approach Path Indicators (PAPI) lights. This standardizes the equipment used to allow pilots to determine visually that they are on the proper glideslope for landing. The program supports the procurement, installation, and commissioning of PAPI systems in order to comply with this ICAO recommendation.

The VASI and PAPI systems have a set of lights that are arranged so that the pilot sees all red lights when the aircraft is below the glideslope and all white lights when the aircraft is above the glideslope. This visual reference helps the pilot maintain the appropriate descent rate to the runway.

At the inception of this program, there were approximately 1,387 older (pre-1970’s) VASIs at international and other validated locations requiring replacement. There are now 877 VASI systems remaining in the NAS. The first priority of the program is to replace VASI systems at approximately 329 ICAO runway ends. This will be completed in fiscal year 2018 when all of the remaining systems have been replaced. The replacement of the remaining VASI systems at non-ICAO airports in the NAS will be completed in fiscal year 2051.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

Air traffic controllers use certain procedures such as Land and Hold Short Operations (LAHSO) to increase airport capacity and prevent aircraft delays. Replacing VASI with PAPI improves on-time performance by increasing the availability of the visual approach slope guidance systems used to help pilots touch down at the appropriate location on the runway.

Program Plans FY 2014 – Performance Output Goals
- Procure nine Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at nine locations.

Program Plans FY 2015 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2016 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2017 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2018 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

2D11, GLOBAL POSITIONING SYSTEM (GPS) CIVIL REQUIREMENTS
FY 2014 Request $20.0M

GPS Civil Requirements, N12.03-01

Program Description

GPS Civil Requirements Program provides system design and development for a network of GPS monitoring stations and processing facilities in order to monitor quality of the GPS signal for civil users. The Global Positioning System (GPS) is a satellite-based system that provides position, navigation, and timing (PNT) service for use by the U.S. government and world-wide users with no direct user charges. GPS provides two PNT services; the Precise Positioning Service (PPS), using the dual L1-C/A (L band signal - Coarse Acquisition) and L2 signals, and the Standard Positioning Service (SPS), using the single L1-C/A signal. Only the SPS is available for worldwide use by the civil community. Currently, GPS consists of second generation satellites (GPS-II) and the

Operational Control Segment (OCS). The GPS program is entering into a period of transition from GPS-II to the third generation (GPS-III) and the modernized operational control segment (OCX).

The National Space-based PNT policy (NSPD-39) requires civil agencies to fund new and unique civil GPS capabilities beyond the civil signals already contained in the current GPS, which includes the L1C signal and civil signal monitoring. DOT is serving as the lead civil agency. FAA will include the funding to implement L1C and civil signal monitoring in its budget request for FY2009-2015 and will provide technical oversight and National Coordination Office (NCO) support costs to serve as DOT's implementing agency for the civil funded capabilities.

Implementation of the L1C signal requires system design and development activities that will be performed by the GPS-III and OCX prime contractors, managed by the U.S. Air Force GPS Wing. The GPS Signal Monitoring system will consist of a worldwide network of 18-21 GPS monitor stations connected to two processing facilities. The monitor stations must be installed at geographically dispersed locations worldwide such that every GPS satellite can be continuously monitored from at least two stations. The monitor stations will collect real-time measurements of the GPS signals (L1C, L1-C/A, L2C, and L5) and forward this information to the processing facilities where a suite of software algorithms will monitor the accuracy, integrity, continuity, and availability performance to verify that modernized GPS system is performing properly.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice*
- *FAA Outcome 1 FAA has the right people with the right skills in the right position at the right time to achieve our goals*
- *FAA Performance Metric 1 Achieve a 90% success rate in the areas of financial management and human resources management: Receive annual Unqualified Audits with no material weaknesses; Maintain the competitive status of all FAA employees within the federal personnel system; Improve the "effective leadership" index score on the OPM Employee Viewpoint survey by 8 percent; Improve the "talent management" index score on the OPM Employee viewpoint survey by 8 percent.*

Relationship to Performance Metric

This project has been directed by the Department of Transportation (DOT) per a 2008 DoD/DOT Memorandum of Agreement on Civil Use of GPS to fulfill responsibilities to fund civil unique capabilities (L1C and Civil Signal Monitoring) under the National PNT Policy NSPD-39, December 2004.

Program Plans FY 2014 – Performance Output Goals

- Provide funding to the Air Force GPS Directorate to implement 1) Civil Signal Monitoring, 2) L1C signal and 3) Civil Studies
- Provide funding for GPS program oversight and technical support.

Program Plans FY 2015 – Performance Output Goals

- Provide funding to the Air Force GPS Directorate to implement 1) Civil Signal Monitoring, 2) L1C signal and 3) Civil Studies
- Provide funding for GPS program oversight and technical support.

Program Plans FY 2016-2018 – Performance Output Goals

- None.

2D12, RUNWAY SAFETY AREAS – NAVIGATION MITIGATION

FY 2014 Request $38.0M

Runway Safety Area – Navigation Mitigation, N17.01-01

Program Description

The FAA's runway safety program improves the overall safety of the Runways and Runway Safety Areas (RSA). The RSA must be free of all objects that are 3 inches above grade and are not frangible. The relocation or removal of existing rigid objects will decrease the potential for damage to aircraft and minimize injuries or fatalities to aircraft passengers and crew members if an aircraft has to use the RSA.

The 2006 DOT Appropriations (PL-109-115) required Part 139 certificated airports to comply with the current RSA airport design standards prior to December 31, 2015. In accordance with PL-109-115, the FAA must report on the agency's progress toward RSA improvements.

The FAA has identified 1,266 RSA projects of varying size and complexity that need to be addressed at various airport locations. These projects would replace non-compliant FAA-owned equipment in the RSAs. FAA will use a phased approached to continue the implementation of RSA projects. Initial funding for projects will be provided each fiscal year, while completion funding will typically be provided the following fiscal year.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

RSA compliance provides a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs. This initiative will address FAA-owned equipment that do not conform to the current RSA standards and modify them to ensure their compliance with Part 139 in Title 14 of the US CFR.

FAA-owned equipment that are not moved or made frangible can pose a considerable safety risk to aircraft and passengers when struck during an overrun. For example, in June 1975 a Boeing 727 crashed into several non-frangible approach lighting systems (ALS) towers while attempting to land at John F. Kennedy Airport in New York. Of the 124 persons aboard, 113 died of injuries received in the crash.

Program Plans FY 2014 – Performance Output Goals

- Complete 82 F&E-funded RSA improvements.
- Provide funding and procure 21 systems for RSA improvements.

Program Plans FY 2015 – Performance Output Goals

- Complete 82 F&E-funded RSA improvements.
- Provide funding and procure 20 systems for RSA improvements.

Program Plans FY 2016 – Performance Output Goals

- Complete 82 F&E-funded RSA improvements.

Program Plans FY 2017 – Performance Output Goals

- Complete 82 F&E-funded RSA improvements.

Program Plans FY 2018 – Performance Output Goals

- Complete 29 F&E-funded RSA improvements.

E: Other ATC Facilities Programs

2E01, FUEL STORAGE TANK REPLACEMENT AND MONITORING

FY 2014 Request $8.7M

Fuel Storage Tank Replacement and Monitoring, F13.01-00

Program Description

The FAA Fuel Storage Tank (FST) Replacement and Monitoring program designs, replaces, and sustains bulk liquid and pressure vessel storage systems that support FAA operations across the NAS. The FST systems include the storage tank (both above ground and underground tanks containing a variety of liquids: gasoline, diesel, propane, oils, glycol, etc.); the flow control devices (pipe, hoses, pumps, valves, etc.); electronic leak detection and inventory control devices (fuel monitoring systems); and electronic/electrical system operation devices (control boards, technician operations stations, switched relays, etc.). The FST Program active inventory includes over 3,400 systems and historical data is retained on over 1,700 previously closed/removed systems.

The majority of FAA storage tanks support electrical generator operations. Standby generators provide NAS facilities with an alternative power supply during periods of commercial power company outages. Prime generators provide the sole source for electrical power for NAS operations. A loss of integrity on any FST component will affect the operation of the generator systems and may ultimately result in a total facility failure.

Storage tanks have historically contained substances that, if accidentally released, could cause an adverse environmental impact or result in personal injury. In response to the risk of accidental release, the federal government, the various state legislatures, county governments and city jurisdictions have passed statutes specifying the minimum requirements for the construction, installation, removal, and operations of storage tank systems. Additional regulations have been established by state, local and international building codes, fire protection codes, airport operating authority requirements, and Occupational Safety and Health Administration (OSHA) mandates. Failure to comply with all elements of these regulatory requirements exposes FAA to the risk of fines and other penalties including loss of the right to use or refill the systems.

Implementation costs are amortized against a 20 year system service lifecycle. An average of 170 FST system replacements is required annually to sustain NAS operational integrity. System components have differing lifecycles so component sustainment requirements continue during full system replacement lifecycles. Additionally, changes in the regulatory environment require immediate response to assure fielded units meet current standards.

Current major initiatives for the FST Program include system upgrades at the Air Route Traffic Control Centers (ARTCC) and prime generator facilities. These systems have been redesigned to provide enhanced technician control, increase redundant capacity and comply with current regulations.

The FST Program uses a prioritization scheme to develop field implementation schedules once funding allocations have been established.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The FST Replacement and Monitoring program reduces the potential for delays by ensuring the proper functioning of navigation aids, automation systems and other air traffic control systems. Fuel system component replacements are prioritized based on a successful ranking application which evaluates the system's critical operation requirements to assure operational availability is sustained. Fuel systems are electronically monitored to assure system integrity and to minimize adverse impacts to personal and environmental safety.

Program Plans FY 2014 – Performance Output Goals

- Implement ARTCC fuel system upgrade at two sites; Seattle Center (ZSE) and Minneapolis Center (ZMP).
- Implement Prime Power fuel system upgrade at two sites; Chandalar, AK (CQR) and Lynn's Inters Glacier, AK (JDL).
- Implement fuel system replacements at 16 General National Airspace System (GNAS) facilities focusing on coastal and island locations subject to salt water deterioration.

Program Plans FY 2015 – Performance Output Goals

- Implement ARTCC fuel system upgrade at two sites; Denver Center (ZDV) and Salt Lake Center (ZLC).
- Implement Prime Power fuel system upgrade at one site; Summit, AK (UMM).
- Implement fuel system replacements at four core ATCT facilities.

Program Plans FY 2016 – Performance Output Goals

- Implement ARTCC fuel system upgrade at two sites; Oakland Center (ZOA) and Jacksonville Center (ZJX).
- Implement TRACON fuel system modernization at eight sites; Honolulu Combined Facility (HCF), Potomac TRACON (PCT), Atlanta TRACON (A80), Merrimack TRACON (A90), Florence TRACON (FLO), Miami TRACON (MIAZ), Huntsville TRACON (HSVZ) and Westbury NY (QHM).
- Implement fuel system replacements at eight ARSR facilities to be prioritized based on field reporting.
- Implement fuel system replacements at six CORE ATCT facilities to be determined by prioritization scheme.
- Implement fuel system replacements at six CORE ASR facilities to be determined by prioritization scheme.
- Implement fuel system replacements at four GNAS facilities to be determined by prioritization scheme.

Program Plans FY 2017 – Performance Output Goals

- Implement TRACON fuel system upgrades at 10 sites; Elgin Il (ELG), Orlando FL (F11), Falmouth MA (FMH), Pensacola FL (P31), Belleview NE (R90), Houston TX (I90), Weldon Springs MO (T75), Boise ID (BOIZ), Longview TX (GGGZ) and Sioux City IA (SUXZ).
- Implement fuel system replacements at 12 ARSR facilities to be prioritized based on field reporting.
- Implement fuel system replacements at 10 CORE ATCT facilities to be determined by prioritization scheme.
- Implement fuel system replacements at 10 CORE ASR facilities to be determined by prioritization scheme.
- Implement fuel system replacements at 20 CORE supporting GNAS facilities to be determined by prioritization scheme.

Program Plans FY 2018 – Performance Output Goals

- Implement TRACON fuel system upgrades at six sites; Edwards AFB CA (EDW), Sacramento CA (NCT), Portland OR (PDX), San-Diego CA (SCT), Seattle WA (SEA) and Anchorage AK (ANCZ).
- Implement fuel system replacements at 12 ARSR facilities to be prioritized based on field reporting.
- Implement fuel system replacements at seven CORE ATCT facilities to be determined by prioritization scheme.
- Implement fuel system replacements at seven CORE ASR facilities to be determined by prioritization scheme.

- Implement fuel system replacements at 14 CORE supporting GNAS facilities to be determined by prioritization scheme.
- Implement fuel system replacements at 44 GNAS facilities to be determined by prioritization scheme.

2E02, UNSTAFFED INFRASTRUCTURE SUSTAINMENT
FY 2014 Request $33.0M

FAA Buildings and Equipment Sustain Support – Unstaffed Infrastructure Sustainment, F12.00-00

Program Description

The Unstaffed Infrastructure Sustainment (UIS) Program modernizes NAS structures and supporting electrical, plumbing and heating/air conditioning equipment to ensure reliable delivery of Air Traffic Control services. There are approximately 28,000 unstaffed facilities within the NAS. The UIS Program is requesting an Acquisition Program Baseline. The Investment Analysis Readiness Decision (IARD) was achieved September 2012. Final Investment Decision (FID) is scheduled for June 2013.

This program includes major replacement and/or upgrading of real property and structures which do not have staff permanently assigned to them. Examples of projects are:

- Major property upgrades including: access roads, grounds, security fencing, storm water controls, parking lots, helicopter landing pads, marine structures (such as docks), security gates, lighting, and walkways;
- Replacement or modernization of FAA infrastructure including: buildings, shelters, roofs, sheds, fuel tanks (heating only), plumbing, heating, ventilating and air conditioning (HVAC) equipment, alarms, and lighting. NAS communication, surveillance, navigation and weather services equipment is currently housed in these unstaffed facilities. The anticipated service life for most of this infrastructure is 25 years, and according to the Facility Service and Equipment Profile (FSEP) database, over 50 percent (50%) of the FAA's current unstaffed infrastructure will exceed its service life within the next five years. The FAA infrastructure portfolio has the added complication that several facilities are located at remote sites, which require more frequent renovation and because of their location need unique logistical solutions;
- Replacement or renovation of NAS supporting structures for antennas and other communications, surveillance, navigation and weather equipment;
- Life Safety: addressing significant and unacceptable occupational safety and health risks (i.e., electrical hazards, fall protection, and physical hazards associated with deteriorated infrastructure) which have been identified at over 50 FAA facilities. These hazards place the safety of FAA employees conducting maintenance at these facilities at risk and can result in NAS disruptions.

Initial portfolio analysis has revealed that many unstaffed facilities:

- Are not compliant with applicable FAA regulations and standards.
- Cannot protect vital air traffic control systems or equipment against premature failure due to environmental impacts (e.g., temperature, excessive corrosion, other).
- While operable, have a fair to poor overall facility condition index (FCI) (Good Condition is 1.0 – 0.95, Fair Condition is 0.95 – 0.90, Poor Condition is below 0.90).
- Have impaired or poor facility accessibility.
- Have structures supporting air-ground communications and navigation and landing aids that have been weakened due to environmental factors (e.g., broadcast towers).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The FAA Unstaffed Infrastructure Sustainment Program supports the FAA's strategic goal of Delivering Aviation Access through Innovation by providing renovation or replacement of existing FAA-owned unstaffed facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance, navigation, communication, and weather equipment. In addition the infrastructure protects the electronic equipment from weather hazards, radio interference, and unauthorized entry. Failure of the infrastructure will result in NAS equipment failures directly reducing capacity of the NAS. A few of the many examples of infrastructure failures that resulted in direct impacts to the NAS include: a roof leak taking the Idaho Falls (IDA) VOR off line for 7 hours and 15 minutes; roof leaks at the Andrews (ADW) VOR causing 280 hours in outages; and Pawnee City (PWE) VOR being off-line for 369 days due to failure of the roof.

Program Plans FY 2014 – Performance Output Goals
- Complete 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2014, Establish FY 2015 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with the Environmental and Occupational Safety and Health (EOSH) Service to ensure compliance requirements are addressed.

Program Plans FY 2015 – Performance Output Goals
- Complete 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2015, establish FY 2016 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service to ensure compliance requirements are addressed.

Program Plans FY 2016 – Performance Output Goals
- Complete 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2016, establish FY 2017 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service to ensure compliance requirements are addressed.

Program Plans FY 2017 – Performance Output Goals
- Complete 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2017, establish FY 2018 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service to ensure compliance requirements are addressed.

Program Plans FY 2018 – Performance Output Goals
- Complete 150 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2018, establish FY 2019 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service to ensure compliance requirements are addressed.

2E03, AIRCRAFT RELATED EQUIPMENT PROGRAM

FY 2014 Request $10.4M

- A, Aircraft Related Equipment (ARE) Program, M12.00-00
- B, Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technology Refresh, M12.01-03 / X, Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Additional Technology Refresh Projects, M12.01-04

A, Aircraft Related Equipment (ARE) Program, M12.00-00

Program Description

The Aircraft Related Equipment program provides equipment and upgrades to FAA's flight inspection (FI) aircraft in order to meet inspection requirements for new and existing navigation and surveillance systems. The FAA's worldwide FI mission is to evaluate and certify instrument flight procedures and to evaluate and certify both ground-based and space based navigational equipment including facilities for Federal, State, Department of Defense (DoD), private and international customers. This mission requires aircraft equipped with specialized test equipment (Automatic Flight Inspection System (AFIS) and NextGen Automatic Flight Inspection system (NAFIS)). The Aircraft Related Equipment (ARE) program updates the FAA's FI aircraft fleet with systems required for inspecting, certifying, modernizing and sustaining the NAS and evolving NextGen requirements. These aircraft must not only be able to perform flight inspection but also be equipped with modern avionics necessary to operate in the evolving NAS environment.

The FI aircraft fleet is composed of 32 specially equipped aircraft. This program provides the technical equipment upgrades and/or replacements to existing aircraft, avionics, and FI mission equipment to meet current and future performance requirements. It also provides a communication system for data gathered while airborne and the Flight Operations Management System (FOMS) used to schedule and manage the inspection process and the navigation facility data upgrades needed for the inspection systems.

The new equipment provides the capability for flight validation & inspection of:

- WAAS/LPV/LP approaches.
- Required Navigation performance (RNP)/ Special Aircraft and Aircrew Authorization Required (SAAR).
- Area Navigation (RNAV) Standard Instrument departures (SIDs)/ Standard Terminal Approach Routes (STARs).
- Distance Measuring Equipment (DME)/DME and GPS routes.
- Automatic Dependent Surveillance – Broadcast (ADS-B).
- Wide Area Multi-lateration (WAM).
- GLS - GPS Landing System.

The ARE program is grouped into three activities:

<u>Aircraft Modernization:</u>
Projects support avionics technology refresh and new or changing regulatory requirements for operating aircraft in domestic and international airspace.

<u>Flight Inspection System Sustainment:</u>
Projects support mission equipment technology refresh and new or changing regulatory requirements necessary to continue flight inspection of legacy NAS systems.

<u>Flight Inspection System Modernization:</u>
Projects support new mission equipment requirements and new or changing regulatory requirements necessary to provide flight inspection of Performance Based Navigation and implementation of evolving NextGen systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The FAA sustains system availability by ensuring the accuracy of navigational aid electronic signals, as well as validating and certifying the approach/departure flight procedures and terminal routes at all airports within the NAS and at military facilities world-wide. To do this the fleet of FI aircraft must be modernized and updated to be compatible with the latest equipment and procedures. By constantly checking electronic aids for navigation and landing, and the associated procedures, availability is maintained. As the data below shows, the checks identify discrepancies that are fixed before they cause delays and diversions of aircraft.

In FY 2011 through FY 2012, a total of 31,849 flight inspections were conducted of existing ground based navigational aids and existing Instrument Flight Procedures (IFPs) and 1,988 had reportable discrepancies. This equates to 6.2% of published IFPs and associated ground based navigational aids requiring further attention. In addition, 7,162 IFPs required flight inspection in order to publish a new or amended flight procedure. The results of those flight inspections required 808 IFPs to be adjusted or found to be unsatisfactory. Of the new or amended IFPs, 11.3% required correction and thereby avoided potentially unsafe IFPs from being published.

Program Plans FY 2014 – Performance Output Goals

<u>Aircraft Modernization:</u>

Beech 300

- Complete interior modification, exterior paint and deploy Pro Line 21 avionics suite on six aircraft.
- Develop installation plan and start acquisition for Integrated Flight Information System (IFIS) 7.0 avionics.

Challenger

- Acquire and install RNP capability on two aircraft.
- Acquire and install Tactical Air Navigation (TACAN) avionics on three aircraft. Note: TACAN is required for DoD and overseas operations.

Flt Inspection Fleet

- Develop flight inspection fleet installation plan for ADS-B avionics.

<u>Flight Inspection System Sustainment:</u>

- Develop Flight Operations Management System (FOMS) integrated with airborne systems.
- Complete interim updates to the Automated Flight Inspection System (AFIS) prior to implementation of NextGen AFIS (NAFIS).

<u>Flight Inspection System Modernization:</u>

- Deploy NAFIS Phase I on six Beech 300 aircraft.

Program Plans FY 2015 – Performance Output Goals

<u>Aircraft Modernization:</u>

Beech 300

- Complete interior modification, exterior paint and deploy Pro Line 21 avionics suite on six aircraft.
- Complete acquisition and installation of IFIS 7.0 avionics.

Challenger

- Complete installation of RNP capability on one aircraft.
- Acquire and install FMS upgrade, IFIS 7.0, updated Pilot/Co-pilot displays and ADS-B.
- Develop installation plan and start acquisition for FANS 1A+.

<u>Flight Inspection System Sustainment:</u>

- Complete interim updates to the Automated Flight Inspection System (AFIS) prior to implementation of NextGen AFIS (NAFIS).
- Deploy Flight Operations Management System (FOMS) integrated with airborne systems.

Flight Inspection System Modernization:
- Complete NAFIS FIAPA software Block I & II development and integration.
- Deploy NAFIS Phase I on six Beech 300 aircraft.
- Deploy NAFIS Phase II on three Beech 300 aircraft.
- Deploy NAFIS Phase II on one Challenger aircraft.

Program Plans FY 2016 – Performance Output Goals
Aircraft Modernization:
Beech 300
- Acquire and install ADS-B aircraft avionics on six aircraft.

Challenger
- Complete RNP and FANS 1A+ installation on one aircraft.
- Acquire flight deck navigation updates, display upgrades, and GLS avionics.
- Acquire and install ADS-B and IFIS 7.0 avionics.

Flight Inspection System Sustainment:
- Complete interim updates to the Automated Flight Inspection System (AFIS) prior to implementation of NextGen AFIS (NAFIS).

Flight Inspection System Modernization:
- Deploy NAFIS Phase II on six Beech 300 aircraft.
- Deploy NAFIS Phase II on two Challenger aircraft.

Program Plans FY 2017 – Performance Output Goals
Aircraft Modernization:
Beech 300
- Complete ADS-B aircraft avionics on six aircraft.

Challenger
- Complete installation of IFIS 7.0 on one aircraft.
- Continue flight deck navigation updates and acquire and install GLS.

Flight Inspection System Sustainment:
- Complete interim updates to the Automated Flight Inspection System (AFIS) prior to implementation of NextGen AFIS (NAFIS).

Flight Inspection System Modernization:
- Deploy NAFIS Phase II on seven Beech 300 aircraft.
- Deploy NAFIS Phase II on three Challenger aircraft.

Program Plans FY 2018 – Performance Output Goals
Aircraft Modernization:
Beech 300
- Complete ADS-B aircraft avionics on six aircraft.

Challenger
- Deploy flight deck navigation updates for three aircraft.

Flight Inspection System Sustainment:
- Complete interim updates to the Automated Flight Inspection System (AFIS) prior to implementation of NextGen AFIS (NAFIS).

Flight Inspection System Modernization:
- Deploy NAFIS Phase II on two Beech 300 aircraft.

B, Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technology Refresh, M12.01-03 / X, Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Additional Technology Refresh Projects, M12.01-04

Program Description

Advanced Fly-By-Wire (FBW) Simulator Technology Refresh will upgrade the Airbus aircraft simulator to add aerodynamic models of newer aircraft and to meet research requirements for new capabilities. The FAA is responsible for the development, analysis and introduction into the NAS of new concepts and technologies for aircraft navigation and instrument flight operations. The FAA Flight Technologies and Procedures Division (AFS-400) establishes and governs policies, criteria and standards by which terminal and en route flight procedures are established and maintained. AFS-400 is also responsible for approving special instrument approach procedures and requests for waivers of standards.

The FAA acquired an Airbus 330/340 (A330/340) convertible 6-axis full flight aircraft simulator that replicates the performance and handling characteristics of a wide-body aircraft with two jet engines (A330) or four jet engines (A340), which are commercial transport aircraft with electronic FBW flight control technologies. The A330/340 simulator with side-stick control complements the narrow-body Boeing 737-800 Next Generation simulator during vital research and development projects and realistic high fidelity operational evaluation activities. Such activities include Closely Spaced Parallel Operations (CSPO), Required Navigation Performance (RNP), and Human-in-the-Loop (HITL) pilot/controller/aircraft terminal operations performance during introduction of new NextGen technology initiatives.

These initiatives include upgrading the A330/340 simulator to incorporate the following technologies: Automatic Dependent Surveillance-Broadcast (ADS-B) Forward Field-Of-View (FFOV), ADS-B Autopilot upgrade, and advanced Head-Up–Display (HUD) with Synthetic Vision System (SVS) technology. Additional technology refresh projects are projected to include upgrades to the flight simulator, Controller Pilot Data Link Communication (CPDLC) System, High Level Architecture (HLA) linking systems/software, dual HUDs, Combined Vision System (CVS) and avionics/cockpit displays. This simulator supports NAS NextGen modernization and development initiatives such as future FAA and National Transportation Safety Board (NTSB) safety initiatives.

Fly-By-Wire Simulator Technology Refresh (M12.01-03):
The FAA's access to industry simulator facilities with the necessary research configurations and data collection capabilities will not be sufficient to meet the anticipated regulatory guidance initiatives from the introduction of new technology supporting NextGen. In FY 2013, AFS-400 will begin a technology refresh of the A330/340 simulator that will include the purchase and installation of peripheral/software updates and enhanced computer simulation models. Aircraft avionics (hardware and software) and cockpit display systems will be brought to the current revision (installation of upgrades developed by the manufacturer) levels. In addition, A320 and A380 simulator Aerodynamic Performance Models will be installed to further explore operational impacts on the NAS from these aircraft types.

The Final Investment Decision (FID) for the Airbus simulator Technology Refresh program was approved in September 2010. Technology Refresh funding for this simulator is being requested in FY 2013 and FY 2014.

Fly-By-Wire Simulator – Additional Technology Refresh (M12.01-04):
An additional Airbus simulator follow-on Technology Refresh CIP is being planned for FY 2016. A FID is planned in FY 2015 which will define the specific components in the Airbus simulator that will need to be refreshed.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

The A330/340 simulator improves air safety by providing the FAA with the capability to conduct NextGen operational evaluation programs on the impact of introducing new technologies and advanced systems integration within the NAS. On-going and future research and development projects will provide regulators with analysis data to ensure safe implementation of new technologies while increasing capacity within the NAS. Improve safety by assisting accident investigators and other inspectors and analysts with replication of mishap incident and trend data that may provide input into procedure and/or equipment modifications. The simulator's high fidelity capability and operational realism along with the ability to quickly modify operational procedures for evaluation will provide enhanced aircraft performance and HITL data for safety analyses across all flight segments.

Program Plans FY 2014 – Performance Output Goals
Fly-By-Wire Simulator Technology Refresh (M12.01-03):
- Achieve Initial Operational Capability (IOC) for advanced HUD, December 2013. (APB milestone)
- Achieve IOC for SVS, January 2014. (APB milestone)
- Achieve IOC for ADS-B Forward Field-Of-View upgrade, July 2014. (APB milestone)
- Achieve IOC for ADS-B Autopilot upgrade, September 2014. (APB milestone)

Fly-By-Wire Simulator – Additional Technology Refresh (M12.01-04):
- None.

Program Plans FY 2015 – Performance Output Goals
Fly-By-Wire Simulator Technology Refresh (M12.01-03):
- Achieve IOC for Airbus 320 Simulator Aerodynamic Model, December 2014. (APB milestone) (Prior year funds)

Fly-By-Wire Simulator – Additional Technology Refresh (M12.01-04):
- None.

Program Plans FY 2016 – Performance Output Goals
Fly-By-Wire Simulator Technology Refresh (M12.01-03):
- Achieve IOC for Airbus 380 Simulator Aerodynamic Model, May 2016. (APB milestone) (Prior year funds)
- Achieve IOC for CPDLC and HLA Linking System/Software Upgrade, July 15, 2016. (Prior year funds)
- Award Contract for dual HUDs, CVS upgrade, August 2016. (Prior year funds)

Fly-By-Wire Simulator – Additional Technology Refresh (M12.01-04):
- Milestones will be developed at Final Investment Decision.

Program Plans FY 2017-2018 – Performance Output Goals
- None.

2E04, Airport Cable Loop Systems – Sustained Support
FY 2014 Request $5.0M

Airport Cable Loop Systems Sustained Support, F10.00-00

Program Description

This program replaces existing on-airport, copper-based, FAA-owned signal/control cable lines that have deteriorated. The primary emphasis will be on projects at Focus Airports with high traffic counts and enplanements. The obsolete underground telecommunications cable infrastructure systems are vulnerable to failure and could cause flight delays related to outages. These lines feed airport surveillance radar, air/ground communications, and landing systems data and information to the tower, and operational and maintenance information to FAA-staffed facilities. Where cost-effective, the program will install fiber-optic cable in a ring formation to provide redundancy and communications diversity. The ring configuration allows information to flow from either side if there is a break in the cable. The airport cable loop program takes advantage of opportunities to save cost by coordinating projects with major construction projects (e.g. tower relocations, and runway projects).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The Airport Cable Loop Systems – Sustained Support, will reduce the number of unplanned outages attributed to deteriorating on-airport copper cables by replacing existing unsupportable communications equipment and the deteriorated FAA-owned underground cable itself. The program improves signaling and communications which allows for increased operational availability of infrastructure systems. There have been 981 delays associated with outages from 1998 to 2012 for the 35 largest airports in the NAS during that specific time period. The number of associated delays has decreased an average of 3% annually since that time. For the FY 2014/2015 sites identified to have corrective action taken, 163 of the delays will be mitigated from having a reoccurrence.

Program Plans FY 2014 – Performance Output Goals
- Start detailed site survey and cost proposal for construction activities at Anchorage, AK airport.
- Start advanced engineering and construction activities at Oakland, CA airport.

Program Plans FY 2015 – Performance Output Goals
- Complete electronics installation at Miami, FL Airport (MIA).
- Complete electronics installation at Austin, TX Airport (AUS).
- Complete electronics installation at Dallas-Fort Worth, TX Airport (DFW).

Program Plans FY 2016 – Performance Output Goals
- Complete engineering package Ft Lauderdale, FL Airport (FLL).
- Two additional airports will be started this year. The FY 2014 planning activities will confirm the sites.

Program Plans FY 2017 – Performance Output Goals
- Complete construction at Ft Lauderdale, FL Airport (FLL).
- Two additional airports will be started this year. The FY 2015 planning activities will confirm the sites.

Program Plans FY 2018 – Performance Output Goals
- Complete electronics installation at Ft Lauderdale, FL Airport (FLL).
- Three additional airports will be started this year, one of which will be a Core airport.

2E05, Alaskan Satellite Telecommunication Infrastructure (ASTI)

FY 2014 Request $11.0M

Alaskan Satellite Telecommunication Infrastructure (ASTI), C17.02-01

Program Description

The Alaskan Satellite Telecommunication Infrastructure (ASTI) program (formerly named Alaskan NAS Interfacility Communications System (ANICS)) will upgrade the FAA owned and operated communications network (using satellite transmissions of data) that provides Alaska with critical, essential and routine air traffic control telecommunications services such as:

- Remote Control Air Ground and Remote Communications Outlets for voice communication with pilots;
- En Route and Flight Service Station Radio Voice Communications;
- En Route and Terminal Radar Surveillance Data; Digitized Radar Data and Digitized Beacon Data;
- Flight Service Station Flight Service Data processing System and the Digital Aviation Weather Network;
- Weather Advisories, Briefings, and Products supporting Automatic Surface Observation System (ASOS), Automated Weather Observation System (AWOS), and AWOS Data Acquisition System (ADAS);
- WAAS Reference Station; and
- Automatic Dependent Surveillance-Broadcast (ADS-B).

ASTI uses primary and alternate satellites that meet FAA Order 6000.36 specifications to provide system circuit diversity and redundancy. The Alaskan Satellite Telecommunications Infrastructure (ASTI) program was initiated to modernize the legacy ANICS network. The ASTI Modernization Contract was awarded in August 2011.

Existing system availability has fallen below required availability and continues to decline. Outages are increasing in both number and duration. Many system components have either reached the end of their useful life or are no longer supportable. In addition, the arctic climate degrades the ground equipment due to cold cycling, corrosion and wind damage. Recently, aggressive technical service efforts have been required to maintain overall system availability and reliability. Conditions have led to a loss of performance capability and increased frequency and cost of maintenance. Much of the Network Management and Control System (NMCS) equipment has reached its capacity as the number of ASTI sites has risen to the current 64 sites. In addition, the NMCS does not provide the level of security assurance that current Federal standards demand.

The ASTI Program will restore system availability through this Modernization program. It will achieve this objective by awarding contracts to acquire and provide Commercial off-the-Shelf (COTS) equipment and associated support services. The modernization efforts will yield several important benefits:

- Improvements in network availability to required levels (.9999 for Phase I sites and .999 for Phase II sites)
- Improved information system security to meet Federal standards;
- Reduced number and duration of outages;
- More efficient use of satellite transponder bandwidth;
- Containment of Operations and Maintenance (O&M) costs; and
- Improved life cycle support (i.e., training, second level engineering support, radome maintenance and depot level supply support).

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

ASTI supports FAA's Strategic Goal of Delivering Aviation Access Through Innovation. The outcome ensure air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure. The Metric is to maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016. ASTI system availability has fallen below 0.9999 and is declining. Aviation access in the NAS is improved by minimizing outages for critical and essential communications links between pilots and air traffic controllers. These links between FAA facilities and pilots are essential to ensure the flow of accurate and reliable information on air traffic movement, weather, and radar data.

Program Plans FY 2014 – Performance Output Goals

- Complete ASTI Modernization installation Contractor Acceptance Inspection (CAI) at key site by September 30, 2014.
- Complete ASTI Modernization installation at Limited Deployment Sites by September 2014.
- Complete Installation (CAI) at 21st site (APB milestone).

Program Plans FY 2015 – Performance Output Goals

- Complete modernization of additional ASTI locations to include installation and testing for modems, multiplexers, Radio Frequency (RF) equipment and NMCS.
- Complete Installation (CAI) at 37th site (APB milestone).

Program Plans FY 2016 – Performance Output Goals

- Complete modernization of additional ASTI locations to include installation and testing for modems, multiplexers, RF equipment and NMCS.
- Complete Installation at (CAI) at 64th site (APB milestone).

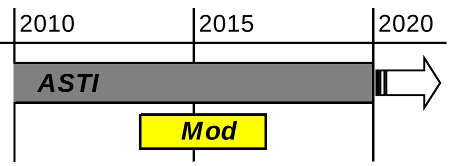
Program Plans FY 2017-2018 – Performance Output Goals

- None.

System Implementation Schedule

Alaskan Satellite Telecommunications Infrastructure

Key site IOC: October 2013 -- Last site IOC: September 2016



2E06, FACILITIES DECOMMISSIONING

FY 2014 Request $6.5M

Decommissioning, F26.01-01

Program Description

The Decommissioning Program works with other FAA programs to identify and plan for the timely disposition of real property. After other programs decommission a system, this program is solely responsible for real property disposal for all FAA NAS sites. The program accomplishes this with a proactive approach in cross-program collaboration and by providing specific insight and expertise to facilitate the disposition of decommissioned or excess real property assets. This approach for disposal of facilities is nationally prioritized to meet current, future, and evolving operational needs. The implementation of NextGen, changes in airspace design and decommissioning of sites that are no long needed to support NAS operations increases the need for the disposal of excess properties.

The NAS Enterprise Architecture identifies the transition of many systems that will require disposal. For example:

- Many ground to ground communication systems such as Radio Communication Links (RCL) are transitioning to the FAA Telecommunications Infrastructure (FTI) service,
- Some locations of ground based navigation systems (i.e. VOR, NDB and ILS (CAT I)) will no longer be required as the transition to satellite navigation continues,
- Surveillance and weather radar systems will be transitioning to the NextGen Surveillance and Weather Radar Capability requiring disposal of existing radars, and
- Consolidation of control facilities under the NextGen Future Facilities effort will require disposal of the existing buildings.

The Decommissioning Program coordinates, plans, and implements actions necessary to facilitate disposition of real property infrastructure and site restorations, when required, of all decommissioned facilities. The four services provided by the Decommissioning Program are as follows:

4. Identifying, verifying, and scheduling the disposition and needed site restoration of decommissioned facilities,
5. Investigating and documenting the structures to be removed at each site, determining the required restoration associated with the site, and developing scopes of work and schedules with milestones,
6. Final disposition of decommissioned infrastructure and property restoration including infrastructure removal or demolition, removal and disposal of debris and hazardous materials, and evaluation of impact upon cultural and historic preservation, wetlands, and natural resource protection, and
7. Conducting Phase I Environmental Due Diligence Audits (EDDA) reports for government-owned properties, as required by the General Services Administration (GSA) and applicable laws.

The Decommissioning Program serves a critical role in the removal of these facilities from the FAA's inventory and the subsequent reduction of Operations and Maintenance (O&M) costs, lease costs (where applicable), and associated liabilities.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

This program directly supports improving management of FAA's real property assets by reducing maintenance costs and disposing of excess assets. Cost avoidance averaging $5M per year results from leases eliminated and maintenance costs avoided because of completed disposition of legacy real properties, which are no longer required.

Program Plans FY 2014 – Performance Output Goals

- Complete approximately 125 Real Property Disposal Projects, approximately 42 per Service Area. These projects include, but are not limited to, Visual Aids, Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc). This will include disposal of Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.
- Dispose of six Very-High Omni-directional Radio (VOR) sites.

Program Plans FY 2015 – Performance Output Goals

- Complete approximately 125 Real Property Disposal Projects, approximately 42 per Service Area. These projects include, but are not limited to, Visual Aids, Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc). This will include disposal of Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.

Program Plans FY 2016 – Performance Output Goals

- Complete approximately 75 Real Property Disposal Projects, approximately 25 per Service Area. These projects include, but are not limited to, Visual Aids Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc). This will include disposal of Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.
- Dispose of eight Very-High Omni-directional Radio (VOR) sites.

Program Plans FY 2017 – Performance Output Goals

- Complete approximately 75 Real Property Disposal Projects, approximately 25 per Service Area. These projects include, but are not limited to, Visual Aids Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc). This will include disposal of Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.
- Dispose of eight Very-High Omni-directional Radio (VOR) sites.

Program Plans FY 2018 – Performance Output Goals

- Complete approximately 75 Real Property Disposal Projects, approximately 25 per Service Area. These projects include, but are not limited to, Visual Aids Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc). This will include disposal of Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.
- Dispose of 22 Very-High Omni-directional Radio (VOR) sites.

2E07, Electrical Power Systems – Sustain/Support

FY 2014 Request $85.0M

Power Systems Sustained Support (PS3), F11.01-01

Program Description

The Electrical Power Systems Sustain Support (PS3) (Power) program funds the purchase and installation of components for backup electric power systems and power regulation and protection equipment. Backup electrical power systems are necessary to allow continued operation of air traffic control facilities when there is an interruption in commercial power sources. These disruptions can result in flights that remain grounded, are placed in airborne holding patterns, or are re-routed to other airports. Reliable backup power systems are installed so air traffic control electronics can maintain required availability and capability and prevent disruptions. These power systems also protect sensitive electronic equipment from commercial power surges and fluctuations. The Power program replaces, refurbishes and renews components of existing power systems and cable infrastructure when necessary to maintain and improve the overall electrical power quality, reliability, and availability. The power system type varies by load sensitivity and the criticality of the equipment that it supports.

The Power program is critical to both maintaining and sustaining NAS capacity by sustaining the reliability and availability of NAS electrical power equipment. The Power program provides the following components and services:

1. NAS Batteries: Large scale battery complexes serve as a backup power source for key NAS facilities including navigation aids and communications. These batteries provide power for a limited time during major power system disruptions and maintain the function of key systems while the NAS transitions to a safe level of reduced operation. The Power program sustains in excess of 4,000 battery installations with periodic replacement to assure reliability.

2. Uninterruptible Power Supply (UPS): A UPS is a device that conditions commercial power and prevents power disruptions and surges from adversely affecting electronic system performance. A UPS is necessary to ensure the continuity of air traffic control by preventing power disruptions to NAS critical infrastructure. The Power program currently sustains 1,783 UPS with an expected service lifecycle of 20 years. A significant portion of the UPS inventory requires replacement due to reliability and supportability issues attributable to age. UPS batteries require refurbishment on a four year cycle.

3. Direct Current (DC) Power Systems: DC power systems are used to provide a low cost, shorter term alternative to an engine generator at facilities with a limited number of equipment. System availability is increased so that commercial power disturbances of up to several hours will not disrupt air traffic operations. The Power program sustains 541 DC Power systems with a service lifecycle of up to 15 years.

4. En Route Power Systems: The FAA operates 21 Air Route Traffic Control Centers (ARTCCs), 2 CERAPS and special TRACON power systems. Backup power is provided by the ARTCC Critical and Essential Power System (ACEPS). Because of the critical role of the En Route Centers in the NAS, they require 100 percent reliable power to maintain system availability.

5. Lightning Protection Grounding, Bonding and Shielding (LPGBS): The LPGBS program provides a systematic approach to minimize electrical hazards to personnel, electromagnetic interference, damage to FAA facilities and to protect electronic equipment from lightning, transients, electrostatic discharge (ESD), and power faults. Sites are hardened sufficiently for the FAA missions – to prevent delay or loss of service, to minimize or preclude outages, and to enhance personnel safety. LPGBS standards have been coordinated with industry standards, and in some cases exceed industry standards where necessary to meet the FAA missions.

6. Power Cable: Power cables at airports comprise $2.2 billion of the total $4.6 billion NAS power system infrastructure. These cables are essential to the operation of all air traffic. Seventy-five percent of this cable is well beyond the condition and age that commercial power companies would continue to operate. The top 300 airports require 18 million feet of power cable to sustain operations. Replacement of this cable costs $120 per foot and would normally be expected to last 30 years. Replacing unreliable terminal power cables has the highest priority in this request.

7. Engine Generators: Engine generators serve as a backup power source for essential NAS electronic systems when commercial power becomes unreliable due to a weather system, natural disaster or other electrical outage beyond FAA control. An example of the need for these systems is that the average ARTCC during the period, April 10, 2010 through March 11, 2011, experienced 25 hours of commercial power failure. The Power program sustains 3,565 NAS engine generators with a useful service life of 24 years. Maintenance of the aged inventory has increased five fold in six years to avoid a significant reduction in reliability and availability.

8. Critical Power Distribution System (CPDS): CPDS consists of a family of standardized Power System types. The CPDS program funds the replacement of existing CPDS system components such as filters, transfer switches, converters, etc., but excludes the acquisition of engine-generators, UPS and batteries. The specific standardized CPDS type employed at a NAS ATC facility is optimally matched to the air traffic designated activity level of the NAS facility. The CPDS is designed to meet performance requirements for reliability, availability and maintainability at air traffic level while optimizing acquisition, and logistic, and training costs.

9. PS3 and Project Support System Engineering: PS3 and Power Systems engineering is an interdisciplinary field of engineering that focuses on design and management of electrical power systems in the NAS. Systems engineering within the power services group focuses on defining and documenting customer requirements, administering the design phase, system validation, quality control, quality assurance, safety improvement, sustainment of established alternative energy generation systems, and system life-includes test facility and procedures for enhanced system designs.

10. Alternative Energy Systems (AES): AES Program integrates and sustains a broad range of clean energy technologies to meet NAS operational demands. Utilization of AES technologies reduces the Agency carbon footprint and helps to achieve Executive goals for reduction of fossil fuel dependencies. Alternative energy generation systems include any of the following: Biomass; Waste to Energy; Landfill Gas; Geothermal Energy; Solar Energy; Ocean Energy; Hydropower; Hydrokinetic; Wind Energy; and Fuel Cell.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

All NAS facilities are dependent on the availability, reliability, and quality of NAS power. Planned electrical power equipment replacement and improvement activities minimize disruption of air traffic, and maximize availability and reliability of NAS systems. PS3 supports the sustainment of the operational availability at 99.7% for reportable power system facilities that support the 30 Core airports. Power systems sustain airport capacity by reducing the incidence of NAS delays caused by equipment outages.

Program Plans FY 2014 – Performance Output Goals

Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year):

- NAS Battery set replacement (60 Sets).
- Power Conditioning Systems (UPS) (13 Sets).
- DC BUS Systems (20 Sets).
- ACEPS En Route Critical Power Systems (3 Sets).
- Lightning Ground Bonding Protect Systems (4 Sets).
- Airport Power Cable Replacements (7 Sets).
- Engine Generators Replacement (89 Sets).
- Critical Power Distribution Systems (2 Sets).
- Power System Sustain Support (PS3) and project support system engineering (6 Sets).
- Alternative Energy Sustainment (7 Sets).

Program Plans FY 2015 – Performance Output Goals

Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year):

- NAS Battery set replacement (70 Sets).
- Power Conditioning Systems (UPS) (16 Sets).
- DC BUS Systems (23 Sets).
- ACEPS En Route Critical Power Systems (2 Sets).
- Lightning Ground Bonding Protect Systems (5 Sets).
- Airport Power Cable Replacements (8 Sets).
- Engine Generators Replacement (100 Sets).
- Critical Power Distribution Systems (6 Sets).
- Power System Sustain Support (PS3) and project support system engineering (10 Sets).
- Alternative Energy Sustainment (7 Sets).

Program Plans FY 2016 – Performance Output Goals

Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year):

- NAS Battery set replacement (70 Sets).
- Power Conditioning Systems (UPS) (16 Sets).
- DC BUS Systems (23 Sets).
- ACEPS En Route Critical Power Systems (2 Sets).
- Lightning Ground Bonding Protect Systems (5 Sets).
- Airport Power Cable Replacements (8 Sets).
- Engine Generators Replacement (100 Sets).
- Critical Power Distribution Systems (6 Sets).
- Power System Sustain Support (PS3) and project support system engineering (10 Sets).
- Alternative Energy Sustainment (7 Sets).

Program Plans FY 2017 – Performance Output Goals

Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year):

- NAS Battery set replacement (70 Sets).

- Power Conditioning Systems (UPS) (16 Sets).
- DC BUS Systems (23 Sets).
- ACEPS En Route Critical Power Systems (2 Sets).
- Lightning Ground Bonding Protect Systems (5 Sets).
- Airport Power Cable Replacements (8 Sets).
- Engine Generators Replacement (100 Sets).
- Critical Power Distribution Systems (6 Sets).
- Power System Sustain Support (PS3) and project support system engineering (10 Sets).
- Alternative Energy Sustainment (7 Sets).

Program Plans FY 2018 – Performance Output Goals
Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year):

- NAS Battery set replacement (70 Sets).
- Power Conditioning Systems (UPS) (16 Sets).
- DC BUS Systems (23 Sets).
- ACEPS En Route Critical Power Systems (2 Sets).
- Lightning Ground Bonding Protect Systems (5 Sets).
- Airport Power Cable Replacements (8 Sets).
- Engine Generators Replacement (100 Sets).
- Critical Power Distribution Systems (6 Sets).
- Power System Sustain Support (PS3) and project support system engineering (10 Sets).
- Alternative Energy Sustainment (7 Sets).

2E08, FAA Employee Housing and Life Safety Shelter System Service
FY 2014 Request $2.5M

FAA Employee Housing and Life Safety Shelter System Services, F20.01-01

Program Description

FAA Employee Housing and Life Safety Shelter System Services program funds the modernization (replacement/refurbishment) of the housing provided by FAA where there are no commercially-available units available for employees at remote facilities. FAA staff that use this housing include flight service station specialists, field technicians, and airport and aircraft inspectors. The Housing program replaces, refurbishes and renews components of existing housing such as: roofing, windows, heating and air conditioning systems and electrical wiring. Primary locations are Alaska, Grand Canyon and American Samoa. A small number of other housing units and shelters are located throughout the United States, including the U.S. Virgin Islands. The cost of renovations in Alaska are higher because there are relatively few roadway systems in Alaska, and barge and heavy-lift aircraft are the primary methods for delivering cargo. This results in higher costs for transporting material and construction.

1. Roofs: The FAA housing was built between the middle 1940s and the 1980s. Roofs, fascia, and soffits periodically need to be replaced to ensure the protection of the structure. This housing is located in areas of extreme weather; high winds, heavy rain, hurricanes, and extreme temperature differences. These conditions greatly decrease the life expectancy of the roofing materials.

2. Structural/Siding/Windows/Doors: Siding, windows, and doors need periodic replacement to ensure the protection of the structure. Some of the housing is located in areas with permafrost and/or earthquakes and movement of the soils under the structure can require major repairs to the foundations.

3. Electrical/Plumbing Systems: Electrical and plumbing systems in the housing need to be replaced to ensure the protection of the structure from damage due to failure of these systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice.*
- *FAA Outcome 2 – FAA is widely recognized as a workplace of choice.*
- *FAA Performance Metric 1 – The FAA is rated in the top 25 percent of places to work in the federal government by employees.*

Relationship to Performance Metric

Housing is needed where no commercially available units are available. All NAS facilities are dependent on regular and unplanned maintenance and repair. Due to the remoteness of these locations other housing is not commercially available so loss of this housing puts all the local NAS facilities at risk due to the extra time and cost involved in daily travel to and from these sites. This project will provide safe, healthy and habitable employee housing and shelters to support the metric for top 25 percent of places to work.

Program Plans FY 2014 – Performance Output Goals

- Complete four Roof replacement Projects.
- Complete four Structural/Siding/Windows/Doors Projects.
- Complete two Electrical/Plumbing Systems Projects.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

ACTIVITY 3: NON-AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A: Support Equipment

3A01, HAZARDOUS MATERIALS MANAGEMENT

FY 2014 Request $20.0M

Environmental Cleanup / HAZMAT, F13.02-00

Program Description

The HAZMAT program remediates FAA owned or leased sites that were contaminated by FAA or previous owner activities. The FAA has identified approximately 730 contaminated sites at approximately 160 distinct locations nationwide that require investigation, remediation, and closure activities. Environmental Cleanup site investigations have indicated that toxic contamination resulted from a variety of hazardous substances including: cleaning solvents, fuels, pesticides, asbestos, polychlorinated biphenyls (PCBs), and heavy metals. FAA organizations, including the Mike Monroney Aeronautical Center and the William J. Hughes Technical Center, have mandatory remediation and monitoring schedules in place as part of negotiated agreements with regulatory agencies. These agreements require the FAA to remediate contaminated soil and groundwater. Extensive contamination at the FAA Technical Center prompted the Environmental Protection Agency (EPA) to place the site on the EPA National Priorities List, indicating its status as one of the Nation's most environmentally dangerous sites (i.e., a Superfund site). In addition, contaminated sites and past noncompliance with requirements of the Hazardous Materials Management (HAZMAT) program account for a large portion of the unfunded environmental liabilities documented in the FAA's Financial Statement.

Annually in September the Environmental Site Cleanup Report (ESCR) is published. This document contains current and expected future cleanup activities for the 730 contaminated sites mentioned above. An estimate of out year Environmental Remediation (ER) Liabilities is also included in this report. The current (FY 2011) ER Liability is estimated at approximately $400M un-inflated, and with contingency the un-inflated ER Liability is estimated at approximately $550M. We continue to make good progress toward remediating sites, approximately 5% of the existing sites are closed each year; however, additional sites are also added each year and some of the higher cost sites are expected to remain open for many years or decades. During the period from the publication of the FY 2010 ESCR to the FY 2011 ESCR the total number of identified sites has decreased from approximately 750 to 730.

To clean up these contaminated sites and comply with applicable environmental regulations, the FAA developed the HAZMAT program. The FAA must continue mandated program activities to achieve compliance with all Federal, State and local environmental cleanup regulations, including the Resource Conservation and Recovery Act of 1976, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and the Superfund Amendment and Reauthorization Act (SARA) of 1986. FAA program activities include conducting site investigations; managing hazardous materials; including hazardous waste accumulation, handling and disposal; installing groundwater monitoring wells; remediating site contamination; and operating air pollution controls. The FAA performs assessment, remediation and closure activities as aggressively and proactively as funding will allow. Future planned efforts include conducting contaminant investigations, implementing site remediation projects and completing required regulatory closures.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The HAZMAT program supports the FAA's Delivering Aviation Access through Innovation goal by continuing to improve financial management of cleanup activities for contaminated sites within existing NAS land and structures. The program achieves this objective through continued refinement of project cost estimating as well as progress tracking of assessment, remediation, and closure activities for contaminated sites. These activities result in a safe and environmentally sound workplace, and protection of the natural resources of surrounding communities.

Program Plans FY 2014 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2013 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

Program Plans FY 2015 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2014 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

Program Plans FY 2016 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2015 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

Program Plans FY 2017 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2016 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

Program Plans FY 2018 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2017 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

3A02, AVIATION SAFETY ANALYSIS SYSTEM (ASAS)
FY 2014 Request $12.7M

Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 2, A17.01-02 / X, Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 3, A17.01-03

Program Description

RCISS is an existing technology refreshment program within Aviation Safety (AVS) to upgrade and maintain the AVS Information Technology (IT) enterprise infrastructure that includes the automation hardware, software, and communication components which support the safety data and applications utilized by the FAA AVS safety workforce. All current and planned AVS capital investment initiatives rely on the IT infrastructure being deployed by RCISS, including the Aviation Safety Knowledge Management Environment (ASKME) and System Approach for Safety Oversight (SASO) programs.

RCISS Segment 2 (A17.01-02):
Segment 2 will upgrade and improve the hardware and software that helps safety and aircraft certification inspectors integrate information from these databases to improve their oversight of the industry. It will also increase the rate of data transfer from centralized databases to their mobile devices. Improving the rate of data transfer will increase the time available for safety inspections. The portable devices that inspectors use during field work to maintain connection with the available databases will be updated to keep up with advances in mobile computing technologies. Segment 2 will also upgrade the protection of safety data systems to prevent this important data from being destroyed by natural disaster. It will improve protection of the facility where the data is stored and prevent access to the data by unauthorized users.

Segment 2 program activities include technology refresh of the following IT infrastructure components supporting AVS's Safety Workforce of over 6,000 people: mobile toolkits (consisting of mobile tablet personnel computers and peripherals); telecommunications services; application servers and data storage devices (hosting national AVS safety applications); and COTS Software licenses. The program will also procure contractor support services to provide specialized technical expertise in modernizing and maintaining the RCISS enterprise infrastructure. Technology refresh is based on the service life of individual components and incrementally performed each year. For example, mobile toolkits deployed to the safety workforce have a service life of four years and approximately 25% of mobile toolkits are replaced each year.

RCISS Segment 3 (A17.01-03):
RCISS Segment 3 will perform technology refresh on the AVS IT infrastructure established by Segments 1 and 2. A Final Investment Decision (FID) is planned for FY 2015 which will define the scope and activities for this segment.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

Inspection and review of airline safety programs and practices are integral to the FAA safety program. The RCISS program provides the infrastructure to support the workforce's need for information on the safety record of an airline and the actions required to meet regulations and directives. This new infrastructure will dramatically enhance the capability of the workforce to complete assignments while conducting work in the field. Having this information allows the safety inspectors to determine if the airline is complying with good safety practices, which is essential to FAA's role in preventing accidents. RCISS enables the realization of the quantifiable safety benefits claimed by the SASO and ASKME investments by providing the IT infrastructure on which these AVS business applications reside. Approximately 20% of the combined SASO and ASKME benefits are attributed to RCISS.

Program Plans FY 2014 – Performance Output Goals
RCISS Segment 2 (A17.01-02):
- Complete the technology refresh of 25% of the safety workforce mobile toolkits with enhanced telecommunications services.
- Complete Acquisition Program Baseline (APB) Milestone (Contract Award - Mobility (MOB) Deployment 7) for annual technology refresh of safety workforce mobile toolkits.
- Complete APB Milestone (Contract Award -Enterprise Data Center (EDC) Deployment 7) for technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.

RCISS Segment 3 (A17.01-03):
- None.

Program Plans FY 2015 – Performance Output Goals

RCISS Segment 2 (A17.01-02):

- Complete technology refresh of 25% of the safety workforce mobile toolkits with enhanced telecommunications services.
- Complete APB Milestone (Contract Award - Mobility (MOB) Deployment 8) for annual technology refresh of safety workforce mobile toolkits.
- Complete APB Milestone (Contract Award -Enterprise Data Center (EDC) Deployment 8) for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.
- Complete RCISS Segment 3 Final Investment Decision.

RCISS Segment 3 (A17.01-03):

- None.

Program Plans FY 2016 – Performance Output Goals

RCISS Segment 2 (A17.01-02):

- Complete technology refresh of 25% of the safety workforce mobile toolkits with enhanced telecommunications services.
- Complete APB Milestone (Contract Award - Mobility (MOB) Deployment 9) for annual technology refresh of safety workforce mobile toolkits.
- Complete APB Milestone (Contract Award -Enterprise Data Center (EDC) Deployment 9) for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.

RCISS Segment 3 (A17.01-03):

- None.

Program Plans FY 2017 – Performance Output Goals

RCISS Segment 2 (A17.01-02):

- None.

RCISS Segment 3 (A17.01-03):

- Complete technology refresh of 25% of the safety workforce mobile toolkits with enhanced telecommunications services.
- Complete Mobility Deployment 10 contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete Enterprise Data Center Deployment 10 contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete Disaster Recovery Deployment 10 contract award for annual technology refresh of disaster recovery equipment.

Program Plans FY 2018 – Performance Output Goals

RCISS Segment 2 (A17.01-02):

- None.

RCISS Segment 3 (A17.01-03):

- Complete technology refresh of 25% of the safety workforce mobile toolkits with enhanced telecommunications services.
- Complete Mobility Deployment 11 contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete Enterprise Data Center Deployment 11 contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete Disaster Recovery Deployment 11 contract award for annual technology refresh of disaster recovery equipment.

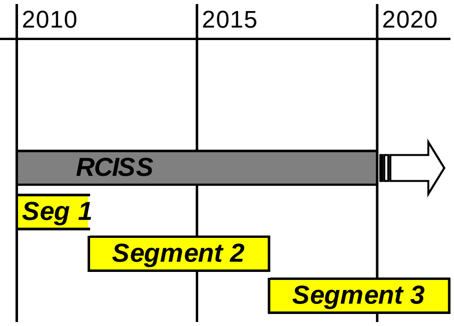
System Implementation Schedule

Aviation Safety Analysis System (ASAS) - Regulation and Certification for Infrastructure System Safety (RCISS)

Segment 1: First site Delivery: 2008 -- Last site Delivery: 2011

Segment 2: First site Delivery: 2012 -- Last site Delivery: 2016

Segment 3: First site Delivery: 2017 -- Last site Delivery: 2021



3A03, LOGISTICS SUPPORT SYSTEMS AND FACILITIES (LSSF)

FY 2014 Request $10.0M

Logistics Center Support System (LCSS) – Segment 2, M21.04-01 / X, Logistics Center Support System (LCSS) – Technology Refresh, M21.04-02

Program Description

The FAA Logistics Center (FAALC) manages the central NAS inventory warehouses and distribution facilities for the FAA. It provides routine and emergency logistics products and services to over 8,091 FAA customers at facilities nationwide, as well as, to the Department of Defense (Air Force, Navy, and Army), state agencies, and foreign countries. It provides logistics support for more than 48,000 systems nationwide, by providing parts, services, supplies and emergency restoration services. The FAALC tracks and accounts for over 62,000 national stock numbers with a total value of $900 million. The current system that is used to manage these functions is the Logistics and Inventory System (LIS).

LIS is an agency developed legacy mainframe application that lacks the capability and flexibility to accommodate the near term or future long-term supply support needs necessary to maintain the NAS. LIS is built using Natural and COBOL languages and was deployed in 1990. Over the last two decades, over 39,000 changes have been implemented in LIS. Its archaic architecture lacks the scalability to support the increased performance requirements projected by the NAS architecture.

LCSS hardware and software has been installed and maintained at the FAA Mike Monroney Aeronautical Center (MMAC) in Oklahoma City. The LCSS program will require a hardware refresh to maintain the installed equipment at the MMAC.

<u>LCSS – Segment 2 (M21.04-01):</u>
The Logistics Center Support System (LCSS) is a mission support IT procurement to re-engineer and automate the FAA's logistics management processes. The program modernizes the FAA's supply chain management and replaces the 20-year old Logistics Inventory System (LIS) in support of the Next Generation of air traffic control (NextGen) environment.

<u>LCSS – Technology Refresh (M21.04-02):</u>
Development hardware for the LCSS program was purchased in FY 2010 with the intent of converting it to production at deployment. In FY 2015 this hardware will have reached its end-of-life five-year cycle and will be eligible for replacement. The disaster recovery hardware purchased in FY 2012 will be eligible for replacement in FY 2017. The disaster recovery hardware will be installed at the disaster recovery site and used for system failures in the event of a disaster at the production site.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The LCSS program supports the Strategic Plan Delivering Aviation Access through Innovation goal with enhanced capability to accurately manage NAS spares and repair requirements in a centralized and automated manner enabling the agency to:

1. Provide the right part, at the right time, to the right place. The metric for this is Issue Effectiveness. Target goal is 85% effectiveness, where issue effectiveness is the shipment of an item in stock within 24 hours of the order or, in the case of a direct ship item, completed processing of the order with the vendor within 24 hours.
2. Provide NAS components and parts that are not defective. Metric: Confirm defective products. Target goal is no more than 10.8 defects per 1,000 issues.
3. Provide services that meet or exceed customer expectations. Metric: Customer satisfaction surveys. Target goal is 86% customer satisfaction.
4. Deliver parts and services on time and defect-free reducing potential air traffic system outages and avoiding the cost of duplicate shipping and handling.

Program Plans FY 2014 – Performance Output Goals

LCSS – Segment 2 (M21.04-01):

- APB milestone: Operational Test & Evaluation (OT&E) completed (October 2013).
- APB milestone: LCSS Initial Operational Capability (IOC): decommission LIS (February 2014).
- APB milestone: LCSS Final Operational Capability (FOC): (April 2014).

LCSS – Technology Refresh (M21.04-02):

- None.

Program Plans FY 2015 – Performance Output Goals

LCSS – Segment 2 (M21.04-01):

- None.

LCSS – Technology Refresh (M21.04-02):

- Hardware Technology Refresh Implemented (9/30/2015).
- Milestone: Replace/Upgrade development and production hardware as appropriate.

Program Plans FY 2016 – Performance Output Goals

LCSS – Segment 2 (M21.04-01):

- None.

LCSS – Technology Refresh (M21.04-02):

- Hardware Technology Refresh Implemented (9/30/2016).
- Milestone: Replace/Upgrade development and production hardware as appropriate.

Program Plans FY 2017 – Performance Output Goals

LCSS – Segment 2 (M21.04-01):

- None.

LCSS – Technology Refresh (M21.04-02):

- Hardware Technology Refresh Implemented (9/30/2017).
- Milestone: Replace/Upgrade disaster recovery hardware as appropriate.

Program Plans FY 2018 – Performance Output Goals

LCSS – Segment 2 (M21.04-01):

- None.

LCSS – Technology Refresh (M21.04-02):

- Hardware Technology Refresh Implemented (9/30/2018).
- Milestone: Replace/Upgrade development and production hardware as appropriate.

System Implementation Schedule

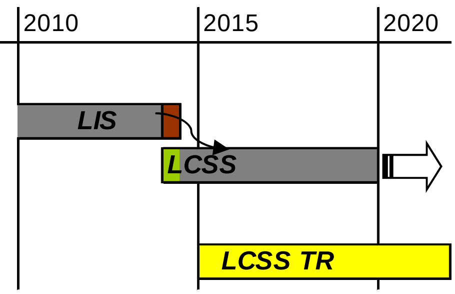
Logistics Center Support System (LCSS)

Decom: February 2014

First site IOC: February 2014 -- Last site IOC: April 2014

LCSS Technology Refresh

First site: 2015 -- Last site: 2021



3A04, National Airspace System (NAS) Recovery Communications (RCOM)

FY 2014 Request $12.0M

Command and Control Communications (C3), C18.00-00

Program Description

The RCOM program supports the FAA emergency Command and Control Communications (C3) system that gives FAA the capability to directly manage and operate the NAS during local, regional and national emergencies when normal common-carrier communications are interrupted. C3 provides and enhances a variety of fixed-position, portable, and transportable emergency communications systems that support crisis management. These C3 systems enable the FAA and other Federal agencies to exchange classified and unclassified communications to protect national security. The RCOM program also supports the Washington Operations Center Complex and modernizes several FAA "continuity of operations" sites, which ensures FAA executives have command and communications during times of crisis. C3 capabilities and related systems include the following:

Emergency Response

- Washington Operations Center Complex (WOCC)
- Remote Transmit Receive (RTR) Facility
- Communication Support Team (CST)
- Emergency Response Vehicle (ERV-02)

Emergency Communications

- Emergency Operations Network (EON)
- Very High Frequency/Frequency Modulation (VHF/FM) Program
- High Frequency/Single Sideband (HF/SSB) Radio System Program
- Fixed Satellite Telephone Network (STN)
- Automated Notification System (ANS)
- Handheld Satellite Phones

Secure Communications

- Secure Telephone Equipment (STE)
- Secure Conference System (SCS)
- Secure Facsimile (SecFac)
- Secure Cellular Phones
- Defense Messaging System (DMS) Secure Internet Protocol Router Network (SIPRNET)
- Automatic Digital Network (AUTODIN)

- OMNI Cryptographic Equipment

Non-Secure Communications

- C3 Lan
- Standard Teleco Phone System
- Automated Message Handling System (AMHS)
- Non-classified Internet Protocol Router Network (NIPRNET)
- Domestic Events Network (DEN)

In addition to the above, there are classified systems, facilities and projects that C3 either manages or supports that are not named or described in this document. These support both intra and interagency agreements and initiatives.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 4 – Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent.*

Relationship to Performance Metric

The RCOM program contributes to the Next Level of Safety goal by ensuring that the FAA's C3 structure can provide classified and unclassified, time-critical, public and NAS information for the FAA Administrator during emergencies. The FAA Administrator shares this information with staff members, key regional managers, the Secretary of Transportation, and other national-level executive personnel.

Program Plans FY 2014 – Performance Output Goals

- Complete Fixed Satellite Equipment Technology Refresh.
- Procure and install VHF/FM equipment for ZTL District (Atlanta), Charlotte (CLT), and St. Louis (STL).
- Complete VHF/FM system requirements documents for Cleveland District (CLE), Buffalo District (BUF), and Bangor District (BGR).

Program Plans FY 2015 – Performance Output Goals

- Procure and install VHF/FM equipment for Cleveland District (CLE), Buffalo District (BUF), and Bangor District (BGR).
- Complete VHF/FM system requirements documents for Memphis (ZME), Minneapolis/St. Paul (MSP), and Cincinnati OEP (CVG).

Program Plans FY 2016 – Performance Output Goals

- Procure and install VHF/FM equipment for Memphis (ZME), Minneapolis/St. Paul (MSP), and Cincinnati (CVG).
- Complete system requirements documents for Philadelphia (PHL), Pittsburgh (PIT), and Detroit (DTW).

Program Plans FY 2017 – Performance Output Goals

- Procure and install VHF/FM equipment for Philadelphia (PHL), Pittsburgh (PIT), and Detroit (DTW).
- Complete VHF/FM system requirements documents for Dallas/Ft. Worth (DFW), Salt Lake City (SLC), and Denver (DEN).

Program Plans FY 2018 – Performance Output Goals

- Procure and install VHF/FM equipment for Dallas/Ft. Worth (DFW), Salt Lake City (SLC), and Denver (DEN).

3A05, FACILITY SECURITY RISK MANAGEMENT

FY 2014 Request $15.0M

Facility and Infrastructure Security Program – Two, F24.01-02

Program Description

The Facility Security Risk Management (FSRM) Program was established in response to Presidential Decision Directive 63, Critical Infrastructure Protection which has been superseded by Homeland Security Presidential Directive (HSPD) 7, Critical Infrastructure Identification, Prioritization and Protection which requires all Federal agencies to assess the risks to their critical infrastructure and take steps to mitigate that risk. The program provides risk mitigation at all FAA staffed facilities, such as centers, towers and terminal radar approach control (TRACON) facilities. The program provides an integrated security system that includes access control, surveillance, x-ray machines, metal detection, and intrusion detection. Other upgrades include adding guardhouses, visitor parking, fencing, perimeter hardening, window blast protection, and lighting.

The objective of the program is to comply with Public Law 106-528, Airport Security Improvement Act of 2000. This objective is accomplished through the installation and maintenance of physical security systems and guard services at designated FAA facilities using the System Security Design and Integration (SSDI), Corrective Maintenance Contract (CMC) II, and National Security Officer Services (NSOS) contracts.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The FSRM Program provides the infrastructure enhancements needed to reduce the risk of disruption of operations at facilities critical to the NAS. These enhancements reduce the risk of unauthorized access and provide early identification of potential security problems. FSRM activities to increase/improve physical security enable the FAA to comply with:

- U.S. Department of Justice Report #381 Vulnerability Assessment of Federal Facilities
- The Airport Security Improvement Act of 2000 (Title 49 USC § 44903. Air Transportation Security)
- Homeland Security Presidential Directive 7, Critical Infrastructure Identification, Prioritization, and Protection
- Homeland Security Presidential Directive 12, Policy for a Common Identification Standard for Federal Employees and Contractors
- FAA Order 1600.69, Facility Security Management Program, as revised.

Both the DOT IG and GAO continue to track our progress in meeting these requirements. As a result operational availability is maintained because enhanced security prevents loss of NAS service.

Program Plans FY 2014 – Performance Output Goals

- Complete Personal Identity Verification (PIV) access control retro-fit (50 sites).

Program Plans FY 2015 – Performance Output Goals

- Complete Personal Identity Verification (PIV) access control retro-fit (75 sites).

Program Plans FY 2016 – Performance Output Goals

- Complete installation of X-ray machines (30 sites) September 1, 2016.
- Complete Personal Identity Verification (PIV) access control retro-fit (75 sites).

Program Plans FY 2017 – Performance Output Goals
- Complete Personal Identity Verification (PIV) access control retro-fit (205 sites).

Program Plans FY 2018 – Performance Output Goals
- Complete perimeter hardening at 12 Security Level 3 and Security Level 4 facilities.

3A06, INFORMATION SECURITY
FY 2014 Request $13.0M

- A, Information Systems Security, M31.00-00
- B, Federal Identity Credential and Access Management (FICAM), M31.04-01

A, Information Systems Security, M31.00-00

Program Description

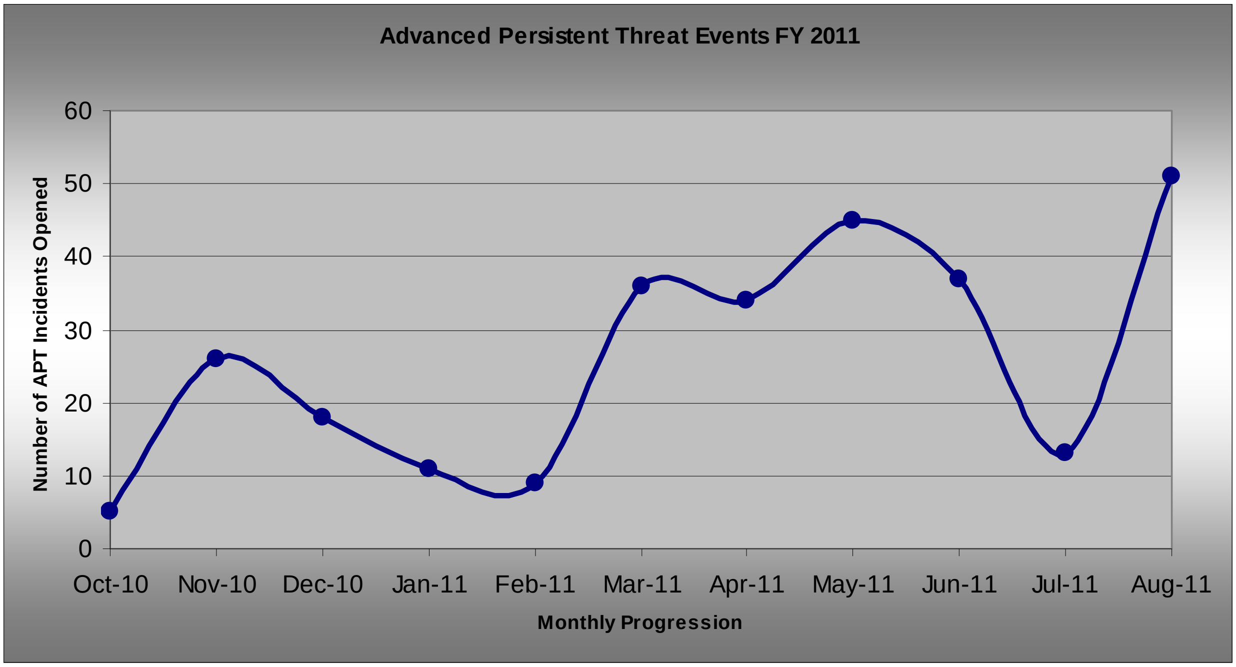
The FAA must ensure the integrity and availability of all its critical information systems, networks, and administrative systems under conditions of increased cyber terrorism and malicious activities by hackers and other unauthorized personnel. In the Homeland Security Presidential Directive/HSPD 7, FAA was directed to protect and ensure the integrity, confidentiality, and availability of all National Airspace Information Systems as well as federal information. Under the Federal Information Security Management Act (FISMA) of 2002, FAA must identify and provide information security protection equal to the risk and magnitude of the harm resulting from unauthorized access, use, disclosure, disruption, modification, or destruction of information that supports the agency, aviation safety and security, and the NAS.

The FAA Information Systems Security (ISS) program is a partnership between the FAA Chief Information Officer (CIO) organization and FAA lines of business and staff offices (LOBs/SOs) with a focus on protecting our information technology (IT) infrastructure. The Cyber Security Management Center (CSMC) provides the following services:
- IT and Information Systems Security (ISS) awareness and training;
- IT development;
- enterprise architecture;
- policy, standards, and requirements;
- program evaluations; and
- system certification and compliance.

This comprehensive Cyber Security effort offers information security awareness training for the agency's key ISS personnel, development and evaluation of policies and standards, formulation of system requirements, certification of systems and ensures their compliance with federal regulations, protection of FAA's computer enterprise, and response to computer security incidents. The CSMC is the operational branch of the FAA ISS Program. It is comprised of facilities, technologies, as well as FAA and contract personnel working as a unified entity to provide extremely effective, enterprise-focused cyber security services to its clients. The CSMC is a 24x7x365 day operation supporting the entire FAA and the Department of Transportation (DOT). In executing the CSMC mission of cyber security for the FAA, the CSMC is the central reporting point for all cyber incidents occurring within the FAA and DOT. Along these lines, the CSMC also represents the entire DOT as the single source provider of the cyber “big picture” when reporting to the Department of Homeland Security (DHS).

The office of the Chief Information Officer (AIO’s) work continues with a comprehensive, proactive approach to preventing and isolating intrusions in the agency’s computer networks. This cyber defense strategy involves hardening of the individual system and network elements, isolating those elements and backing up those elements to avoid services disruptions.

Advanced Persistent Threat events are targeted attacks on federal government systems, which pose a serious and imminent threat to those systems. These are events specific in nature, objective and patterned. The development of the term "Advanced Persistent Threat" was initiated as an indirect route to allow the communication of these events and the identification of systems that have been compromised or affected by sophisticated cyber attacks. The chart below shows the monthly Advanced Persistent Threat event trend for October 2010 through August 2011.



Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

The FAA supports and implements security strategies and plans by: (1) ensuring effective preparedness, detection, response, and recovery regarding cyber attacks; (2) integrating information security efforts into all acquisition and operation phases to protect FAA people, buildings, and information; and (3) supporting the nation's efforts to safeguard homeland security, in particular the aviation infrastructure and industry.

Program Plans FY 2014 – Performance Output Goals

- Implement cyber security sensing and reporting systems for two component subsystems of the NAS.
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and Federal Desktop Core Configuration (FDCC)/The United States Government Configuration Baseline (USGCB) scanning of 60% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Install wireless technologies that monitor for rogue wireless network threats and vulnerabilities in locations TBD.
- Conduct software code vulnerability security analysis on 60 legacy and development agency systems.
- Conduct at least three Webinar/ training sessions on software assurance to FAA employees and contractors.

- Enhance the FAA Enterprise Architecture regarding cyber security protection by developing cyber security requirements and reviewing certification and authorization work.
- Develop Enterprise Architecture (EA) per annual architectural guidelines including data, information and information security architectures. Develop the EA based upon the Federal Enterprise Architecture Framework (FEAF) utilizing the Federal Segment Architecture Methodology (FSAM) or other OMB approved framework.
- Consolidate Line of Business plans, conduct a quality assessment, and develop the final EA update.

Program Plans FY 2015 – Performance Output Goals
- Implement cyber security sensing and reporting systems for two component subsystems of the NAS.
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 70% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Install wireless technologies that monitor for wireless network threats and vulnerabilities in locations TBD.
- Conduct software code vulnerability security analysis on 80 legacy and development agency systems.
- Conduct at least four Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

Program Plans FY 2016 – Performance Output Goals
- Implement cyber security sensing and reporting systems for two component subsystems of the NAS.
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 80% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Conduct software code vulnerability security analysis on 100 legacy and development agency systems.
- Conduct at least five Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

Program Plans FY 2017 – Performance Output Goals
- Implement cyber security sensing and reporting systems for two component subsystems of the NAS.
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 90% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Conduct software code vulnerability security analysis on 120 legacy and development agency systems.
- Conduct at least six Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

Program Plans FY 2018 – Performance Output Goals
- Implement cyber security sensing and reporting systems for two component subsystems of the NAS.
- Evaluate and deploy at least two new technologies to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement vulnerability and FDCC/USGCB scanning in support of continuous monitoring of 99% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Have completed software code vulnerability security analysis on 150 legacy and development agency systems.

- Conduct at least six Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

B, Federal Identity Credential and Access Management (FICAM), M31.04-01

Program Description

The FAA's Federal, Identity, Credential and Access Management (FICAM) program will ensure all FAA federal employees and contractors who work for the agency will use the Personal Identity Verification (PIV) credentials to gain access to the agency's systems and networks using procedures compatible with existing automation systems. The agency will implement and integrate the identity and access management capability across the entire FAA network infrastructure. The FICAM program will phase in implementation using existing government owned software products that are capable of integrating PIV authentication and authorization on the FAA networks and information systems. The FAA program will either augment legacy security controls of existing systems or substitute its controls for those that otherwise would be designed and implemented in new or refreshed systems dependent on the cost/benefit results. Utilizing the PIV cards for facility access authentication and systems and applications access and authorization will create a uniform and consolidated security and access control environment. Implementing the identity, credential and access management requirements provides the Agency with the opportunity to eliminate redundant, repetitive manual processes and to centralize access control, monitoring, alerts and auditing data while meeting FAA's performance, reliability and availability requirements. All hardware and software purchasing or configuration changes will be completed using the Agency's configuration management process. FICAM will achieve the goals and objectives of Homeland Security Presidential Directive-12 (HSPD-12), "Policies for a Common Identification Standard for Federal Employees and Contractors" and The Office of Management and Budget (OMB) Memorandum M-11-11, "Continued Implementation of Homeland Security Presidential Directive (HSPD) 12 – Policy for a Common Identification Standard for Federal Employees and Contractors". The Department of Homeland Security (DHS) has developed a plan of action for agencies that will expedite the Executive Branch's full use of the PIV credentials for access to federal facilities and information systems.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

This FAA FICAM Program provides agency services for identity, credential and access management to improve security, privacy and trust:

- **Identities**: Maintain a single set of digital identities that all facilities and information systems can trust.
- **Credentials**: Put those identities on secure credentials for personnel to present to facilities and information systems.
- **Access**: Use those credentials to access the agency's resources.

The FAA's FICAM Program allows different facilities and information management systems to share access controls. Each resource will continue to decide who can access it, but will not need to administer separate passwords. Our long term goal is to create that same kind of trust and interoperability with other government agencies, external organizations, and the public.

Program Plans FY 2014 – Performance Output Goals

Advance Security and Progress FAA's Compliance with Federal Information Security Management Act (FISMA) Regulations:

- Enhance the Physical Access Management Framework by increasing the number of FAA facilities that require electronic access control to accept PIV cards and validate against the PIV authoritative directory from 0.003% to 5% by FY 2014.
- Enhance the Logical Access Management Framework by increasing the number of FAA FISMA reportable applications, which have not been granted a waiver, to accept PIV cards from 1% to 25% by FY 2014.
- Provide application authorization capability in the enterprise Logical Access Management Framework in FY 2014.
- Prepare for Joint Resource Council (JRC) decisions, completing Concept of Requirements Definition Readiness Decision.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

3A07, SYSTEM APPROACH FOR SAFETY OVERSIGHT (SASO)

FY 2014 Request $9.5M

System Approach for Safety Oversight (SASO) – Phase 2a, A25.02-01 / X, System Approach for Safety Oversight (SASO) – Phase 2b, A25.02-02

Program Description

The SASO Program improves, automates, and standardizes FAA's Flight Standards (AFS) safety oversight and inspection processes by implementing International Civil Aviation Organization (ICAO) Safety Management System (SMS). To implement SMS within AFS four components are being developed; Safety Assurance System (SAS), Safety Risk Management (SRM), Safety Policy (SPO) and Safety Promotion (SPR).

Safety Assurance System (SAS) – The SAS supports a new proactive systems safety approach that will significantly improve the FAAs ability to identify and address hazards and safety risks before they result in accidents. Existing information systems and tools will be examined to determine their ability to support systems safety oriented oversight and redundant applications will be consolidated. Obsolete and unsuitable systems will be removed and replaced with an integrated suite of databases and analysis tools that coincide with the new SMS-based processes. The new systems, analysis and decision support tools will consistently provide accurate, critical information needed to make timely safety decisions, and the newly engineered oversight processes will emphasize the use of this data by the FAA when making critical decisions. Finally, the program will exchange information from these systems with national and international government and industry organizations throughout the aviation community to increase awareness of systemic safety risks and maximize levels of safety. The SAS will provide easier and quicker access to safety information for FAA employees that certificate and surveil the aviation industry.

Safety Risk Management (SRM) – SASO SRM activities include specific enhancements to the SAS toolset to support SRM, particularly with respect to the development and assessment of risk controls and the implementation of functional and data interfaces. These interfaces will interconnect the AFS SRM functions with SRM functions of other AVS services and offices, most notably the Aircraft Certification Service (AIR). This will be done in conjunction with updating internal AFS policy and procedures in accordance with SMS constructs and requirements.

Safety Policy – SASO Safety Policy improvements will focus on integrating safety planning, organizational structure and responsibilities, and operational procedures and controls. SASO will put in place processes and procedures to facilitate the development of plans and procedures to meet FAA, Office of Aviation Safety (AVS) and AFS safety objectives, and the establishment of acceptable levels of safety for both individual certificate holders and applicable aviation industry segments viewed as a whole. SASO will develop methodology for establishing an acceptable level of risk for particular industry segments and types of operations, and procedures to continuously monitor aggregate, industry level risk. Finally, references and process controls will be updated to support integration into the overall AVS SMS.

Safety Promotion – SASO Safety Promotion initiatives include five primary activities: development of a positive safety culture within AVS and AFS and certificated and non-certificated entities; communication of ongoing SMS efforts and outputs to all employees; establishment of personnel competency requirements for SMS activities; capturing knowledge of safety issues and incorporating it into the air transportation system; and updating product/service provider SMS requirements.

SASO is divided into three phases. SASO Phase I was a Research and Development (R&D) effort designed to develop and test the SAS concept, i.e. using automation to guide and support the FAA's safety oversight and inspection process, for the major air carriers as defined by Tile 14, Code of Federal Regulations (CFR) Part 121 and demonstrated the benefits of system safety to AFS and the aviation community. SASO Phase 1 resulted in the development and deployment of the SAS "Pilot Project" used to test the SAS concept in an operational environment for the major air carriers (CFR Part 121). SASO Phase 1 is considered complete. SASO Phase II further develops and implements the SAS concept for other CFR Parts. SASO Phase II is divided into two segments: Alpha and Beta.

<u>SASO Phase II Alpha (A25.02-01):</u>
SASO Phase II Alpha is the first segment and covers the years FY 2010 through FY 2015. In this segment, the AFS SAS Pilot Project is further developed and implemented and adds functionality to support AFS oversight of Title 14 CFR Parts 135 (commuter and on-demand operators) and 145 (repair stations). In October 2010, a prototype demonstration failed a risk-based analysis, a key requirement of the AFS SAS. A rework effort of the business processes has been completed and changes are being incorporated into the SAS. Also, changes to the testing and implementation strategies have been instituted to help mitigate further program risk. As a result, the SAS development and deployment will be delayed by approximately twenty months and the original completion of this phase is projected to slide from FY 2013 to FY 2015. Full deployment and initial operational capability (IOC) of the SAS is planned in FY 2015 by deploying the SAS to approximately 110 field sites and headquarters. A baseline change will be finalized in the fourth quarter, FY 2013, to reflect these program changes.

<u>SASO Phase II Beta (A25.02-02):</u>
SASO Phase II Beta is the second segment and covers FY 2014 through FY 2019. A Final Investment Decision (FID) for Phase II Beta is planned for 3rd quarter 2014. During this phase, SAS functionality is further developed to accommodate the remaining Title 14 CFR Parts regulated by AFS. These include, but are not limited to, other air operators, Pilot Schools and Training Centers, Aviation Maintenance Technical Schools, other certificated operations such as helicopter external load, and agriculture/crop dusting. Additionally, the remaining three components of the SMS (safety risk management, safety policy, and safety promotion) will be developed and implemented during this phase.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

SASO supports the goal of reducing the air carrier fatal accident rate by implementing a SMS that will assist aviation safety inspectors with their statutory oversight of the aviation industry. SASO Phase II Alpha implements an automation system that fulfills the first of four SMS components, Safety Assurance. SASO Phase II Beta completes the remaining three SMS components, Safety Promotion, Policy and Risk Management. After completion of both Phases, the aviation safety inspector workforce will be better informed so they can improve their enforcement of safety regulations and continue to protect America's flying public.

Program Plans FY 2014 – Performance Output Goals

SASO Phase II Alpha (A25.02-01):

- Complete testing and evaluation of the Safety Assurance System (SAS).
- Commence fielding of the SAS.

SASO Phase II Beta (A25.02-02):

- Complete FID for Phase II Beta in 2^{nd} quarter.

Program Plans FY 2015 – Performance Output Goals

SASO Phase II Alpha (A25.02-01):

- Complete fielding of the SAS.
- Achieve IOC of the SAS.

SASO Phase II Beta (A25.02-02):

- Conduct SAS Business Process Reengineering (BPR).
- Conduct SAS Phase II Beta Preliminary Design Review.
- Conduct Safety Risk Management (SRM) Preliminary Design Review.
- Conduct Safety Promotion (SPR) Preliminary Design Review.
- Conduct Safety Policy (SPO) Preliminary Design Review.
- Deliver SRM, SPR, SPO business processes documentation.

Program Plans FY 2016 – Performance Output Goals

SASO Phase II Alpha (A25.02-01):

- None.

SASO Phase II Beta (A25.02-02):

- Conduct SAS Phase II Beta Critical Design Review.
- Complete development of SAS Phase II Beta automation software package.
- Conduct Safety Risk Management (SRM) Critical Design Review.
- Conduct Safety Promotion (SPR) Critical Design Review.
- Conduct Safety Policy (SPO) Critical Design Review.
- Deliver SRM, SPR, SPO Software Design Documentation.

Program Plans FY 2017 – Performance Output Goals

SASO Phase II Alpha (A25.02-01):

- None.

SASO Phase II Beta (A25.02-02):

- Complete SAS Phase II Beta development of automation software package ready for testing.
- Complete Safety Risk Management (SRM) software development.
- Complete Safety Promotion (SPR) software development.
- Complete Safety Policy (SPO) software development.

Program Plans FY 2018 – Performance Output Goals

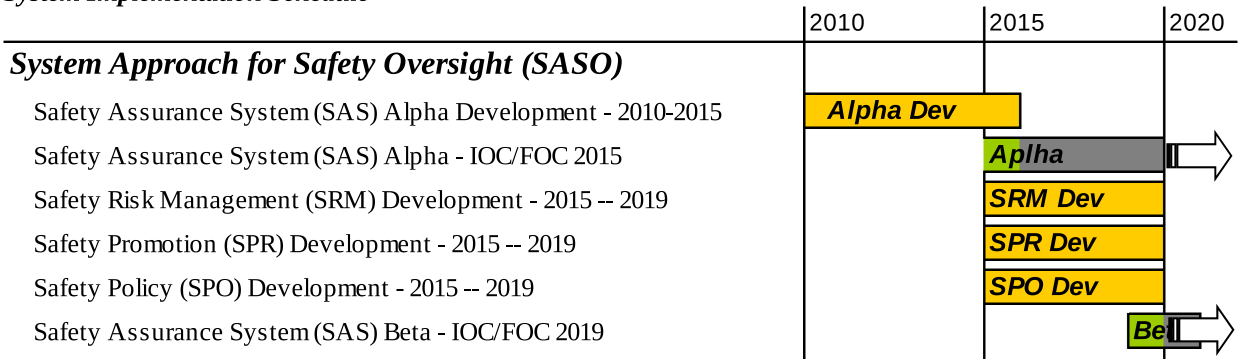
SASO Phase II Alpha (A25.02-01):

- None.

SASO Phase II Beta (A25.02-02):

- Complete SAS Phase II Beta automation software integration and test.
- Complete Safety Risk Management (SRM) software integration and test.
- Complete Safety Promotion (SPR) software integration and test.
- Complete Safety Policy (SPO) software integration and test.

System Implementation Schedule



3A08, AVIATION SAFETY KNOWLEDGE MANAGEMENT ENVIRONMENT (ASKME)

FY 2014 Request $12.2M

Aviation Safety Knowledge Management Environment (ASKME) – Segment 2, A26.01-01

Program Description

The Aviation Safety Knowledge Management Environment (ASKME) is a suite of information technology (IT) tools designed to support and enable the FAA Aircraft Certification Service (AIR) to more efficiently certify new aircraft and modifications to existing aircraft. The program was established to provide a comprehensive automation environment for critical safety business processes for the Office of Aviation Safety through deployment of 18 integrated business solutions (18 projects) between Fiscal Year 2008 and Fiscal Year 2017. Segment 1 covers fiscal years FY08-FY12 and Segment 2 covers fiscal years FY13-FY17. ASKME, Segment 2, obtained its baseline decision on September 21, 2011 from the FAA Joint Resources Council.

The environment created by integration of ASKME projects will provide electronic storage and retrieval of FAA technical documentation, and lessons learned from previous certifications that involved aircraft design and manufacturing safety issues, so that they can be accessed and shared more easily. ASKME will provide a comprehensive automated system and electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/ manufacturing certification and airworthiness certification to help approve operating certificates, design or modification of aircraft and meet aircraft safety conditions; designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

Segment 1 IT Application Deliverables Included:

- Electronic File Service (EFS)
- Work Tracking Software – Risk Based Resource Targeting (WTS-RBRT)
- Monitor Safety Related Data (MSRD)(3 related applications)
    - Monitor Safety Analyze Data (MSRD-MSAD)
    - Oversee System Performance – Internal (MSRD-OSPi)
    - Oversee System Performance – External (MSRD-OSPe)
- Designee Supervision / Past Performance (DS/PP)
- Assimilate Lessons Learned (ALL)
- Work Tracking Software – Work Activity Tracking (WTS-WAT)
- Engineering Design Approval (EDA)
- DTE-DDS Technical Evaluations – Aircraft Certification Audit Info System (ACAIS)

Segment 2 IT Application Deliverables Include:

- Electronic File Service (EFS) – Production Support and Historical Scanning
- Work Tracking Software – Budget Management (WTS-BMgmt)

- Airworthiness Directives Development (ADD)
- Airworthiness Certifications (4 related applications):
  - Standard Airworthiness Certifications (StdAC)
  - Special Airworthiness Certifications (SpclAC)
  - Special Flight Authorizations (SFA)
  - Certification of Imported/Exported Products (CI/EP)
- Compliance and Enforcement Actions (CEA)

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

The Aircraft Certification Service (AIR) is responsible for ensuring that civil aircraft are designed and manufactured to operate safely within the NAS. ASKME will provide the automated systems to conduct safety data analysis and data gathering, as well as the collection of lessons learned as it applies to AIR's safety-related responsibilities (e.g. aircraft certification and certificate management, regulatory development, designee supervision and oversight, and operational safety). ASKME will provide AIR with a comprehensive mechanism aimed at: 1) the early identification and resolution of accident precursors; 2) the promotion of systematic and structured risk assessment/risk management practices; and 3) the proactive management of safety issues throughout the lifecycle of an aircraft and its components. The projected benefit from FY 2013 to FY 2023 is estimated at 77.26 avoided fatalities.

Program Plans FY 2014 – Performance Output Goals

- Finalize System Specification Requirements for Standard Airworthiness Certifications (StdAC).
- Finalize System Specification Requirements for Special Airworthiness Certifications (SpclAC).
- Finalize System Specification Requirements for Special Flight Authorizations (SFA).
- Finalize System Specification Requirements for Certification of Imported/Exported Products (CI/EP).
- Complete development, test, and implementation phases for Engineering Design Approval (EDA).
- Complete development, test, and implementation phases for Develop and Deploy DTE-DDS Technical Evaluations-ACAIS.
- Complete development, test, and implementation phases for MSRD-Oversee System Performance External (OSPe).
- Complete development, test, and implementation phases for Designee Supervision/Past Performance (DS/PP).
- Complete design, development, test, and implementation phases for Work Tracking Software-Budget Management (WTS-BMgmt).
- Complete scanning of 25% of historical documents for Electronic File System (EFS).

Program Plans FY 2015 – Performance Output Goals

- Finalize documented detailed System Specification Requirements Compliance and Enforcement Actions (CEA)
- Complete design, development, test, and implementation phases Airworthiness Directives Development (ADD).
- Complete scanning of 25% of historical documents for Electronic File System (EFS).

Program Plans FY 2016 – Performance Output Goals

- Complete design, development, test, and implementation phases Standard Airworthiness Certifications (StdAC).
- Complete design, development, test, and implementation phases Special Airworthiness Certifications (SpclAC).
- Complete design, development, test, and implementation phases for Special Flight Authorizations (SFA).
- Complete design, development, test, and implementation phases for Certification of Imported/Exported Products (CI/EP).
- Complete design, development, test, and implementation phases for Compliance and Enforcement Actions (CEA).

- Complete scanning of 25% of historical documents for Electronic File System (EFS).

Program Plans FY 2017 – Performance Output Goals
- Complete scanning of all historical documents for Electronic File System (EFS).
- Complete requirements document identifying additional user needs.
- Conduct user in service training.

Program Plans FY 2018 – Performance Output Goals
- None.

3A09, DATA CENTER OPTIMIZATION
FY 2014 Request $1.0M

Data Center Consolidation Initiative, F30.01-01

Program Description

The Data Center Consolidation Initiative (DCCI) consolidates existing data centers and provides application owners with access to state-of-the-art data center services for administrative and mission support systems and services. It shifts agency IT investments to more efficient technologies and better use of data center resources. These improvements will solve persistent agency shortfalls, support agency IT cost reduction initiatives, ensure compliance with the OMB mandate to consolidate data centers, and reduce year-to-year spending on data centers. New data center hosting requests continue to be presented to data centers which are at or near capacity. In addition, numerous applications and services are currently hosted in server/computer rooms which are not conducive to efficient or secure IT operations.

Historically, the FAA has managed a distributed data center environment which permitted costly data center sprawl without real alignment to enterprise-level planning and requirements. Much of the agency's current data center capacity is inadequate to support FAA services and is operating at near capacity in Oklahoma City and Atlantic City. The lines of business (LOBs) and staff offices (SOs) continue to host services in sub-standard data center spaces in part due to this capacity shortage. The FAA currently provides services from within local computer rooms, which expose the agency to security and technical risks. In addition, this environment perpetuates a lack of governance and leads to further inefficiencies in equipment and services.

During February 2010 OMB launched the Federal Data Center Consolidation Initiative (FDCCI) to curb year-to-year spending on federal data centers and to support federal sustainability goals. OMB requires agencies to consolidate excess data center capacity, show improved use of existing data center resources, and streamline processes in a shared IT services environment. Every year agencies must update data center inventories, make commitments to close excess data center spaces, and estimate related cost savings. Beginning in 2011 the General Accountability Office (GAO) also began to report to Congress on individual agency progress.

The FAA will require investment funds to accomplish large-scale consolidation, primarily to support the cost of migrating servers and applications to strategically selected data centers. Savings will be achieved over time as spaces are decommissioned and the agency stops incurring related facilities costs; staffing needs are reduced; and services are migrated to modern, optimized data center facilities.

The agency now maintains 155 data center spaces, which comprise roughly 57,000 square feet of space. Of these spaces, 19 are at least 1,000 square feet, and the largest is 7,600 square feet. The spaces require floor space, power, cooling and other infrastructure such as: telecommunications networking, racks, etc. They host 2,744 computer servers and additional data storage hardware.

The agency plans to use the DCCI program to consolidate 35 to 40 spaces, which comprise approximately 20 percent of the current footprint and currently host 1,109 servers. Consolidation would occur within existing regional data centers, the CLERC server room in FOB10B at Headquarters, the System Management Facility at the Mike

Monroney Aeronautical Center in Oklahoma City, and the data center at the William J. Hughes Technical Center. The agency would also use at least one additional enterprise data center which is yet to be identified. Options for the additional center include using the new Herndon data center (not yet part of the agency data center inventory) or a third-party data center hosting service.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

By reducing the number of data center facilities, standardizing controls and providing enterprise-wide governance, DCCI will increase the FAA's security posture. DCCI will replace the current patchwork of network and security solutions with a well-engineered unified infrastructure that allows for quick identification of vulnerabilities and enables FAA to stop potential attacks. Consolidating security and technologies will simplify security controls, help automate processes and ensure an operationally efficient approach.

Program Plans FY 2014 – Performance Output Goals

- Complete FAA data center consolidation plan.
- Complete migration of 20 servers to consolidation centers.

Program Plans FY 2015-2018 – Performance Output Goals

- None.

3A10, AEROSPACE MEDICAL EQUIPMENT NEEDS (AMEN)

FY 2014 Request $5.0M

Aerospace Medical Equipment Needs (AMEN) – Technology Refresh – Phase 1, M53.01-01 / X, Aerospace Medical Equipment Needs (AMEN) – Technology Refresh – Phase 2, M53.01-02

Program Description

The Aerospace Medical Equipment Needs (AMEN) program will replace 121 items of the Civil Aerospace Medical Institute (CAMI), Aerospace Medical Research Division's laboratory equipment. This older laboratory equipment lacks the modern capabilities needed for testing and will be replaced with more capable Commercial-Of-The-Shelf (COTS) products over the FY 2012 through FY 2016 period. The program was approved with a 5-year baseline (FY 2012 – FY 2016). AMEN Technology Refresh Phase 1, M53.01-01, replaces the 121 items while AMEN Technology Refresh Phase 2, M53.01-02, replaces 23 items (category D: Scientific and Engineering Research Systems) that are acquired under AMEN Phase 1 and have a four year life cycle.

CAMI, located at the Federal Aviation Administration (FAA) Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, Oklahoma, is the medical certification, education, research, and occupational medicine wing of the Office of Aerospace Medicine (AAM) within the FAA's Aviation Safety Organization (AVS). CAMI supports regulation of aviation safety and development of aeromedical safety standards. CAMI's personnel work in sophisticated research laboratories and testing facilities with the need for modern scientific, engineering, and medical systems. The equipment to be procured by the AMEN program supports two critical FAA research areas: Bioaeronautical Sciences and Protection & Survival.

AMEN Technology Refresh Phase 1 (M53.01-01):
Much of the laboratory equipment used by CAMI's scientists, physicians, and engineers is old and becoming obsolete. This aging equipment places several accreditations at risk, and does not allow the FAA to keep up with science and technology advances currently available in the market. The AMEN technology refresh program is designed to replace 121 equipment items classified into the following categories:

1. 27 Biochemical Sample Analyses Systems e.g., chromatographs, spectrometers, molecular biology instruments, and gene sequencing systems – 7 year life cycle.
2. 24 Biochemical Sample Preparation and Physiological Monitoring Systems e.g., centrifuges, plates, tonometer, oxymeters, extraction tools, balances – 10 year life cycle.
3. 38 Storage, Cleaning, Machining, and Laboratory Safety Systems e.g., refrigerators, freezers, fume hoods, filing cabinets, locker, washer, dryer, drills – 20 year life cycle.
4. 23 Scientific and Engineering Research Systems e.g., High rate material test system, data mining statistical tools, scientific information systems, light system electronic control - 4 year life cycle. (These items will be replaced by AMEN Technology Refresh at the end of their life cycle)
5. 7 Mechanical and Engineering Monitoring Systems e.g., environmental monitoring (includes Altitude Chamber), anthropometric dummies, calibration systems, transducers – 15 year life cycle.
6. 2 Evacuation and Impact Testing Systems e.g., Impact Sled and Aircraft Cabin Environment Facility (ACEF) – 25 year life cycle.

AMEN Technology Refresh Phase 2 (M53.01-02):
AMEN Technology Refresh Phase 2, replaces 23 items (category D: Scientific and Engineering Research Systems) that are acquired under AMEN Phase 1 and have a four year life cycle.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

More modern equipment will support four human safety research areas: (1) AEROMEDICAL SYSTEMS ANALYSIS: Assessment of very large datasets concerning aircrew, their medical certification, and their involvement in aviation accidents and incidents; (2) ACCIDENT PREVENTION AND INVESTIGATION: Development of procedures to detect aeromedically unsafe conditions and trends. The forensic toxicology laboratory serves as the primary national site for toxicology testing relative to accident investigation fatalities; (3) CRASH SURVIVAL: Assessment of crash environments including head impact, seat deformation, occupant restraint performance, and safety device effectiveness; all key issues in aircraft certification processes and protection of human life; and (4) AVIATION PHYSIOLOGY. Assessment of human performance at altitude, adequacy of protective breathing equipment, aircraft environmental control systems/cabin air quality, and methods of detection/protection from chemical, biological, and radiological threats. This research will lead to a better understanding of disease and environmental stress factors (alcohol, fatigue, hypoxia, g-forces) that concern medical certification decision-making processes, aircrew performance, aeromedical education programs for aviation medical examiners, pilots, and flight attendants; accident investigation practices; certification of aircraft equipment and protective devices; and harmonization of standards.

Program Plans FY 2014 – Performance Output Goals
AMEN Technology Refresh Phase 1 (M53.01-01):
- Contract Awards by 7/1/14 (of type A: 2, B: 12, C: 17, D: 2, and E: 2,).
- Award contract for Altitude Chamber Air Handling System, July 2014. (APB milestone)
- All items acquired in FY 2012 in service by 9/2014 including disposition of old equipment.
- Complete In-Service for Impact Sled System, 9/14/2014. (APB milestone)
- Complete In-Service for Aircraft Evacuation Research Facility, 9/24/2014. (APB milestone)

AMEN Technology Refresh Phase 2 (M53.01-02):
- None.

Program Plans FY 2015 – Performance Output Goals
AMEN Technology Refresh Phase 1 (M53.01-01):
- All items acquired in FY 2013 in service by 9/15 including disposition of old equipment. (Prior year funds)
- Complete In-Service for Altitude Chamber Control System, February 2015. (APB milestone) (Prior year funds)

AMEN Technology Refresh Phase 2 (M53.01-02):
- None.

Program Plans FY 2016 – Performance Output Goals
AMEN Technology Refresh Phase 1 (M53.01-01):
- All items acquired in FY 2014 in service by 9/2016 including disposition of old equipment. (Prior year funds)
- In-Service Altitude Chamber Air Handling System, April 2016. (APB milestone) (Prior year funds)

AMEN Technology Refresh Phase 2 (M53.01-02):
- Contract Award: continued refresh of items in Category D: Scientific and Engineering Research Systems.

Program Plans FY 2017-2018 – Performance Output Goals
- None.

3A11, AVIATION SAFETY INFORMATION ANALYSIS AND SHARING (ASIAS)*
FY 2014 Request $15.0M

Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS), G07A.02-01

Program Description

The ASIAS program is an information safety analysis and data sharing collaboration involving industry and government to proactively analyze broad and extensive data to advance aviation safety. The primary objective of ASIAS is to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS uses internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data. ASIAS fuses these data sources in order to identify safety trends in the NAS, leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities.

The information analysis and sharing mission directly supports safety promotion and safety assurance initiatives with analytical results such as baseline information and trends; and indirectly supports safety risk management through issue identification, information and tools for analysis of hazards. System wide analysis and modeling support risk assessment and management for both existing and future systems by identifying potential systemic risks associated with new systems (in NextGen) as well as existing systems. To fully realize the benefits of the SMS approach to safety and reach the safety levels demanded by the public, it will be necessary to address shortcomings in the current aviation system by:

- Replacing inadequate, informal communication with prompt and comprehensive exchanges of aviation safety information
- Coordinating and sharing the resources required to maximize the effectiveness of tool development and issue analysis
- Establishing a collaborative approach to identifying and mitigating system safety issues posing the highest risks.

ASIAS supports these objectives by aggregating and sharing data among ASIAS participants in order to more clearly understand precursors to accidents. ASIAS aggregates disparate aviation safety data sources in a central repository, increasing its potential value for analysis-based insight and providing insights that would not be available if data is not shared. ASIAS also performs advanced safety analytical capabilities and analyses that would not be available to individual participants performing similar analyses.

ASIAS has initiated the process of proactively analyzing, identifying and monitoring the data for potential high risk safety issues that might otherwise remain hidden until uncovered in post-incident investigations. New automated processes will facilitate advanced analysis of comprehensive data which will provide new insights about potential safety risks in both the current NAS and as the NAS evolves to NextGen.

The activities in the program include:

1. Research to develop ASIAS capabilities that build upon and extend existing capabilities for managing and processing aviation safety and performance data,
2. The development of tools that convert both textural and numeric data into information, and
3. The creation of visualization capabilities that aid causal/contributing factor analyses and risk assessment.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

ASIAS is a vital component needed to achieve this goal. Safety insights from ASIAS analyses are communicated to the ASIAS participants and, as authorized by the ASIAS Executive Board (AEB), to the others in the aviation community. Participants will leverage insight to identify risk-reducing alternatives or changes to operations or processes. Implemented changes will prevent would-be accidents. Safety insights from ASIAS will be applicable to a broad range of aviation communities (e.g., commercial, general aviation (GA), helicopters) and other civilian agencies involved with aviation operations (e.g., airport operators, airport authorities) and specifically to the FAA as it develops and implements NextGen. ASIAS supports promotion and expansion of safety information efforts, particularly as a FAA-industry partnership and data-driven safety program to identify, prioritize and address risks and/or vulnerabilities before they lead to accidents.

Program Plans FY 2014 – Performance Output Goals

- Convert existing distributed nodes to the centralized ASIAS node to achieve operational cost efficiencies.
- Demonstrate the use of the ASIAS web portal as a collaboration tool among stakeholders, including access to selected aggregated fused data sets and expanded analytical capabilities by ASIAS participants for their internal analysis.
- Develop and implement, through limited application for select fleets, a new data standard for Flight Operational Quality Assurance (FOQA) data.

Program Plans FY 2015 – Performance Output Goals

- Demonstrate the use of ASIAS capabilities to measure safety risks that may evolve through the implementation of NextGen capabilities.
- Expand data fusion to include the integration of voluntarily submitted text safety reports from both FAA and ASIAS participants with digital flight data and FAA surveillance data.

Program Plans FY 2016 – Performance Output Goals

- Complete the evolution of the ASIAS architecture to one where all proprietary data are available on a secure centralized network where such data can be efficiently integrated with other non-proprietary data.
- Expand ASIAS analytical capabilities to include the storage, retrieval, and analysis of ATC voice archives; demonstrate the application of these capabilities through one of the ASIAS Directed Studies.
- Introduce a methodology for automated vulnerability assessment capability into ASIAS.

Program Plans FY 2017 – Performance Output Goals

- Through the ASIAS Portal, enable full 3-D visualization of selected safety events using aggregate fused data for ASIAS participants use in their internal analysis.
- Align Directed Studies and analytical techniques with NextGen system changes (e.g., ATM procedures, airspace redesign) and community changes (e.g., fleet changes, avionics).
- Expand ASIAS studies beyond those affecting commercial aviation in the NAS through assessment of issues that impact multiple segments of the aviation community (e.g. interaction of GA and commercial aviation) as well as targeted studies for specific communities such as rotorcraft or GA fixed wing.
- Develop automated capabilities to alert atypical flight and system behavior using fused digital and textual data.

Program Plans FY 2018 – Performance Output Goals

- Establish the participation in ASIAS of UAS operators based upon risk-based, statistically significant standards.
- Complete the transition of ASIAS to a cloud-based architecture for data storage and analytical capabilities, and provide access to other organizations to conduct their own analyses in a cloud based environment.
- Expand ASIAS studies to include risks identified by unsupervised exploratory (atypicality) analysis performed on databases consisting of fused proprietary and publicly available data.
- Complete integration of ASIAS with other NextGen portfolios through establishment of appropriate requirements-driven safety metrics and monitoring strategies to demonstrate safety performance.

3A12, NATIONAL TEST EQUIPMENT PROGRAM

FY 2014 Request $3.0M

National Test Equipment Program, M17.01-01

Program Description

The National Test Equipment Program (NTEP) is responsible for the purchase, calibration, maintenance, and management of FAA test equipment at over 41,000 sites. NTEP ensures that the NAS equipment operates within technical and safety specifications. The test equipment is used by technicians to troubleshoot, repair, and certify new and legacy systems. Operational NAS systems must be certified by this test equipment before being returned to service.

Analysis conducted during the Service Analysis and CRD phases indicates that between 19%-25% of the 77,000 pieces of Test Equipment (TE) require replacement, with an estimated cost of approximately $320M. Some existing test equipment is more than 30 years old and spare parts for this old equipment are no longer manufactured, so it must be replaced. Replacement of the current analog test equipment must be forward compatible with the advanced digital technology being deployed through NextGen. Current requirements reflect a critical need for Transmission, Comm Service Monitors, Signal Generators, and Oscilloscopes. In addition, the NTEP will be able to improve the safety of certain procedures as technology enhancements reduce the need to perform certain functions, such as climbing high towers.

Within the Acquisition Management System process, the program completed the Concept and Requirements Development phase with the Investment Analysis Readiness Decision (IARD) JRC approval on September 20, 2012. Following a successful Final Investment Analysis (FIA) phase, the Final Investment Decision (FID) is expected on or before June 2013. These milestones have been incorporated on the FAA's Enterprise Architecture (EA) Roadmap for Facilities. If approved at the FID, the program's spend plan has prioritized satisfying the test equipment shortfall at the FAA's Core 30 airports.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

Poor performing test equipment impacts the mean-time to restore between outages. When test equipment is functioning at an optimal performance, it provides a return on investment through greater efficiencies in maintaining the NAS. Representative systems that are impacted by the program include: Communication, Automation, Surveillance, Power, Navigational, and Weather.

Program Plans FY2014 – Performance Output Goals
- The National Test Equipment program plans to procure and deliver to the Service Areas:
    - 20 communication test sets
    - 40 telephone test sets
    - 30 cable and antenna analyzers
    - 20 signal generators
    - 10 counters

Program Plans FY2015 – Performance Output Goals
- The National Test Equipment program plans to procure and deliver to the Service Areas:
    - 20 communication test sets
    - 40 telephone test sets
    - 30 cable and antenna analyzers

Program Plans FY2016 – Performance Output Goals
- The National Test Equipment program plans to procure and deliver to the Service Areas:
    - 40 communication test sets
    - 80 telephone test sets
    - 60 cable and antenna analyzers

Program Plans FY2017 – Performance Output Goals
- The National Test Equipment program plans to procure and deliver to the Service Areas:
    - 40 communication test sets
    - 80 telephone test sets
    - 60 cable and antenna analyzers

Program Plans FY2018 – Performance Output Goals
- The National Test Equipment program plans to procure and deliver to the Service Areas:
    - 40 communication test sets
    - 80 telephone test sets
    - 60 cable and antenna analyzers

3A13, MOBILE ASSETS MANAGEMENT PROGRAM

FY 2014 Request $3.0M

Mobile Asset Management Program, F31.01-01

Program Description

The Mobile Asset Management Program (MAMP) provides easily moveable NAS equipment to restore certain operations during periods of extended equipment outages, to ensure continuity of NAS operations. Mobile NAS equipment provides for the continuity or restoral of air traffic control when an air traffic control tower (ATCT) or other NAS system is out of service due to a disaster or extensive repair/modernization/upgrade and to augment air traffic control functions during major public events which may impact air traffic safety. The MAMP provides mobile assets that function as ATCTs, terminal radar approach control (TRACON) facilities, remote transmitter/receiver (RTR) sites, remote communications air/ground (RCAG) sites, and other systems that experience unexpected outages or planned system downtime for non-routine maintenance, modernization, or upgrade.

The FAA's mobile assets are in a serious state of disrepair and are often incapable of providing their intended service without first undergoing significant maintenance or repair. The inventory consists of 104 assets that range from 30KW Mobile Engine Generators (MX) to four-position, mobile ATCTs (MATCTs). The near term need is to replace eight obsolete large four-position MATCTs and restore the remaining assets to a full operational capability. The MATCTs, which were acquired in the 1990s and are experiencing serious material failures and they must be replaced. Currently, there is no centralized management or logistics support oversight of these assets to keep them in a fully operational condition. As a result of these deficiencies, the FAA is experiencing significant difficulty in providing functional mobile assets when emergency conditions warrant their use. MAMP will provide the mobile assets and the means to manage those assets.

National Deployment Centers shall be established in each Service Area. The Central Service Area (CSA) and Western Service Area (WSA) will establish their Deployment Centers in FY 2014, and the Eastern Service Area (ESA) will establish its Deployment Center in FY 2015. The Deployment Centers will serve as national property custodians of the mobile assets. Sheltered storage is mandatory. The Deployment Centers will arrange for transportation of the mobile assets to and from the event location, and verify inventory/assessment with the receiving custodian. The Deployment Center will maintain a website schedule of the mobile assets deployments within their area of responsibility. The mobile assets will be maintained by the District Offices and Systems Support Center (SSC) personnel at the appropriate Deployment Center in advance of a deployment.

Efforts are underway to develop a set of requirements for all mobile assets. These requirements will be the basis for building an inventory of mobile assets that will enable the FAA to respond to planned and unplanned outages in the NAS.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation,*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent through 2016.*

Relationship to Performance Metric

The MAMP program supports NAS operational availability by providing backup service for radars, control towers, and communications systems. Hurricane Katrina and the Haiti earthquake revealed that the FAA is not well prepared to handle disasters. Also, each year there are 10-15 ATCT modernization efforts in progress which require mobile assets to maintain operations assets are not always available necessitating the development of "work around" procedures result in extending the duration of the projects. Additionally, the majority of the ATCTs are over 50 years old resulting in an increasing number of unforeseen outages requiring mobile assets to maintain operations.

Program Plans FY 2014 – Performance Output Goals
- Award national Indefinite Delivery Indefinite Quantity (IDIQ) Mobile Towers Contract.
- Acquire two Large Self-Contained MATCTs.
- Develop prototype modular MATCT, across multiple years.
- Establish a National Deployment Center for CSA and WSA.
- Acquire test equipment, tools and ancillary for CSA and WSA Deployment Centers.
- Acquire security cameras and access control for CSA and WSA Deployment Centers.
- Repair / modernize six Silver Streak MATCTs to support NAS operations.

Program Plans FY 2015 – Performance Output Goals
- Acquire three large Self-Contained MATCTs.
- Develop prototype modular ATCT, across multiple years.
- Repair / modernize six two position MATCTs.
- Establish a National Deployment Center for ESA.

Program Plans FY 2016 – Performance Output Goals
- Acquire a Modular MATCT.
- Repair / modernize six two position MATCTs.

Program Plans FY 2017 – Performance Output Goals
- Acquire a Modular MATCT.
- Repair / modernize six two position MATCTs.

Program Plans FY 2018 – Performance Output Goals
- Acquire four large Self-Contained MATCTs.
- Repair / modernize six two position MATCTs.

3A14, AEROSPACE MEDICINE SAFETY INFORMATION SYSTEM (AMSIS)
FY 2014 Request $3.9M

Aerospace Medicine Safety Information System (AMSIS) – Segment 1, A35.01-01

Program Description

The Aerospace Medicine Safety Information System (AMSIS), Segment 1, will develop a new information system for tracking and analyzing medical information associated with pilots, air traffic controllers and other aviation related personnel.

The Office of Aerospace Medicine (AAM) is responsible for:
- the Medical Certification of Airmen;
- Medical Clearance of Air Traffic Control Specialists (ATCSs);
- Oversight of the Aviation Industry’s Drug and Alcohol Testing Programs;
- Designation, Training, Oversight and Surveillance of Aviation Medical Examiners;
- FAA Employee Substance Abuse Testing;
- Airmen Aviation Physiology and Survival Training and Education;
- FAA Employee Health Awareness; and
- Aerospace Medicine and Human Factors Research.

AAM processes the medical certification applications of approximately 400,000 pilots each year and maintains millions of medical records as part of AAM’s role in the oversight of three quarters of a million airmen and nearly 17,000 ATCSs.

These information systems are becoming obsolete. The business processes that support the medical certification of airmen, and the other aviation safety programs, need to be re-engineered. The information technology must be refreshed and aligned with OMB/DOT/FAA information systems architecture and security standards. Additionally, because these are medical information systems AAM must also align these systems with the national health information technology standards and security requirements. The systems must also successfully and securely interface with approximately 3,500 health care providers designated by the FAA, known as Aviation Medical Examiners, who perform pilot and ATCS medical examinations. The systems must advance from their current client-server platform, some of which are accessible through the internet, to web-based applications.

AMSIS Segment 1 encompasses three phases of assessment, planning and implementation that will result in significant improvements to the Medical Certification process and thus to the pilots, ATCS, and Medical Examiners. Development and implementation will be based on best industry practices. The AMSIS program will evaluate strategic approaches to cost savings and operational efficiencies such as virtualization, cloud deployments, modular development with service orientation, and Web 2.0 applications. AMSIS will significantly reduce development costs and provide a cost effective solution to Medical Certification IT that is flexible and scalable.

Phase 1 Assessment. This phase will begin by evaluating current AAM core business processes to determine the effectiveness and efficiency of those processes. Those results will be used to determine if any further improvements can be made and will then be reviewed using best practices and process improvement technique to determine if any steps can be eliminated or streamlined. AAM information systems will be evaluated based on proposed changes to AAM core business processes and the architecture of AAM subsystems. A gap analysis will compare the current architecture of AAM subsystems to agency standards for architecture. Assessments must also be conducted to align our architecture with the national electronic healthcare records and other information systems architectures.

Phase 2 Planning. A transitional roadmap will be developed to retire legacy components (reducing legacy operational costs) and to integrate our systems with the targeted Enterprise Architecture. For example, cross referencing of pilot’s medical information through multiple government databases is needed to identify persons who are not medically eligible to be a pilot. AMSIS will meet Congressional and DOT OIG mandates to establish a capability to match airmen medical records with the electronic health records of other government agencies and departments. External databases such as the National Health Information Network (NHIN), Health Information Exchange (HIE) system medical records and the National Information Exchange Model (NIEM) will be accessed to meet mandated goals of information exchange while reducing the costs.

Phase 3 Implementation. Based on the results of the analysis, a risk-based iterative development cycle will be initiated. An aggressive strategy of artifact reuse such as external standards, business process models, architectural structures and coded configuration items will be applied to manage risk associated with cost, schedule and technological issues.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

Over the past 5 years, approximately 5,000 pilots have been denied a medical certificate each year. AMSIS will provide better data accessibility and a greater ability to analyze medical information and denial data to identify safety trends that could impact system safety.

Specifically, AMSIS will reduce accidents and improve safety by:

- Reducing falsification of health records and preventing pilots or ATCSs from operating in the NAS when they have medical conditions hazardous to aviation safety;
- Improving the ability to analyze medical data and identify and mitigate hazards related to specific and/or systemic airmen and ATCS health issues;

- Improving the ability to match airmen and ATCS medical records with the electronic health records of other government agencies and departments;
- Ensuring the accuracy and integrity of airmen and ATCS medical data;
- Leveraging the National Health Information Network (NHIN), Health Information Exchange (HIE) system medical records, and Ad Hoc, Regional, Multi-Regional HIEs, to improve the accuracy of airmen and ATCS medical data and
- Improving the surveillance and oversight of designees and aviation industry substance abuse programs.

Program Plans FY 2014 – Performance Output Goals
- Award contract for Phase 1.
- Evaluate and document AAM core business processes.
- Conduct and document IT gap analysis and Business Process Re-Engineering (BPR) results.
- Conduct and document results of an Architectural review for support of technology requirements.

Program Plans FY 2015 – Performance Output Goals
- Complete development of implementation plan for Phase 2.
- Award contract for Phase 2.
- Conduct an incremental solution prototyping delivering an initial airman eAuthentication functionality.
- Document prioritization of automation of core AAM IT capabilities for rapid deployment.
- Develop modular components of airmen certification and data verification functionality.

Program Plans FY 2016 – Performance Output Goals
- Update implementation plan for Phase 3.
- Complete initial segments of core functionality internal to AAM.
- Complete initial interagency information exchanges of airmen certification criteria.
- Complete a limited deployment of diverse web-enabled mobile interface options.

Program Plans FY 2017 – Performance Output Goals
- Update implementation plan for Phase 3.
- Update Enterprise Architecture and technology constraints documents.
- Prepare optimal implementation strategy document (TBD).
- Complete development of full operational capability.

Program Plans FY 2018 – Performance Output Goals
- None.

B: Training, Equipment, and Facilities

3B01, AERONAUTICAL CENTER INFRASTRUCTURE MODERNIZATION
FY 2014 Request $12.3M

Aeronautical Center Infrastructure Modernization, F18.00-00

Program Description

The Aeronautical Center Infrastructure Modernization program funds renovation and restoration of critical leased and owned facilities at the Aeronautical Center in Oklahoma City to ensure they remain viable for the mission of present and future FAA employees, students, and contractors. Funding from this program allows renovation of facility space used by Air Operations, Engineering, Training (Radar/Navaids), NAS Logistics, airmen/aircraft registration, safety, and Business Services. Program funding will be used for facility renovation, building system replacement, and telecommunications infrastructure upgrade.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The Aeronautical Center Infrastructure Modernization program sustains a cost effective workplace for Air Operations, Engineering, and Training that contribute to the FAA's 99.7% NAS system availability goal. This program reduces the cost of Air Traffic Organization (ATO) operations by providing facilities that are lower in cost when compared with Oklahoma City General Services Administration (GSA) metropolitan leased facilities and GSA national averages for leased facilities.

This program enhances financial discipline by providing Technical Operations and Air Traffic training through updated training facilities for resident and computer-based learning and development. In addition, 13% of Aeronautical Center space provides business service facilities for the DOT/DELPHI/Prism/Castle Data Center Operations, consolidated Accounting Operations services, Acquisition, ATO Data Center Operations, and Aviation Safety (AVS/CAMI).

Program Plans FY 2014 – Performance Output Goals

- Award construction contract to relocate ASR-9/Mode S, ARSR-3, Common Air Route Surveillance Radar (CARSR) and ASR-8.
- Award design contract to renovate Bldg 152, Environmental System Support building.
- Award construction contract of Thomas P. Stafford exterior wall panel replacement.
- Complete Phase 1 (of 4) renovation construction of the Systems Training Building.
- Award contracts for Phase 3 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 22, 29, 5, 215, 117, 123, 136, 166, 167, 185 (34 of 61 buildings). Includes security assessments, upgrades, and disaster recovery testing on North campus fiber for redundancy on network routers.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and East campus duct banks/fiber installation.

Program Plans FY 2015 – Performance Output Goals

- Award renovation construction contracts for the Environmental System Support (Bldg 152) to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting and insulation.
- Complete relocation construction of ASR-9/Mode S, ARSR-3, CARSR and ASR-8 radars.
- Complete Phase 2 (of 4) renovation construction of the Systems Training Building.
- Award contracts for Phase 4 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 24, 23, 4, 25, 199, 204, 208, 209, 211, 214, 218 (45 of 61 buildings). Includes Security assessments, upgrades, disaster recovery testing, West campus fiber for redundancy on network routers and upgrades Mike Monroney Aeronautical Center (MMAC) network to support redundancy, reliability, security and availability.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and North campus duct banks/fiber installation.

Program Plans FY 2016 – Performance Output Goals

- Award renovation construction contract for Phase 1 renovation of Multi-Purpose Building #24, to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting and insulation.
- Complete Phases 3 & 4 (final phases) renovation construction of the Systems Training Building.

- Award contracts for Phase 5 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 27, 12, 3, 30, 200, 228, 174, 186, 2, 747, 8, 196, 201, 217, 227, 243 (61 of 61 buildings). Includes security assessments, upgrades, disaster recovery testing and fiber/copper cable for Bldg 214 support to network.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and duct banks/fiber installation.

Program Plans FY 2017 – Performance Output Goals
- Complete renovation construction of Bldg 152, the Environmental Systems Support Facility.
- Award contracts for Phase 1 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 1, 14, 10, 6, 109, 113, 161, 187, 195 (10 of 61 buildings). Includes security assessments, firewall upgrades, disaster recovery testing and fiber/copper cable for Bldg 215 support to network.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and Bldg 214 duct banks/fiber installation.

Program Plans FY 2018 – Performance Output Goals
- Complete construction of Phase 1 Multi-Purpose Building renovation.
- Award renovation construction contract for Phase 2 renovation of Multi-Purpose Building #24 to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting and insulation.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and duct banks/fiber installation.

3B02, DISTANCE LEARNING
FY 2014 Request $1.0M

Distance Learning, M10.00-00

Program Description

The Distance Learning program will provide for technology refresh of Computer-Based Instruction (CBI) Delivery Platforms at all CBI Learning Centers, and it will increase connectivity and upgrade network multimedia support and services. The system consists of about 1,100 Learning Centers located at virtually every FAA facility around the world: 2275 CBI Platforms at 610 Air Traffic Sites (includes 235 Federal Contract Towers (FCTs)) and 490 Technical Operations Sites). The FAA is providing the technology refresh of the CBI Platforms for two reasons: (1) to support high-performance media and simulations required in many lessons; and (2) because replacement parts for current platforms are becoming obsolete and hard to obtain.

The technology refresh is accomplished in a phased, multi-year approach. The FY 2014 technology refresh will begin a new technology refresh cycle which covers the years FY2014 – FY2017. A subsequent technology refresh cycle will begin in FY 2018 and will run through FY 2021.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The major benefit of distance learning is the substantial reduction in student time away from work, and student travel and per diem costs associated with resident-based training. In addition, distance learning delivery methods increase training effectiveness, increase training opportunities for all FAA employees, and provide flexibility in training schedules through local management control. The FAA CBI system and the Aviation Training Network (ATN) must deliver initial operator, transition, and maintenance training for many NAS programs. By providing a standard training delivery and equipment simulation platform across all NAS programs, the need for such equipment and the space it would occupy is much reduced. All of these factors contribute to a reduction in the unit cost of service for en route, terminal, and flight service. The program contributes well over $16.8M savings in travel and per diem each year. These efficiencies combine to produce a better prepared, better trained, and safer diverse workforce.

Program Plans FY 2014 – Performance Output Goals

- Award Contract to provide for the technology refresh of 635 out of 2275 (27.9%) CBI Platforms at En Route Air Traffic Facilities (ARTCC, TRACONs) and FCT CBI Learning Centers by Sept-2014.
- Provide updates to courseware and application via network and/or DVD's to 2275 CBI Platforms by Sept-2014.

Program Plans FY 2015 – Performance Output Goals

- Award contract to provide for the technology refresh of 600 out of 2275 (54.3%) CBI Platforms at Air Traffic Facilities (ARTCC, Terminal) and FCT CBI Learning Centers by Sept-2015.
- Provide updates to courseware and application via network and/or DVD's to 2275 CBI Platforms by Sept-2015.

Program Plans FY 2016 – Performance Output Goals

- Award contract to provide for the technology refresh of 540 out of 2275 (78%) CBI Platforms at ATO-TO and FCT learning centers by Sept-2016.
- Provide updates to courseware and application via network and/or DVD's to 2275 CBI Platforms by Sept-2016.

Program Plans FY 2017 – Performance Output Goals

- Award contract to provide for technology refresh of 500 out of 2275 (100%; end of refresh cycle FY14-FY17) CBI Platforms at ATO-TO FCT learning centers by Sept-2017.
- Provide updates to courseware and applications via network and/or DVD's to 2275 CBI Platforms by Sept-2017.

Program Plans FY 2018 – Performance Output Goals

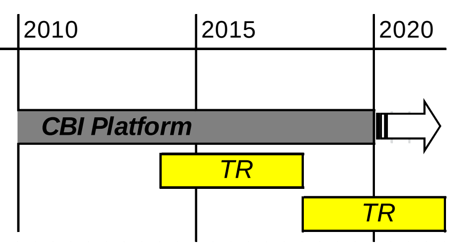
- Award contract to provide for technology refresh of 635 out of 2275 (27.9%) CBI Platforms at En Route Air Traffic Facilities (ARTCC, TRACONs) and FCT CBI Learning Centers by Sept-2018.
- Provide updates to courseware and application via network and/or DVD's to 2275 CBI Platforms by Sept-2018.

System Implementation Schedule

Computer-Based Instruction (CBI) Platform

Technology Refresh Phased Implementation: 2014 -- 2017

Technology Refresh Phased Implementation: 2018 -- 2021



ACTIVITY 4: FACILITIES AND EQUIPMENT MISSION SUPPORT

4A01, SYSTEM ENGINEERING (SE2020) AND DEVELOPMENT SUPPORT

FY 2014 Request $35.6M

- A, CIP Systems Engineering & Development Support – SE2020, M03.03-01
- B, Provide ANF/ATC Support (Quick Response), M08.01-00

A, CIP Systems Engineering & Development Support – SE2020, M03.03-01

Program Description

The System Engineering 2020 (SE-2020) program manages a portfolio of contracts providing support services for research, analysis, systems engineering and integration for both NextGen and non-NextGen initiatives. It provides access to research, technical, engineering and programmatic resources that support the FAA's NextGen transformational programs and further improves the legacy systems in the NAS. The portfolio of contracts was awarded in two major categories: Screening Information Request 1 (SIR 1) Research and Mission Analysis; and Screening Information Request 2 (SIR 2) Systems Engineering.

SIR 1 Research and Mission Analysis supports the full range of NextGen Research & Mission Analysis support services in one or more functional task areas related to NextGen and activities necessary to reach the Investment Analysis Readiness Decision (IARD) phase in the Acquisition Management System (AMS) Lifecycle. SIR 1 Research and Mission Analysis includes the following service support activities:

- Concept and Requirements Definition Planning
- Early Life Cycle Concepts and Prototyping
- Early Life Cycle Human Factors Research
- Early Life Cycle Concepts of Operations Research
- Early Life Cycle Human Performance Analysis
- Proof of Concept Research
- Pre-Operational Concept Demonstration Trials
- Cost Benefit Analysis
- Operational Demonstration Trials
- Concept Integration
- Rapid Prototyping/Fast-Time Modeling
- Real-Time Simulations
- Real-Time Human In-the-Loop Simulations
- Full-Scale Concept Demonstrations
- Cognitive Task Analysis Methods
- Conceptual Operations Verification and Validation

SIR 2 Systems Engineering supports systems engineering activities that occur throughout the AMS Lifecycle for both NextGen and non-NextGen service activities. SIR 2 Systems Engineering does not perform R&D, post-FID full-scale development, NAS system maintenance, or program management support for program offices responsible for fielding and/or maintaining NAS systems. The majority of SIR 2 Systems Engineering activities are expected to occur after the AMS Lifecycle Acquisition Management phase, "Concept and Requirements Definition" (CRD). In addition, SIR 2 Systems Engineering supports pre-IARD activities related to the technology refresh of current NAS systems before the "Solution Implementation" phase of the AMS lifecycle. SIR 2 Systems Engineering supports the following activities:

- Concept and Requirements Definition
- Final Investment Analysis

- Final Requirements Documents, Enterprise Architectural Products
- Safety and Regulatory
- Business Continuity Planning
- Portfolio Analyses
- Maintenance, Operation and Enhancements of Financial Systems
- Acquisition Support
- Schedules
- Human Factors
- Concepts of Operations
- Human Performance Analysis
- Proof of Concept Validation
- Pre-Operational Trials and Operational Trials
- System Integration
- Rapid Prototyping/Fast-Time Modeling
- Pre-Development Real-Time Simulations
- Real-Time Human In-the-Loop Simulations
- Full-Scale Prototype Demonstrations
- Verification and Validation
- Cognitive Task Analysis Methods
- Cost Benefit Analysis

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The SE2020 program contributes to the performance metric for cost efficiency by providing support for designing and managing NAS modernization and in particular the NexGen activities. With contractor assistance, the FAA is able to plan, analyze and manage NAS system improvements more efficiently and effectively. In addition, financial management and investment analysis support helps the FAA track cost, balance competing budgetary resources and make important decisions necessary to ensure that program dollars provide the greatest return on investment.

Program Plans FY 2014 – Performance Output Goals

- Award Vendor Program Management Task Orders (all seven 2020 prime vendors).
- Conduct Quarterly Vendor Program Management Reviews.
- Conduct Chief Financial Officer (CFO) Quarterly Reviews.
- Develop Contract and Financial Status Report (monthly basis).
- Develop 2020 Update to FAA NextGen Executive Team (monthly basis).
- Conduct 2020 Showcase.

Program Plans FY 2015 – Performance Output Goals

- Award Vendor Program Management Task Orders (all seven 2020 prime vendors).
- Conduct Quarterly Vendor Program Management Reviews.
- Conduct CFO Quarterly Reviews.
- Develop Contract and Financial Status Report (monthly basis).
- Develop 2020 Update to FAA NextGen Executive Team (monthly basis).
- Conduct 2020 Showcase.
- Exercise First Option Period for 2020 Full and Open prime vendors.

- Exercise First Option Period for 2020 Small Business prime vendors and/or issue new Small Business contract award(s) (Strategy to be determined).
- Perform vendor fee reconciliation (for six 2020 prime vendors).

Program Plans FY 2016 – Performance Output Goals
- Award Vendor Program Management Task Orders (all seven 2020 prime vendors).
- Conduct Quarterly Vendor Program Management Reviews.
- Conduct CFO Quarterly Reviews.
- Develop Contract and Financial Status Report (monthly basis).
- Develop 2020 Update to FAA NextGen Executive Team (monthly basis).
- Conduct 2020 Showcase.
- Exercise Full and Open Option for one 2020 prime vendor.
- Perform vendor fee reconciliation for one 2020 prime vendor.

Program Plans FY 2017 – Performance Output Goals
- Award Vendor Program Management Task Orders (all seven 2020 prime vendors).
- Conduct Quarterly Vendor Program Management Reviews.
- Conduct CFO Quarterly Reviews.
- Develop Contract and Financial Status Report (monthly basis).
- Develop 2020 Update to FAA NextGen Executive Team (monthly basis).
- Conduct 2020 Showcase.

Program Plans FY 2018 – Performance Output Goals
- Award Vendor Program Management Task Orders (all seven 2020 prime vendors).
- Conduct Quarterly Vendor Program Management Reviews.
- Conduct CFO Quarterly Reviews.
- Develop Contract and Financial Status Report (monthly basis).
- Develop 2020 Update to FAA NextGen Executive Team (monthly basis).
- Conduct 2020 Showcase.
- Exercise Second Option Period for 2020 Full and Open prime vendors.
- Exercise Second Option Period for 2020 Small Business prime vendors and/or issue new Small Business contract award(s) (Strategy to be determined).
- Perform vendor fee reconciliation (for up to six 2020 prime vendors).

B, Provide ANF/ATC Support (Quick Response), M08.01-00

Program Description

This program provides quick response support for ATO organizations to solve unforeseen issues that arise. These issues may be related to immediate needs such as: corrective action in information technology such as installing a communications link for a new facility or service; and accommodating new requirements that require adjusting financial management systems to create new cost accounting reports. It also covers responding to emergency unforeseen regional problems such as relocating an antenna for a remote communication facility. These projects are unexpected and must be done to maintain efficient services and operations.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

This project supports cost efficiency initiatives by providing the ability to respond quickly to unforeseen needs, issues or situations that, if left unresolved, could result in higher operating or future replacement costs.

Program Plans FY 2014-2018 – Performance Output Goals

- Implement projects as approved in the budget year.

4A02, PROGRAM SUPPORT LEASES
FY 2014 Request $42.1M

Program Support Leases, M08.06-00

Program Description

Program Support Leases include over 2,800 leases that support air traffic operations and provides oversight of existing and new leases. FAA leases land needed for building shelters and transmission towers for communication, surveillance, and navigation systems (including air rights restrictions around the facilities as necessary to prevent interference with electronic signals). The program also leases land and technical commercial space for air traffic control towers (ATCT), system support facilities, and other mission related activities. The program provides management and consulting support services and develops technical guidance for entering into new lease agreements. New leases are required when ATC facilities are relocated or when airspace redesign requires new sites for additional navigation and communications equipment. New leases may also be needed when new air traffic control towers or service area technical facilities are built to provide new services or meet new mission requirements.

Leases typically have a term of 5-20 years and are renegotiated prior to expiration. Existing leases are examined prior to expiration to validate the need and to determine reasonable future lease provisions. A site survey is performed to determine the current level of use of the leased property and to examine potential cost effective alternatives such as collocating with another facility. Lease arrangements can be complex requiring negotiations with multiple owners and accommodating stringent site specific requirements to meet operational needs. A business case assessment using decision making tools evaluates potential new leases to determine the most cost effective solution that will have the least risk for unsatisfactory performance. Approximately 500 expiring leases over the three service areas are reviewed each year.

Lease costs normally escalate because the market value of land continues to increase. When lease costs increase, it can be more cost effective to own property rather than continue a lease. In those cases, the program will not renew the lease and negotiate the purchase of the land or facility. A business case assessment supplemented by a market analysis of real estate values in the area will determine whether it is more advantageous to lease or buy property.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

In support of the Agency Strategic Goal 3, Delivering Aviation Access through Innovation, this program is improving management of the FAA's real property assets; thus, contributing to the cost effectiveness of air navigation infrastructure and associate systems. Real property costs are being effectively controlled through:

1. Implementing cost effective alternatives such as colocation as leases expire,
2. Converting leases to ownership where feasible,

3. Terminating leases that are not needed for future operations, and
4. Negotiating fair and reasonable lease rates when lease are renewed.

Program Plans FY 2014 – Performance Output Goals
- Conduct six site surveys to determine best alternatives to pursue regarding FY 2015 expiring leases.
- Conduct quarterly video teleconference meetings with Service Areas on business case issues.
- Achieve 95% on time lease payments to avoid late payments fees.

Program Plans FY 2015 – Performance Output Goals
- Conduct six site surveys to determine best alternatives to pursue regarding FY 2016 expiring leases.
- Conduct quarterly video teleconference meetings with Service Areas on business case issues.
- Achieve 95% on time lease payments to avoid late payments fees.

Program Plans FY 2016 – Performance Output Goals
- Conduct six site surveys to determine best alternatives to pursue regarding FY 2017 expiring leases.
- Conduct quarterly video teleconference meetings with Service Areas on business case issues.
- Achieve 95% on time lease payments to avoid late payments fees.

Program Plans FY 2017 – Performance Output Goals
- Conduct six site surveys to determine best alternatives to pursue regarding FY 2018 expiring leases.
- Conduct quarterly video teleconference meetings with Service Areas on business case issues.
- Achieve 95% on time lease payments to avoid late payments fees.

Program Plans FY 2018 – Performance Output Goals
- Conduct six site surveys to determine best alternatives to pursue regarding FY 2019 expiring leases.
- Conduct quarterly video teleconference meetings with Service Areas on business case issues.
- Achieve 95% on time lease payments to avoid late payments fees.

4A03, LOGISTICS SUPPORT SERVICES (LSS)
FY 2014 Request $11.5M

NAS Regional/Center Logistics Support Services, M05.00-00

Program Description

The Logistics Support Services (LSS) program uses contractor support to perform FAA services at the Mike Monroney Aeronautical Center, the William J. Hughes Technical Center, the three FAA Service Areas, and FAA Headquarters. This contractor support assists the FAA in delivery of contracting, real estate, space management, environmental management, and materiel management tasks. This contract is managed by FAA National Logistics Division in direct support of CIP projects, accounting system capitalization, and property control-related activities.

These services currently represent a significant portion of the workforce for acquisition, real estate, and materiel management in the three Logistics Service Areas and at the Aeronautical and Technical Centers. The LSS program is instrumental in establishing new or upgraded facilities, including ATCTs and TRACONs throughout the NAS. LSS resources will also continue to be used for asset tracking and documentation efforts to obtain and maintain a clean audit opinion.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The program will support FAA objectives by improving financial management while delivering quality customer service. Specifically, the program provides key support functions which enable the FAA to manage real property assets, maintain a clean audit opinion, and plan the execution of critical acquisition activities supporting the NAS. These functions are performed throughout the three Logistics Service Areas, FAA Technical Center, and FAA Aeronautical Center.

Related project management goals include:

1. Complete 80% of the annual real property OMB inventory validation effort.
1. Designate 75% of the disposed real property assets as "retired" within 30 days of the date the disposal forms are received.
2. Capitalize 85% of all personal and real property capital assets within 65 days of date placed in service.
3. Award at least 90% of all formal contracts (over $100K) in less than 180 calendar days (Office of Acquisition Services (AMQ)) and in less than 120 days (Logistics Service Areas) from the time a purchase request is received from the requiring organization.

Program Plans FY 2014 – Performance Output Goals

- Complete 90% of the work assignments in support of the annual real property OMB inventory validation effort.
- Complete 90% of the work assignments to support the "retired" real property disposal effort.
- Complete 90% of the work assignment capitalization efforts for both real and personal property assets.
- Complete 90% of the work assignments regarding acquisition (MMAC only).
- Complete 100% of acquisition activities to ensure that the follow-on LSSC is awarded by 3/1/14.

Program Plans FY 2015 – Performance Output Goals

- Complete 90% of the work assignments in support of the annual real property OMB inventory validation effort.
- Complete 90% of the work assignments to support the "retired" real property disposal effort.
- Complete 90% of the work assignment capitalization efforts for both real and personal property assets.
- Complete 90% of the work assignments regarding acquisition (MMAC only).
- Complete Option Year 1 acquisition activities to fully fund the program-funded task orders on the LSSC (3/1/15).

Program Plans FY 2016 – Performance Output Goals

- Complete 90% of the work assignments in support of the annual real property OMB inventory validation effort.
- Complete 90% of the work assignments to support the "retired" real property disposal effort.
- Complete 90% of the work assignment capitalization efforts for both real and personal property assets.
- Complete 90% of the work assignments regarding acquisition (MMAC only).
- Complete Option Year 2 acquisition activities to fully fund the program-funded task orders on the LSSC (3/1/16).

Program Plans FY 2017 – Performance Output Goals

- Complete 90% of the work assignments in support of the annual real property OMB inventory validation effort.
- Complete 90% of the work assignments to support the "retired" real property disposal effort.
- Complete 90% of the work assignment capitalization efforts for both real and personal property assets.
- Complete 90% of the work assignments regarding acquisition (MMAC only).
- Complete Option Year 3 acquisition activities to fully fund the program-funded task orders on the LSSC (3/1/17).

Program Plans FY 2018 – Performance Output Goals

- Complete 90% of the work assignments in support of the annual real property OMB inventory validation effort.
- Complete 90% of the work assignments to support the "retired" real property disposal effort.
- Complete 90% of the work assignment capitalization efforts for both real and personal property assets.
- Complete 90% of the work assignments regarding acquisition (MMAC only).
- Complete Option Year 4 acquisition activities to fully fund the program-funded task orders on the LSSC (3/1/18).

4A04, MIKE MONRONEY AERONAUTICAL CENTER LEASES
FY 2014 Request $17.9M

Aeronautical Center Lease, F19.00-00

Program Description

The Aeronautical Center lease provides annual rent for leased land/building rent and insurance that comprise approximately 80 percent of Aeronautical Center space: 2.8M sq ft of leased space and 1,100 acres of land, having a replacement value of $710M.

The Aeronautical Center is the FAA's centralized location that supports FAA National Airspace Systems (NAS) Air Operations/flight checks, engineering, system testing, training (Radar/Navaids), NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research, and Business Services in Oklahoma City.

The Center provides facilities that support the work of 7,100 employees, students, and contractors on a daily basis; and 10,000 to 11,000 visitors annually; the largest concentration of FAA personnel outside of Washington D.C.

The lease is comprised of:

- Master Lease land/building rent, sustainment and insurance
- Thomas Road warehouse lease
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators
- Grounds Maintenance Building

The Aeronautical Center requires large parcels of land as NAS test sites for surveillance radar, communications, weather, and navigation/landing systems, as well as warehouse, administrative office space, and training facilities. It is a Level IV security site based on numbers of employees, facility square footage, sensitivity of records, volume of public contact, and mission-critical facilities whose loss, damage, or destruction may have serious or catastrophic impact on the NAS.

Funding for this program assures continuity of the Aeronautical Center facility and that it remains viable for current and future generations of FAA employees by providing for annual lease costs specified in the lease agreement. The lease will expire in 2028.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The Mike Monroney Aeronautical Center Lease sustains a cost effective workplace for Air Operations, Engineering, and Training. Eighty percent (80%) of Aeronautical Center space is used for direct support of the ATO by Engineering Organizations, Aviation System Standards (AVN) operations and flight check, the Logistics Center, Air Traffic Control training, ATO Technical Operations Training and Certification, and system testing of Radar and Navaids. An additional 13% of Aeronautical Center space provides business service facilities for DOT/DELPHI/Prism/Castle Data Center Operations, consolidated Accounting Operations services, Acquisition, ATO Data Center Operations, and Aviation Safety (AVS/Civil Aeromedical Institute (CAMI)). The current lease is very cost efficient ($17.90 per gross square footage (gsf) compared to the $25.20 GSA rate for Oklahoma City, 29% below GSA rates, a $38.7M cost avoidance in FY 2010-2011). Leasing is more cost effective than investing in the $710M replacement cost of the leased facilities.

Program Plans FY 2014-2018 – Performance Output Goals

- Complete monthly lease payments for rent, interest, and insurance on time.

4A05, TRANSITION ENGINEERING SUPPORT
FY 2014 Request $16.5M

- A, NAS Integration Support Contract (NISC), M22.00-00
- B, Configuration Management Automation (CMA), M03.01-02

A, NAS Integration Support Contract (NISC), M22.00-00

Program Description

NISC provides technical expertise to assist the agency in deploying, implementing, and integrating many different components and equipment into the NAS within established modernization schedules. Some of the work products that support transition, implementation, and integration activities include: transition plans and timelines, equipment installation schedules, engineering site preparation packages, site implementation plans, analysis of environmental impacts, test procedures, site test monitoring, and corporate work planning. The program will provide over 1000 Full Time Equivalent (FTE) technical support annually.

The NISC contract supports a myriad of FAA priorities. Several examples representative of the breadth of NISC support include:

- NISC assists the FAA with meeting the 2020 Automatic Dependent Surveillance-Broadcast (ADS-B) aircraft surveillance technology requirements by contacting each of the approximately 400 aircraft owners in Alaska to advise them of the project and to collect information about the avionics installed on the aircraft that would need to be integrated with the new ADS-B equipment. Gathering of information is nearly complete - total of 361 aircraft have been determined to be qualified for the ADS-B upgrade. NISC helps assure the original test group for ADS-B will continue to have these services available into the future.

- NISC provides program support to the FAA Aviation Safety Knowledge Management Environment (ASKME) Program. The ASKME Program is a Joint Resources Council (JRC) baseline program. The primary objective of NISC support for ASKME is to provide project management, requirements analysis, system development, and program control oversight to support the mission of each ASKME project and their associated monitoring and controlling requirements, as mandated by the FAA Acquisition Management System (AMS).

- NISC provides technical expertise to internal and external customers on Aeronautical information and publications pertaining to AeroNav Products, in support of the concepts and principles contained in FAA Order 8260.3B, Standard for Terminal Instrument Procedures (TERPS). Specifically, NISC reviews aeronautical information and publications when released to confirm that air navigation information and technical data content is accurate and correct; performs geographical computations for aeronautical facilities; reviews the National Flight Data Digest to determine if published data requires a Notice to Airmen (NOTAM) or an amendment to published instrument approach procedures; evaluates existing NOTAM and initiates amendment actions to affected instrument approach procedure(s) or airway(s).

- A Direct Entry Digital NOTAM (DDN) System Feasibility study was completed to support the development and implementation of the DDN system. NISC support is developing a plan that would provide innovative approaches for training, conducting airport surface validation activities, and implementing an Airport Manager Self-Certification process, which would result in cost reductions.

- NISC supports the System Approach to Safety Oversight (SASO) Program Office in Risk Management, Quality Assessments and software Independent Verification and Validation (IV&V). This support includes the development, identification and analysis of programmatic risks, preparing and maintaining the SASO Risk Register along with related Exhibit Office of Management and Budget (OMB) 300 inputs, IV&V software testing and assessing Phase IIA Safety Assurance System (SAS). NISC is also tasked to develop technical concepts, evaluation methodologies, and performance metrics related to the aviation Safety Management System (SMS).

- NISC supports the Environmental and Occupational Safety and Health (EOSH) compliance program. Engineering and design efforts to meet EOSH regulatory requirements are conducted on facilities before construction or implementation begins. NISC supports the EOSH efforts to accelerate the schedule for performing environmental due diligence audits for facilities, which have been declared excess.

- NISC resources help implement the FAA environmental cleanup program providing cost savings to the FAA through mitigating future environmental liability to the agency. One of the examples is that NISC conducted the environmental assessment of the Oakdale, PA Air Route Surveillance Radars (ARSR) site, performing its remedial planning and overseeing required actions. The work involved the investigation and creation of remedial and abatement plans for two site buildings. NISC performed thorough on-site inspection of each building, reviewed the asbestos abatement plans for each building, and documented other significant hazardous material that required removal before building demolition.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The FAA’s transition engineering support contract provides experienced personnel at a current average cost of $69 per hour. This cost effective rate supports the ATO service centers and headquarters offices with the planning and coordination of NAS programs. It also provides support to key FAA program management functions. This support assists the FAA in the financial management of a variety of F&E NAS modernization programs and projects.

Program Plans FY 2014-2018 – Performance Output Goals

- Achieve 100% of the quality requirements as defined in the NISC Task Orders.

B, Configuration Management Automation (CMA), M03.01-02

Program Description

The Configuration Management Automation (CMA) program will procure a commercial-off-the-shelf (COTS) industry standard tool designed to support both National Airspace System (NAS) and Non-NAS FAA assets, as mandated by FAA order 1800.66, Configuration Management Policy. CM is a disciplined and systematic approach for establishing processes which support the five tenets of Configuration Management:

- CM Planning and management,
- Configuration identification,
- Configuration control,
- Configuration status accounting, and
- Configuration audits.

In addition, the FAA currently plans to host the CMA servers, provide associated training for users, and supply maintenance to the system.

The decommissioning of legacy NAS systems as NextGen equipment is installed requires accurate records of the configuration of present systems. Knowing the configuration of present systems and the changes needed to install new systems will result in FAA cost savings in both the short and long term. Configuration Management Automation is the tool that supports the planning required for both the removal of older equipment and fielding of new systems.

Currently, one of the primary tools in the Agency's CM tool-suite architecture is the Web Change Management system (WebCM). This tool was implemented in 2005 for managing proposed changes to FAA assets requiring configuration control. This tool provides an automated system for reviewers to view proposed changes and provide comments. WebCM promotes cost efficiencies by reducing the time and effort required by reviewers which results in the timely implementation of proposed changes. The savings come from reduced system acquisition and maintenance costs.

The other component of the current tool-suite architecture is the Replacement Documentation and Configuration Identification System (RepCON), an in-house developed tool designed to provide automated CM support. It collects NAS configuration data and associated status to maintain the as-is NAS configuration. This tool has reduced costs to collect, store and retrieve configuration information that was previously done by maintaining "hard copy" documentation.

In order to meet future demands for the efficient processing of configuration changes, an improved automation system is needed to replace the outdated legacy systems and reduce the associated fee structure of maintaining those systems. It must interface with other systems to create a closed-loop process that provides the appropriate structure and toolsets needed for a complete configuration management system that provides consistent answers to inquiries from all sources. This system will move FAA from a process that relies heavily on CM practitioners' institutional knowledge to giving them a scalable, network-centric architecture. The existing lack of a closed-loop CM system requires multiple manual processes to retrieve information related to the proposed change which can lead to time consuming duplication of effort and inaccurate results. CMA will create the infrastructure necessary to leverage process-to-process integration, minimize redundancy, and cluster processes around a single integration point.

CMA will be implemented in two Segments. Segment I will replace the legacy systems (WebCM and RepCON) and this new system will interface with various CM-related systems to obtain a single point of access to accurate, up-to date CM information (i.e. Facility Power Panel Schedule (FPPS), Safety Risk Management Tracking System (SRMTS), Technicians Network (TechNET), NAS Documentation (NASDOC), NAS Technical Library, ProjectWise Electronic Drawing Management System (EDMS), Facility Service and Equipment Profile (FSEP), Lightweight Directory Access Protocol (LDAP) and NAS Enterprise Architecture (NAS EA). Segment II will provide additional interfaces with other systems as needed to provide all information needed by reviewers during a change review.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

CMA maps to the Performance Metric of implementing cost efficiency initiatives by:

- Reducing costs associated with delay risks during the implementation of new systems and technology by providing the ability to identify configuration problems early in the development process;
- Reducing equipment maintenance costs through a coordinated systems approach that identifies maintenance issues early in the procurement process;
- Providing a cost efficient seamless enterprise-wide access to a repository of validated, real-time CM data which will reduce reviewers time and effort; and
- Standardizing CM processes which will result in a more efficient and effective management of the change process.

Program Plans FY 2014 – Performance Output Goals

- Complete Investment Analysis on CM COTS alternative.
- Complete Market Survey and further cost analysis.
- Achieve Final Investment Decision.
- Award CMA contract for solution implementation.

Program Plans FY 2015 – Performance Output Goals

- Achieve Initial Operation Capabilities (IOC) for Segment I.

Program Plans FY 2016 – Performance Output Goals

- Achieve Full Operational Capabilities (FOC) for Segment I.
- Achieve In-Service Decision (ISD) for Segment I.

Program Plans FY 2017 – Performance Output Goals

- Begin implementation of Segment II to achieve enterprise visibility of Non-NAS IT assets.

Program Plans FY 2018 – Performance Output Goals

- Complete Segment II Full Operational Capabilities (FOC).

4A06, TECHNICAL SUPPORT SERVICES CONTRACT (TSSC)
FY 2014 Request $25.0M

Technical Support Services Contract (TSSC), M02.00-00

Program Description

The TSSC Program provides a contract vehicle to augment FAA's work force with professional engineering, technical, and construction services to assist FAA project implementation by performing site surveys and selection; engineering; environmental; fire/life safety; equipment installation; asbestos and obsolete equipment removal. Services also include testing; drafting; staging, warehousing and distribution; and contract surveillance and oversight. The TSSC Program helps the FAA ensure timely completion of projects for NAS modernization. TSSC will provide approximately 500 Full Time Equivalent (FTE) level of support and will monitor $70M in non labor costs for projects such as Fixed-Price subcontracts for site preparation construction. The total number of FTEs provided will vary depending upon the amount of funding available from other programs (CIPs) that use TSSC support (since those programs must pay from their own funds for the contractor effort allotted to their project) to accomplish specific project needs.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

In a typical year, more than 3,700 separate projects are completed by FAA using the TSSC Program. Customers using TSSC support services benefit from high quality contractor labor support that is experienced, flexible, reliable, and cost effective. This quality customer service is substantiated by the consistently high customer (engineer and Engineering Technical Officer) satisfaction ratings earned by the contractor during the bi-annual award fee process. The contractor has consistently been rated higher than 90 percent. Award fee ratings are based on metrics and feedback from customers for cost, schedule, management and technical performance by TSSC.

The TSSC Program contributes to cost control by helping the FAA install new equipment on a timely basis. This avoids added costs for holding and storing equipment and allows the FAA and the aviation industry to receive equipment and system modernization benefits on schedule. The TSSC Program Office collaborates with the NAS Integration Support Contract (NISC) Program Office to share development of a common contract tracking program and program office support contracts to reduce management costs.

Another cost savings by the TSSC Program is to move its regional management counterparts into vacant, unused FAA space when available, thereby saving tens of thousands of dollars in lease rental agreements that would have been paid through the contract vehicle. This cost-effective measure has taken place at several offices within all three FAA Service Area organizations.

Program Plans FY 2014-2018 – Performance Output Goals

- TSSC operates similar to a performance-based contract. All work ordered incorporates quality, schedule, and cost metrics. The policy for 100% work release performance measure ensures that each customer's requirement is addressed. And measuring three key performance metrics ensures that the FAA receives the highest quality output (products, services or deliverables), on time, for the best value (cost) available.
- TSSC strives for small business participation by contractually requiring the following goals: Small Business (45%), Small Disadvantage (10%), Women-Owned (5%), Service Disabled Veteran-Owned (3%).
- TSSC incorporates and maintains internal automated cost control measures and audits of Contractor invoicing insuring that invoices submitted by the Contractor and paid by the FAA match the official Delphi PR account records at a rate of 99% or greater.

4A07, RESOURCE TRACKING PROGRAM (RTP)
FY 2014 Request $4.0M

Resource Tracking Program (RTP), M08.14-00

Program Description

The RTP/Corporate Work Plan (CWP) is a computer management system (including hardware, software, development, training, and support) used by the FAA Service Units, Service Centers, the Technical Center, and the Aeronautical Center for identifying requirements, internal budget preparation, implementation planning, resource estimating, project tracking, and measuring performance of projects. The CWP helps users to share and coordinate FAA's project data during the various stages of implementation (i.e., planning, scheduling, budgeting, execution, and closeout). The CWP system and its supporting data are continuously used for reporting project metrics to project managers, responsible engineers, program offices, and various other customers.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation.*
- *FAA Outcome 4 – NextGen capabilities are fully implemented and utilized in how US aviation community system needs are met.*
- *FAA Performance Metric 1 – Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.*

Relationship to Performance Metric

The RTP/CWP contributes to FAA performance metric to maintain 90% of major system investments within 10% variance by providing an enterprise level project management system that allows field and headquarters' office to use consistent data for managing capital programs.

Program Plans FY 2014-2018 – Performance Output Goals

- Deliver quarterly software upgrades to better maximum cost and schedule date for project/program management.
- Provide monthly project management reports.

4A08, CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)
FY 2014 Request $70.0M

CIP Systems Engineering & Technical Assistance – MITRE, M03.02-00

Program Description

The CAASD is an FAA-sponsored Federally Funded Research and Development Center (FFRDC) operated under a Sponsoring Agreement with the MITRE Corporation. In June 2010 a new FFRDC contract was awarded to MITRE Corporation for program efforts starting in FY 2010 with a base period through FY 2015. The contract includes an option for five years of continuing coverage through FY 2020.

CAASD high quality research, systems engineering, and analytical capabilities help FAA meet the technically complex challenges in the NAS. CAASD provides independent advanced research and development required by the FAA to obtain technical analyses, prototypes and operational concepts needed to fulfill goals and outcomes of FAA's Destination 2025, NextGen Implementation Plan, National Aviation Research Plan (NARP), NAS Enterprise Architecture and other Agency long range plans. CAASD provides a high level of technical expertise to support the Federal workforce.

The CAASD ***Product Based Work Plan*** (PBWP) is aligned with Agency goals, outcomes and activities with particular emphasis on Destination 2025 Goal 3, "Delivering Aviation Access through Innovation" and is consistent with CAASD's Long Range Plan (FY 2013-2017). The CAASD PBWP and Long Range Plan, both approved by the FAA's FFRDC Executive Board, define an outcome-based program of technically complex research, development, and system engineering activities.

Benefits of CAASD work are detailed in the ***CAASD Long Range Plan*** for each program Outcome. Individual CAASD deliverables provide FAA stakeholders with important data and recommendations that support FAA decision making and contribute to objective accomplishment.

The Work Plan is categorized in the following areas:

<u>NAS Concept of Operations, Architecture and Integration</u>. Develop the NAS Concept of Operations, Architecture and NextGen System Integration; Improve understanding of the future environment, including anticipated demand at

airports and for airspace; Anticipate the impact of planned improvements on future capacity; Develop and integrate the NextGen enterprise architecture, operational concepts, capability action plans, and roadmaps to ensure an integrated evolution that aligns with the agencies' enterprise architectures; Analyze NAS-wide strategic issues and ensuring their alignment with the evolving NextGen architecture; and Conduct research to gain a better understanding of late mid-term NextGen operational concept elements and how to transition to them.

Air Traffic Management (ATM) Operational Evolution. Provide analysis of the NAS mission needs, system requirements and proposed system design to identify critical enhancement needs and to ensure that system enhancements will meet operational needs in a cost-effective manner. Provide an understanding of the benefits associated with capability enhancements. Provide assessments of concept maturity, operational feasibility and implementation risks, including identification of cross-domain dependencies. Advance the maturity of emerging ATM improvement concepts by developing algorithms, prototype capabilities, and conducting Human-in-the-Loop (HITL) evaluations. Create consensus on new capabilities, procedures, and priorities for evolving the ATM operations. Evaluate NAS system-level performance. Develop operational strategies. Develop and evaluate new metrics to measure overall NAS operational performance. Research potential advancements in aviation technologies as elements of solutions that will permit the FAA to reduce its cost of ownership. Develop domestic and international requirements and engineering standards for future advancements in aviation technologies. Provide FAA with technical analyses of architecture alternatives. Provide technical and operational insight into systems that can be used to safely permit reduced separation standards and/or significantly increase overall system capacity and productivity. Assist the FAA in identifying and prioritizing among the more promising operational changes, procedures and enabling technologies. Develop and validate cross domain operational evolution plans. Conduct technology transfer of data, artifacts, and insights gained from research.

Airspace and Performance-Based Navigation. Leverage the precision, reliability, predictably, and efficiencies of improved navigation and procedures through Area Navigation (RNAV). Research new concepts for achieving a performance-based NAS, including the closely spaced Paired Approach concept. Model and simulate operational improvements and impacts to address mid-term and far-term Performance-Based Navigation (PBN) requirements of the NextGen to include research of avionics via proprietary agreements with avionics manufacturers. Identify issues and lessons learned for improving airspace and procedures design.

Validate Flight Standards procedure development tools. Analyze and engineer the processes that govern airspace strategic planning and analysis efforts to support the development of standards and guidelines for airspace redesign. Perform system-wide optimization analyses of airspace and procedures reflecting a strategic plan as key building blocks for NextGen. Design and execute technical analyses on airspace security incidents and their impacts on the NAS. Perform airspace security concept development and systems engineering analyses to develop and evolve the FAA's capabilities and tools for communicating, coordinating, and mitigating airspace security incidents. Develop and evaluate new operational security performance metrics.

Safety and Training. Develop safety assurance processes as an integral part of normal operations. Perform technical analyses of NAS-wide accident and runway incursion risks to identify airports or specific types of operations with the highest risk, and prioritize implementation of appropriate operational and technological mitigations, leading to a reduction in accidents and runway incursions. Develop metrics and processes that allow FAA to proactively identify potential safety issues with both operations and architecture. Identify risks before they lead to incidents or accidents. Identify and assess the feasibility of new or advanced capabilities and standards that mitigate safety issues in the NAS. Leverage the collaboration of operational experts across the agency and research into technologies and capabilities to improve safety. Enhance the quality and efficiency of Terminal Radar Approach Control (TRACON) and En Route controller training, to allow for reduced training time and cost, improved trainee success rates, and improved workforce capabilities (e.g., reduced operational errors, improved productivity). Improve the delivery, quality, flexibility, and standardization of controller training. Facilitate through training improvements more effective operational transitions of NextGen solutions.

Communications, Navigation, Surveillance, and Cyber-Security Infrastructure. Establish the Communications, Navigation, and Surveillance (CNS) foundation for FAA's mid-term and far-term evolution strategies. Develop and evaluate advanced NAS CNS system concepts and requirements, and assess alternative technological approaches to meeting requirements in cost-effective ways. Perform research, modeling, simulation, and demonstration of prototypes of technical and operational enhancements to the NAS CNS and cyber security systems. Conduct technical, architectural, operational, cost analyses, and modeling to support the implementation of CNS services in the NAS. Conduct spectrum analysis focusing on strategic issues related to the availability of adequate spectrum resources to support CNS for NextGen operational concepts. Conduct analysis of the operations enabled by data communications. Perform technical, architectural, and safety analysis. Participate in the development of international standards and harmonization to support the implementation of digital data communications services in the NAS. Conduct engineering analyses and assessments of industry provided solutions, and develop transition strategies for the FAA's NextGen Voice Communications System (NVS).

Unmanned Aircraft Systems. Provide technical analyses supporting strategic solutions for practical and coordinated UAS integration into the NAS and NextGen. Partner with other Government Agencies' FFRDCs in actively researching improved access for Public UASs and facilitating cross-agency joint solutions. Implement standards for safe operation of UASs without compromising the safety or efficiency of the NAS. Collect and utilize NAS metrics to proactively detect issues prior to incidents or accidents.

Special Studies, Laboratory and Data Enhancements. Provide an integrated research environment that ensures individual research activities, prototypes, and capabilities can be brought together with the appropriate mixture of fidelity and flexibility to facilitate integrated investigations, compressed spiraling of operational concepts and procedure development. Develop and sustain the Aviation Integrated Demonstration & Experimentation for Aeronautics (IDEA) laboratory infrastructure for expanded cross-domain scenario generation tools to support real-time Human-in-the-Loop as well as enable fast-time capabilities. Provide a data repository system that allows efficient access to aviation data and associated tools. Provide a flexible model of the NAS capable of quickly and reliably estimating the high-level impacts of new technologies, procedures, or infrastructure improvements on key system performance metrics. Conduct special studies of key subjects not directly related to a current outcome, if directed by FAA senior management.

Mission-Oriented Investigation and Experimentation (MOIE). Develop tools and techniques for studying NAS capacity, throughput, performance, system dynamics and adaptation to technology and policy-driven change. Identify opportunities for innovative solutions to NAS problems and enhancements to NAS capabilities and procedures. Research future concepts and technologies to understand their potential impact on the NAS. Apply prototyping, in-lab demonstrations, and experimentations to test concepts. Explore new regimens including complexity theory, agent-based modeling, and productivity modeling.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Maintain a NAS on-time arrival rate of 88 percent at Core airports through 2016.*

Relationship to Performance Metric

The CAASD provides independent advanced research and development required by the FAA to obtain operational concepts, technical analyses, prototypes, procedures, and systems requirements needed to fulfill the vision for the NAS enterprise architecture, FAA's Destination 2025 and the NextGen Implementation Plan. FAA adoption of the new systems and procedures in the NAS improves on-time performance, increases capacity, and provides a safer and more efficient global air transportation system.

Program Plans FY 2014-FY 2018 – Performance Output Goals

- Complete activities identified in the Product Based Work Plan for the year.
- Update the Long Range Plan budget exhibit each year.
- Conduct Quarterly Reviews of MITRE progress.

4A09, AERONAUTICAL INFORMATION MANAGEMENT PROGRAM*
FY 2014 Request $9.1M

Collaborative Air Traffic Management – Flight & State Data Management – AIM Segment 2, G05A.02-05 / X, Collaborative Air Traffic Management – Flight & State Data Management – AIM Segment 3, G05A.02-06

Program Description

The AIM Modernization program will provide aviation users with digital aeronautical information that conforms to international standards and supports NextGen objectives. Digital aeronautical data enables near real-time processing of data to improve access to and quality of airport and special activity airspace information supporting better decision-making by NAS operators.

AIM will implement information systems and services necessary to incorporate standard airport mapping and special activity airspace structure and status data. It improves on present information distribution because it is an integrated digital source of aeronautical information, airport and airspace data necessary to achieve shared situational awareness, including its fusion with NOTAM data developed in AIM Modernization (AIMM) Segment 1.

<u>AIM Segment 2 (G05A.02-05):</u>
Segment 2 will build on pre-implementation efforts that were performed in the NextGen Common Structure and Status Data (CSSD) program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange. Aeronautical Common Services will:

- Improve distribution of Special Activity Airspace (SAA) relevant information among stakeholders. Digital management of SAAs will also facilitate calculation of airspace usage and availability metrics in support of efficiency of air traffic management, analysis of SAA usage, integration with industrial partners, and scheduling automation.
- Provide access to Airports Geographic Information System (GIS) data for critical information about airports including airport mapping and status.
- Fully leverage the SWIM Common Support Services infrastructure to deliver quality aeronautical information using common standards and services.
- Implementation will be via a Cloud environment.

Schedule to meet Final Investment Decision (FID):

- Investment Analysis Readiness Decision: November 2012
- Release of SIR for software development contract supporting AIM Modernization Segment 2 – May 2013;
- Risk-Adjusted Cost Model – November 2013;
- Business Case Analysis Report (BCAR), Implementation Strategy and Planning Document (ISPD), Final Requirements Document (FRD) – November 2013; and
- FID – December 2013.

<u>AIM Segment 3 (G05A.02-06):</u>
AIM Segment 3 will modernize and expand on the initial SAA and GIS capabilities from AIM Modernization Segment 2 by adding the ability to dynamically update the status of SAA and airport configuration data from the authoritative source. Additional capabilities will include the processing of static airspace constraints and business intelligence services to serve up fused data and integrated data products on demand to end use applications. This will be done through web services which, when fully implemented, will provide much improved access and increased functionality embedded in the information services with respect to filtering, data fusion (visualization of airspace, relational delivery and display of features and maps, geospatially referenced NOTAM data, etc.) so that end user applications and decision support tools may take advantage of these services to provide a significantly enhanced user experience to their user base. The information services developed will enable end user applications to provide data that they have not had access to, a much more integrated data set, and provision of that data in much more useable and flexible forms to end users using modern web service technologies and a single platform for delivering data from the authoritative source. ANSP decision support tools, Airline systems, DoD applications, pilot

briefing services and other web based commercial applications will have access to far more powerful tools available through these services to deliver a product tailored to and fit for use by the respective end user of the system or tool ingesting the data service. Using a standard model for aeronautical information exchange (AIXM) and Service Oriented Architecture (SOA)/Cloud services to access both dynamic and static aeronautical data across NAS systems and databases, users will have access to fused GIS, status, and reference data as integrated data products through the aeronautical common services.

Alignment of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

AIM Modernization Segment 2 will target enhancements and new functionality to improve and expand AIM services. The program will improve the accuracy and timeliness of information regarding Special Activity Airspace and Airport data. Analyses will be conducted to compare this data to the legacy systems baseline to determine the actual amount of improvement provided.

Standardizing and centralizing aeronautical data within the NAS will contribute to meeting the FAA's safety performance goals and will enhance the safety of FAA air traffic control systems. NAS safety depends upon the timely and accurate exchange of information between internal and external users.

Program Plans FY 2014 – Performance Output Goals
<u>AIM Segment 2 (G05A.02-05):</u>
- Complete Final Investment Decision for AIMM Segment 2 that includes final Program Requirements (fPR), Business Case Analysis Report (BCAR), Implementation Strategy & Planning Document (ISPD), Acquisition Program Baseline (APB), and revised Enterprise Architecture.
- Award of AIMM Segment 2 software development contract and hold Post Award Conference (PAC) and Technical Post Award Conference (TPAC) that include delivery of required vendor management plans.
- Complete AIMM Segment 2 System Requirements Review (SRR) that includes the draft System Segment Specification (SSS) and Verification Requirements Traceability Matrix (VRTM).

<u>AIM Segment 3 (G05A.02-06):</u>
- None.

Program Plans FY 2015 – Performance Output Goals
<u>AIM Segment 2 (G05A.02-05):</u>
- Complete AIMM Segment 2 Preliminary Design Review (PDR) for Release 1 that includes the final SSS and VRTM, and draft Release 1 Software Requirements Specifications (SRS), Software Design Document (SDD) and Web Service Description Documents (WSDD).
- Complete AIMM Segment 2 Detailed Design Review (DDR) for Release 1 that includes the final Release 1 SRS, SDD and WSDD.
- Complete AIMM Segment 2 Release 1 code development and development of test procedures.
- Complete IARD for AIMM Segment 3.

<u>AIM Segment 3 (G05A.02-06):</u>
- None.

Program Plans FY 2016 – Performance Output Goals
<u>AIM Segment 2 (G05A.02-05):</u>
- Complete AIM Modernization Segment 2, Release 1 Development and Test.
- Achieve Initial Operational Capability for AIM Modernization Segment 2 (Release 1).
- Complete AIMM Segment 2 Preliminary Design Review (PDR) for Release 2 that includes draft Release 2 SRS, SDD and WSDD.

- Complete AIMM Segment 2 Detailed Design Review (DDR) for Release 2 that includes the final Release 2 SRS, SDD and WSDD.
- Complete AIMM Segment 2 Release 2 code development and development of test procedures.
- Complete IID for AIMM Segment 3.

AIM Segment 3 (G05A.02-06):

- None.

Program Plans FY 2017 – Performance Output Goals

AIM Segment 2 (G05A.02-05):

- Complete AIM Modernization Segment 2, Release 2 Development and Test. (Prior year funds)
- Achieve Full Operating Capability for AIM Modernization Segment 2 (Release 2). (Prior year funds)

AIM Segment 3 (G05A.02-06):

- Complete Final Investment Decision for AIMM Segment 3.
- Complete AIMM Segment 3 System Requirements Review (SRR) that includes the draft SSS and VRTM.

Program Plans FY 2018 – Performance Output Goals

AIM Segment 2 (G05A.02-05):

- None.

AIM Segment 3 (G05A.02-06):

- Complete AIMM Segment 3 Preliminary Design Review (PDR) for Release 1 that includes the final SSS and VRTM, and draft Release 1 SRS, SDD and WSDD.
- Complete AIMM Segment 3 Detailed Design Review (DDR) for Release 1 that includes the final Release 1 SRS, SDD and WSDD.
- AIMM Segment 3 Release 1 code development and development of test procedures.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix C

Fiscal Years 2014 – 2018

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Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2014 Budget Total	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.	FY 2018 Est.
	Activity 1: Engineering, Development, Test and Evaluation	**$392.3**	**$464.0**	**$531.6**	**$653.3**	**$661.3**
1A01	Advanced Technology Development and Prototyping (ATDP)	$33.5	$30.2	$30.0	$34.3	$36.9
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$12.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$6.0	$8.1	$9.2	$10.3	$10.0
1A05	Data Communication in support of Next Generation Air Transportation System (NextGen)*	$115.5	$149.5	$177.4	$225.6	$230.0
1A06	Next Generation Air Transportation System (NextGen) – Demonstrations and Infrastructure Development*	$24.7	$24.8	$21.6	$27.0	$28.9
1A07	Next Generation Air Transportation System (NextGen) – System Development*	$61.5	$59.5	$65.6	$75.0	$85.3
1A08	Next Generation Air Transportation System (NextGen) – Trajectory Based Operations (TBO)*	$18.0	$32.0	$37.5	$47.0	$51.0
1A09	Next Generation Air Transportation System (NextGen) – Reduce Weather Impact*	$6.0	$10.3	$8.4	$8.4	$4.0
1A10	Next Generation Air Transportation System (NextGen) – Arrivals/Departures at High Density Airports*	$7.0	$28.4	$31.0	$55.6	$51.5
1A11	Next Generation Air Transportation System (NextGen) – Collaborative Air Traffic Management (CATM)*	$41.0	$33.2	$27.0	$34.0	$32.1
1A12	Next Generation Air Transportation System (NextGen) – Flexible Terminal and Airports*	$15.0	$18.6	$14.5	$20.5	$21.8
1A13	Next Generation Air Transportation System (NextGen) – System Networked Facilities*	$9.0	$9.0	$10.8	$11.0	$12.0
1A14	Next Generation Air Transportation System (NextGen) – Future Facilities* **	$10.0	$24.7	$61.0	$67.0	$30.0
1A15	Next Generation Air Transportation System (NextGen) – Performance Based Navigation (PBN) – Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)*	$32.2	$22.7	$22.7	$22.7	$22.7
1A16X	Next Generation Air Transportation System (NextGen) – Safety, Security and Environment*	$0.0	$0.0	$2.0	$2.0	$32.0
	Activity 2: Procurement and Modernization of Air Traffic Control Facilities and Equipment	**$1,523.2**	**$1,512.4**	**$1,482.7**	**$1,429.2**	**$1,466.4**
	A. En Route Programs	**$643.7**	**$561.9**	**$548.6**	**$569.3**	**$614.0**
2A01	En Route Automation Modernization (ERAM)	$26.1	$0.0	$0.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements (ERAM System Enhancements and Technology Refreshments and ERAM Sector Enhancements)*	$65.0	$71.0	$110.0	$145.0	$187.5
2A03	En Route Communications Gateway (ECG)	$2.2	$8.7	$2.9	$2.0	$2.0
2A04	Next Generation Weather Radar (NEXRAD)	$4.1	$7.1	$6.5	$6.3	$5.5
2A05	ARTCC Building Improvements/Plant Improvements	$53.0	$53.0	$61.0	$63.0	$63.5
2A06	Air Traffic Management (ATM)	$13.8	$1.9	$0.0	$0.0	$0.0
2A07	Air/Ground Communications Infrastructure	$5.5	$3.0	$3.2	$3.2	$3.2
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.9	$5.9	$0.0	$0.0	$0.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2014 Budget Total	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.	FY 2018 Est.
2A09	Voice Switching Control System (VSCS)	$20.0	$9.8	$9.9	$11.3	$11.2
2A10	Oceanic Automation System	$4.8	$2.0	$0.0	$0.0	$0.0
2A11	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$20.3	$40.0	$42.0	$50.0	$50.0
2A12	System-Wide Information Management (SWIM)*	$70.5	$61.8	$69.5	$42.3	$38.5
2A13	Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation*	$282.1	$246.3	$188.4	$189.6	$174.9
2A14	Windshear Detection Service (WDS)	$2.0	$4.3	$5.2	$4.5	$1.0
2A15	Weather and Radar Processor (WARP)	$0.7	$0.0	$0.0	$0.0	$0.0
2A16	Collaborative Air Traffic Management Technologies (CATMT)*	$29.4	$3.3	$15.6	$18.0	$30.0
2A17	Colorado ADS-B Wide Area Multilateration (WAM) Cost Share*	$3.4	$0.0	$0.0	$0.0	$0.0
2A18	Tactical Flow Time Based Flow Management (TBFM)*	$10.5	$0.5	$3.6	$1.8	$0.1
2A19	ATC Beacon Interrogator (ATCBI) – Technology Refresh	$1.0	$0.0	$0.0	$0.0	$0.0
2A20	Next Generation Weather Processor (NWP)*	$23.5	$43.3	$30.8	$32.3	$46.6
	B. Terminal Programs	**$492.5**	**$560.8**	**$542.4**	**$508.9**	**$460.2**
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$12.1	$13.4	$10.5	$0.0	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) – Provide	$3.6	$0.0	$0.0	$0.0	$0.0
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$45.5	$56.7	$79.3	$60.0	$46.8
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$136.6	$143.6	$132.2	$89.7	$20.0
2B05	Terminal Automation Program	$2.6	$2.6	$2.7	$2.7	$2.8
2B06	Terminal Air Traffic Control Facilities - Replace	$72.0	$100.0	$100.0	$110.0	$110.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$53.2	$52.7	$52.7	$53.1	$53.1
2B08	Terminal Voice Switch Replacement (TVSR)	$5.0	$0.0	$0.0	$0.0	$0.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$29.0
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$10.9	$13.6	$3.8	$3.5	$1.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance Radar (MASR)	$19.4	$21.1	$10.1	$6.7	$4.4
2B12	Runway Status Lights (RWSL)	$35.3	$26.2	$20.6	$0.0	$0.0
2B13	National Airspace System Voice System (NVS)*	$16.0	$30.2	$15.1	$15.0	$15.0
2B14	Integrated Display System (IDS)	$4.1	$16.9	$13.3	$5.7	$1.1
2B15	Remote Monitoring and Logging System (RMLS) Technology Refresh	$1.0	$2.2	$1.1	$3.4	$4.5
2B16	Mode S Service Life Extension Program (SLEP)	$7.3	$8.1	$11.3	$14.0	$23.8
2B17	Surveillance Interface Modernization (SIM)	$6.0	$0.0	$0.0	$0.0	$0.0
2B18	Terminal Flight Data Manager (TFDM)*	$23.5	$42.0	$55.3	$107.1	$137.4
2B19	Voice Recorder Replacement Program (VRRP)	$6.2	$0.0	$0.0	$0.0	$0.0
2B20	Precision Runway Monitor Replacement (PRMR) – Multilateration Technology Upgrade	$5.0	$1.0	$3.0	$7.0	$7.5
2B21	Integrated Terminal Weather System (ITWS)	$1.3	$4.4	$5.4	$5.0	$3.8
	C. Flight Service Programs	**$17.1**	**$16.1**	**$27.1**	**$33.2**	**$37.3**
2C01	Aviation Surface Weather Observation System	$10.0	$8.0	$8.0	$10.0	$10.0

(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2014 Budget Total	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.	FY 2018 Est.
2C02	Future Flight Services Program (FFSP)	$3.0	$5.0	$16.0	$18.0	$21.8
2C03	Alaska Flight Service Facility Modernization (AFSFM)	$2.9	$2.9	$2.0	$2.0	$2.0
2C04	Weather Camera Program	$1.2	$0.2	$1.1	$3.2	$3.5
	D. Landing and Navigation Aids Programs	**$207.8**	**$199.9**	**$180.2**	**$145.9**	**$137.0**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$8.3	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) – Establish	$7.0	$7.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$109.0	$105.0	$105.7	$97.9	$100.9
2D04	Runway Visual Range (RVR) & Enhanced Low Visibility Operations (ELVO) Program	$6.0	$6.0	$6.0	$6.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$4.0	$3.0	$3.0	$3.0	$3.0
2D07	Visual Navaids - Establish/Expand	$2.5	$2.0	$2.0	$2.0	$2.0
2D08	Instrument Flight Procedures Automation (IFPA)	$4.5	$2.4	$3.0	$2.0	$2.0
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$3.0	$3.0	$3.0	$3.0	$6.0
2D10	VASI Replacement – Replace with Precision Approach Path Indicator	$2.5	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$20.0	$20.0	$0.0	$0.0	$0.0
2D12	Runway Safety Areas – Navigation Mitigation	$38.0	$41.0	$40.0	$14.5	$1.6
	E. Other ATC Facilities Programs	**$162.1**	**$173.7**	**$184.3**	**$171.9**	**$217.9**
2E01	Fuel Storage Tank Replacement and Monitoring	$8.7	$6.8	$14.0	$14.0	$16.0
2E02	Unstaffed Infrastructure Sustainment	$33.0	$33.0	$33.3	$34.4	$44.4
2E03	Aircraft Related Equipment Program	$10.4	$9.0	$11.4	$9.0	$9.0
2E04	Airport Cable Loop Systems – Sustained Support	$5.0	$5.0	$5.0	$5.0	$10.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$11.0	$11.4	$11.1	$0.0	$0.0
2E06	Facilities Decommissioning	$6.5	$5.0	$6.0	$6.0	$10.0
2E07	Electrical Power Systems – Sustain/Support	$85.0	$100.0	$100.0	$100.0	$125.0
2E08	FAA Employee Housing and Life Safety Shelter System Service	$2.5	$0.0	$0.0	$0.0	$0.0
2E09X	Independent Operational Test/Evaluation	$0.0	$3.5	$3.5	$3.5	$3.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$148.6**	**$132.9**	**$139.3**	**$124.3**	**$121.8**
	A. Support Programs	**$135.3**	**$118.7**	**$124.2**	**$109.3**	**$106.8**
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A02	Aviation Safety Analysis System (ASAS)	$12.7	$11.9	$20.2	$11.3	$15.3
3A03	Logistics Support Systems and Facilities (LSSF)	$10.0	$1.0	$1.5	$1.1	$1.4
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$15.0	$15.1	$15.0	$15.1	$15.1
3A06	Information Security	$13.0	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$9.5	$12.5	$9.5	$9.5	$9.0
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$12.2	$10.2	$7.5	$4.2	$0.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2014 Budget Total	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.	FY 2018 Est.
3A09	Data Center Optimization	$1.0	$0.0	$0.0	$0.0	$0.0
3A10	Aerospace Medical Equipment Needs (AMEN)	$5.0	$0.0	$2.5	$0.0	$0.0
3A11	Aviation Safety Information Analysis and Sharing (ASIAS)*	$15.0	$15.0	$15.0	$15.0	$15.0
3A12	National Test Equipment Program	$3.0	$2.0	$4.0	$4.0	$4.0
3A13	Mobile Assets Management Program	$3.0	$4.0	$2.0	$2.0	$3.0
3A14	Aerospace Medicine Safety Information System (AMSIS)	$3.9	$3.0	$3.0	$3.1	$0.0
	B. Training, Equipment and Facilities	**$13.3**	**$14.2**	**$15.1**	**$15.0**	**$15.0**
3B01	Aeronautical Center Infrastructure Modernization	$12.3	$13.2	$14.1	$14.0	$14.0
3B02	Distance Learning	$1.0	$1.0	$1.0	$1.0	$1.0
	Activity 4: Facilities and Equipment Mission Support	**$231.7**	**$246.8**	**$248.5**	**$247.5**	**$259.2**
4A01	System Engineering (SE2020) and Development Support	$35.6	$36.2	$35.0	$35.0	$35.0
4A02	Program Support Leases	$42.1	$45.2	$46.7	$48.2	$49.7
4A03	Logistics Support Services (LSS)	$11.5	$11.5	$11.0	$11.0	$11.0
4A04	Mike Monroney Aeronautical Center Leases	$17.9	$18.4	$18.8	$19.3	$19.7
4A05	Transition Engineering Support	$16.5	$16.5	$18.0	$20.0	$20.0
4A06	Technical Support Services Contract (TSSC)	$25.0	$25.0	$25.0	$25.0	$30.0
4A07	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$4.0	$3.8
4A08	Center for Advanced Aviation System Development (CAASD)	$70.0	$75.0	$75.0	$75.0	$80.0
4A09	Aeronautical Information Management Program*	$9.1	$15.0	$15.0	$10.0	$10.0
	Activity 5: Personnel Compensation, Benefits and Travel	**$482.0**	**$495.9**	**$503.9**	**$516.7**	**$527.4**
5A01	Personnel and Related Expenses	$482.0	$495.9	$503.9	$516.7	$527.4

* Titles with asterisk represent NextGen BLIs
** Additional funding to cover the cost of construction is included in the proposed Immediate Transportation Investment in FY 2014.

Note: BLI numbers with X represent outyear programs not requested in the FY 2014 President's Budget.

Note: FY 2015-2018 outyear funding amounts are estimates.

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Total Year Funding	**$2,777.8**	**$2,852.0**	**$2,906.0**	**$2,971.0**	**$3,036.0**
Targets	**$2,777.8**	**$2,852.0**	**$2,906.0**	**$2,971.0**	**$3,036.0**

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Capital Investment Plan

Appendix D

Fiscal Years 2014 – 2018

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APPENDIX D

FAA CAPITAL PROGRAM

INFORMATION FOR MAJOR PROGRAMS

Because of the criticality of on-budget and on-time acquisitions to the efficient transition to NextGen, The Government Accountability Office (GAO) was directed to determine the status of ATO's performance in acquiring ATC systems.

In December 2007 the GAO issued its report GAO-08-42 entitled, "AIR TRAFFIC CONTROL FAA Reports Progress in System Acquisitions, but Changes in Performance Measurement Could Improve Usefulness of Information". This report documented the findings and provided recommendations to the FAA.

One recommendation was to identify or establish a vehicle for regularly reporting to Congress and the public on ATO's overall, long-term performance in acquiring ATC systems by providing original budget and schedule baselines for each program and the reasons for any baseline revision. The table provided in this Appendix provides the most current information for FAA's Major Active Programs and is in direct response to the GAO's recommendation.

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FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2 ACAT 1	Aug-07	Sep-14	$1,681.5	Mar-11	Sep-14	$1,695.1	Sep-14	$1,726.2	Current Baseline vs Original Baseline: In Mar-11 the Investment Decision Authority (IDA) approved a baseline schedule replan and strategic decision to incorporate the Colorado WAM, Phase II into the ADS-B baseline. Note: Colorado WAM, Phase II was previously baselined in Dec-09 Current Estimate vs Current Baseline: The increase of $31.1M to the current baseline (-1.8% variance) is due to a $6.8M funding earmark in FY 2009 to conduct a Target Level of Safety study to obtain approval for 3 nautical mile separation standards for En Route, another funding earmark of $9.3M in FY 2008 to accelerate Future Air to Air Applications Development, and an increase of $15M for ADS-B related modifications for Terminal software. Note: The increase to the current estimate is -0.9% when the funding earmarks are excluded.
Automatic Dependent Surveillance Broadcast (ADS-B) FY14 - 20 ACAT 1	May-12	Sep-20	$960.4	May-12	Sep-20	$960.4	Sep-20	$960.4	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in May-12.
Collaborative Air Traffic Management Technologies (CATMT) Work Package 2 ACAT 3	Sep-08	Sep-14	$109.5	Sep-08	Sep-14	$109.5	Sep-14	$109.5	
Data Communications (Data Comm) Segment 1, Phase 1 ACAT 1	May-12	May-19	$741.4	May-12	May-19	$741.4	May-19	$741.4	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in May-12.

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
En Route Automation Modernization (ERAM) ACAT 1	Jun-03	Dec-10	$2,154.6	Jun-11	Aug-14	$2,484.6	Aug-14	$2,528.5	Current Baseline vs Original Baseline: The completion date for ERAM has slipped to Aug-14 resulting in a 44 month schedule variance (-49%) to the original baseline. The budget has increased by $330M (-15.3% variance). The budget and schedule variances are associated with the following factors; (1) project plan did not factor in the risks associated with the operational complexity at the selected sites, (2) Insufficient testing environment failed to identify software issues before deployment to key sites (3) Insufficient communication between the Program office and field sites (4) uneven stakeholder engagement during development/deployment. Current Estimate vs Current Baseline: The increase of $43.9M to the current estimate (-1.8% variance) is due to including additional 2nd level engineering costs in the F&E budget for FY12 and FY13 (versus Ops budget).
Flight Standards Inspector Aircraft Replacement (FSIAR), Segment 2	Sep-11	Aug-13	$11.1	Sep-11	Aug-13	$11.1	Aug-13	$11.1	
Logistics Center Support System (LCSS) ACAT 2	Apr-10	Feb-14	$67.4	Feb-12	Feb-14	$67.4	Feb-14	$67.4	
Facility Security and Risk Management (FSRM) 2 ACAT 2	Jun-11	Sep-22	$182.5	Jun-11	Sep-22	$182.5	Sep-22	$182.5	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Jun-11.

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
Next Generation Air-to-Ground Communication System (NEXCOM) - Segment 1A ACAT 2	Sep-98	Sep-08	$407.6	Dec-05	Sep-13	$324.7	Sep-13	$324.7	Current Baseline vs Original Baseline: The schedule extension was due to resource issues to install radios. The decrease in budget is associated with a May-00 JRC decision to reduce the program scope to the acquisition of multimode digital radios.
Next Generation Air-to-Ground Communication System (NEXCOM) - Segment 2, Phase 1 ACAT 2	Sep-11	Sep-18	$285.9	Sep-11	Sep-18	$285.9	Sep-18	$285.9	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Sep-11.
Regulation and Certification Infrastructure for System Safety (RCISS) - Segment 2 ACAT 3	Oct-10	Sep-16	$90.7	Oct-10	Sep-16	$90.7	Sep-16	$90.7	
Runway Status Lights (RWSL) ACAT 1	Jan-10	Oct-15	$327.4	Jan-10	Oct-15	$327.4	Jun-16	$352.4	Current Estimate vs Current Baseline: The completion date for RWSL has slipped from Oct-15 to Jun-16 resulting in an 8 month schedule delay (-9% variance). The slip in schedule is associated with delays in the start of construction at four airports due to a funding deferral of $20M beyond FY13. The budget has been projected to increase by $25M (-7.6% variance) due to changes in construction methods, revised airport requirements, requests for additional light arrays, and construction re-mobilization associated with the FAA furlough (2 week period from Jul-11 to Aug-11).

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
System Approach for Safety Oversight (SASO) Phase IIa ACAT 3	Sep-08	Sep-13	$88.0	Sep-08	Sep-13	$88.0	May-15	$99.5	Current Estimate vs Current Baseline: The completion date for SASO IIA is estimated to slip 20 months (-33% variance) and budget growth of $11.5M (-13% variance). (The baseline change decision is planned for FY13 Q4) The variances are associated with revised Business Process rules, the inclusion of additional testing and changes to the implementation strategy.
System Wide Information Management (SWIM) Segment 1 ACAT 2	Jul-09	Sep-15	$310.2	Jul-09	Sep-15	$310.2	Sep-15	$310.2	
System Wide Information Management (SWIM) Segment 2A ACAT 2	Jul-12	Dec-17	$120.2	Jul-12	Dec-17	$120.2	Dec-17	$120.2	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Jul-12.
Terminal Automation Modernization and Replacement, Phase 3, Segment 1 (TAMR3, S1) ACAT 1	Dec-11	Oct-17	$438.0	Dec-11	Oct-17	$438.0	Oct-17	$438.0	
Terminal Automation Modernization and Replacement (TAMR), Phase 3, Segment 2 ACAT 1	Sep-12	Aug-19	$462.5	Sep-12	Aug-19	$462.5	Aug-19	$462.5	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Sept-12.
Terminal Automation Modernization and Replacement (TAMR), Phase 1 Tech Refresh and Terminal Enhancements ACAT 1	Sep-12	Feb-20	$475.4	Sep-12	Feb-20	$475.4	Feb-20	$475.4	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Sep-12.

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline			Current Baseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Time Based Flow Management (TBFM) ACAT 3	Apr-10	Nov-14	$115.0	Apr-10	Nov-14	$115.0	Nov-14	$115.0	
Wide Area Augmentation System (WAAS) ACAT 1	Jan-98	Aug-99	$1,006.6	May-09	Sep-13	$3,008.1	Sep-13	$3,008.1	**Current Baseline vs Original Baseline:** Budget was increased due to satellite communications moving to the F&E appropriation from O&M and to extend the life cycle of the baseline. The schedule was extended to meet system specification and user requirements.

FAA Capital Programs
Major Programs with Completed Acquisition Phase

	Original Baseline			Current Baseline			Actual Results		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
Instrument Flight Procedures Automation (IFPA) ACAT 2	Sep-06	Sep-11	$50.8	Apr-10	Sep-12	$50.8	Sep-12	$50.8	The program was completed in Sep-12 with Initial Operating Capability (IOC) of Instrument Procedures Development System (IPDS) Module 2.
International Flight Inspector Aircraft (IFIA) ACAT 2	Dec-03	Aug-09	$27.4	Dec-03	Aug-09	$27.4	May-12	$33.7	The program was completed in Sep-12 with acheivement of Full Operating Capability (FOC) on the last 2 aircraft to support NextGen Flight Inspection requirements.

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Appendix E

Fiscal Years 2014 – 2018

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LIST OF ACRONYMS AND ABBREVIATIONS

--Number--	
2D	two dimensional
2DBC	two dimensional bar coding
3D	three dimensional
4D	four dimensional
4D-OTM	four dimensional-oceanic trajectory management
4D Wx SAS	four dimensional weather single authoritative source
--A--	
AAtS	airborne access to SWIM
AAM	office of aerospace medicine
AAR	airport arrival rate
ABAAS	architectural barriers act accessibility standards
ABRR	airborne reroute execution
ACAIS	aircraft certification and audit information system
ACAS-X	redesigned airborne collision avoidance system
ACAT	acquisition category
ACEF	aircraft cabin environment facility
ACE-IDS	automated surface observing system controller equipment-information display system
ACEPS	ARTCC critical and essential power systems
ACM	adjacent center metering
ACS	aeronautical common services
ACTD	advanced concept technology demonstration
AEB	acquisition executive board
ADA	American Disabilities Act
ADAS	automated weather observation data acquisition system
ADD	airworthiness directives development
ADM	add drop multiplexer
ADS-B	automatic dependent surveillance-broadcast
ADS-C	automatic dependent surveillance-contract
ADS-R	automatic dependent surveillance-rebroadcast
AEA	association of European airlines
AEB	ASIAS executive board
AEDT	aviation environmental design tool
AEFS	advanced electronic flight strip
AeroMACS	aeronautical mobile airport communications system
AES	alternative energy systems
AFIS	automatic flight inspection system
AFS	FAA flight technologies and procedures division
AFSFM	Alaskan flight service facility modernization
AFSS	automated flight service station
A/G	air-to-ground
AGIS	airport geographic information system
AGL	above ground level
AI	aeronautical information
AI	artificial intelligence
AIDSIM+	beta version of airport capacity model

AIM	aeronautical information management
AIM	accident incidence model
AIMCss	aeronautical information management common support service
AIMM	aeronautical information management modernization
AIR	FAA aircraft certification service
AIRE	atlantic interoperability initiative to reduce emissions
AIRMET	airmen meteorological advisory system
AirNav	airports and navigations aids
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
ALDARS	automated lightning detection and reporting system
ALL	assimilate lessons learned
ALS	approach lighting system
ALSF-2	approach lighting system with sequenced flashing light model 2
ALSIP	approach lighting system improvement program
AMASS	airport movement area safety system
AMEN	aerospace medical equipment needs
AMHS	automated message handling system
AMMS	automated maintenance management system
AMP	airspace management program
AMRS	aeronautical mobile (R) service
AMS	acquisition management system
AMSIS	aerospace medicine safety information system
ANF	air navigation facilities
ANICS	Alaskan national airspace system interfacility communications system
ANS	automation notification system
ANSP	air navigation service provider
ANT	automated NextGen tower
AOC/FOC	airline operation center/flight operation center
AOCC	Atlantic operations control center
APB	acquisition program baseline
APMT	aviation portfolio management tool
APNT	alternate positioning navigation and timing system
APT	advanced persistent threat
APTS	AVN process tracking system
ARC	aviation rulemaking committee
ARE	aircraft and related equipment
ARINC	Aeronautical Radio Incorporated
ARMS	airspace resource management system
ARMT	airport resource management tool
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ARTS IE/IIE/IIIE	automated radar terminal system model IE/ IIE /IIIE
ASAS	aviation safety analysis system
ASBU	aviation system block upgrade
ASDE-3	airport surface detection equipment – model 3
ASDE-X	airport surface detection equipment – model x
ASDP	advanced signal data processor
ASI	aviation safety inspectors
ASIAS	aviation safety information analysis and sharing
ASKME	aviation system knowledge management environment
ASOS	automated surface observing system

ASR-7, 8, 9, 11	airport surveillance radar model 7, 8, 9, and 11
ASR/CD	airport surveillance radar/common digitizer
ASSC	airport surface surveillance capability
ASTERIX	all purpose structured Eurocontrol surveillance information exchange
ASTI	Alaskan satellite telecommunication infrastructure
ASWON	automated surface weather observation network
ATAG	aerospace transportation advisory group
ATC	air traffic control
ATCBI-4, 5, and 6	air traffic control beacon interrogator model 4, 5, and 6
ATCRBS	air traffic control radar beacon system
ATCS	air traffic control specialist
ATCSCC	air traffic control system command center
ATCT	air traffic control tower
ATDP	advanced technology development prototyping
ATIEC	air traffic information exchange conference
ATIS	automated terminal information service
ATM	air traffic management
ATMRPP	ATM requirements and performance panel
ATN	aeronautical telecommunication network
ATN	aviation training network
ATOP	advanced technologies and oceanic procedures
ATSS	airway transportation system specialist
ATPA	automatic terminal proximity alert
ATS	air traffic services
AUM	arrival uncertainty management
AVS	FAA office of aviation safety
AUTODIN	automatic digital network
AWOS	automated weather observing system
AWSS	automated weather sensor systems
AXSL	ASDE-X safety logic
--B--	
BADA	base of aircraft data
BCAR	business case analysis report
BCD	baseline change decision
BLI	budget line item
BPM	business process management
BUEC	back up emergency communication
BVR	beacon video reconstitutor
BW	bandwidth
BWM	bandwidth manager
--C--	
C3	command and control communications
CAASD	Center for Advanced Aviation System Development
CAC	central air conditioning
CACR	collaborative airspace constraint resolution
CAI	contractor acceptance inspection
CAMI	Civil Aerospace Medical Institute
CARF	central altitude reservation function
CARTS	common-automated radar tracking system

CARSR	common air route surveillance radar
CANSO	civil air navigation service organization
CAS	commercially available software
CAS	collision avoidance system
CAST	commercial aviation safety team
CAT	category of precision landing requirements
CATM	collaborative air traffic management
CATMT	collaborative air traffic management technologies
CAVS	CDTI assisted video separation
CBI	computer-based instruction
CCB	change control board
CCS	conference control switch
CD 2	common digitizer (converts analog radar data to digital format)
CDA	continuous descent approach
CDM	collaborative decision making
CDP	concept development plan/ climb descent procedures
CDR	critical design review
CDTI	cockpit display of traffic information
CEA	compliance and enforcement actions
CEDAR	comprehensive electronic data analysis
CENRAP	center radar approach
CERAP	center radar approach control
CFE	communications facilities enhancement
CFIT	controlled-flight-into-terrain
CFR	code of federal regulations
CHI	computer human interface
CI/EP	certification of imported/exported products
CIM	collaborative information management
CIO	chief information officer
CIP/FIP	current icing product/future icing product
CIWS	corridor integrated weather system
CIX	collaborative information exchange
CLEEN	continuous low energy, emissions and noise
CMA	configuration management automation
CMC	corrective maintenance contract
CMTD	concept maturity technology development
CNS	communications, navigation and surveillance
CONOPS	concept of operations
CONUS	continental United States
COS	continuity of service
COSPA	consolidated storm prediction for aviation
COTS	commercial off-the-shelf
CPDLC	controller-pilot data link communications
CPDS	critical power distribution system
CRA	conflict resolution advisory
CRD	concept and requirements document
CRDR	concept requirements development readiness
CREWS	CTAS remote weather system
CSM	certified software management
CSMC	cyber security management center
CSPA	closely spaced parallel approaches
CSPO	closely spaced parallel runway operations

CSPR	closely spaced parallel runways
CSSD	common status and structure data
CST	communication support team
CssWx	common support services weather
CTAS	center TRACON automation system
CTP	collaborative trajectory planning
CTS	coded time source
CWP	corporate work plan
CY	calendar year
--D--	
DAH	design approval holder
DALR	digital audio legal recorder
DARPA	Defense Advanced Research Projects Agency
DASI	digital altimeter setting indicator
DAT	digital audio tape
DataComm	data communications
DBRITE	digital bright radar indicator tower equipment
DC BUS	direct current electrical distribution system
DCCI	data center consolidation initiative
DCIS	data communications integrated services
DCL	departure clearance
DCNS	data communication air/ground network service
DDN	direct entry digital NOTAM
DDR	detailed design review
DDS	delegation option authorization/designated alteration station/special federal aviation regulation
DELPHI	DOT accounting system
DEN	domestic events network
DESIREE	distributed environment for simulation rapid engineering and experimentation
DF	direction finder
DHS	Department of Homeland Security
DME	distance measuring equipment
DMN	data multiplexing network
DMS	defense messaging system
DNS	domain name service
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
D-OTIS	digital operational terminal information service
DOTS+	dynamic ocean tracking system plus
DR	disaster recovery
DRC	disaster recovery center
DREN	defense research and engineering network
DRSR	digital remote surveillance communication interface processor replacement
D position	data controller position
DSP	departure spacing program
DS/PP	designee supervision/past performance
DSR	display system replacement
DST	decision support tool
DT&E	development test and evaluation
DUATS/S	direct user access terminal system

DVD	digital virtual disc
DVOR	doppler VOR
DVRS	digital voice recorder system
--E--	
EA	enterprise architecture
EBUS	enhanced backup surveillance
ECG	en route communication gateway
ECP	engineering change proposal
EDA	engineering design approval
EDC	enterprise data center
EDDA	environmental due diligence audits
EDMS	electronics drawing management system
EES	ERAM evaluation system
e-FAROS	enhanced final approach runway occupancy signal
eFAST	electronic FAA accelerated and simplified task
EFS	electronic flight strip
EFS	electronic file service
EFSTS	electronic flight strip transfer system
EFVS	enhanced flight vision systems
EISA	Energy Independence and Security Act of 2007
EISS	enterprise information system security
ELVO	enhanced low visibility operations
EMB	enterprise messaging bus
EMC	energy management and compliance
EMS	environmental management system
EOL	end of life
EON	emergency operations network
EOS	end of service
EOSH	environmental & occupational safety and health
EPA	Environmental Protection Agency
EPACT	Energy Policy Act of 2005
EPB	external boundary protection
EPO	emergency power off
ER	environmental remediation
ERAM	en route automation modernization
ERAU	Embry Riddle Aeronautical University
ERIDS	en route information display system
ERV	emergency response vehicle
ES	extended squitter
E-Scan	electronic scan
ESCR	environmental site cleanup report
ESD	electrostatic discharge
ESRL	Earth Sciences Research Laboratory
ESV	expanded service volume
ETA	estimated time of arrival
ETR	emergency transmitter replacement
ETVS	enhanced terminal voice switch
EUROCAE	European Organization for Civil Aviation Equipment
EUROCONTROL	European ANSP
EVM	earned value management
EVS	enhanced vision system

EWD	weather information network server dissemination
EWIN	enhanced weather information network
--F--	
F-420	wind sensor
FAALC	FAA logistics center
FAC	NextGen activities for transforming facilities
FACT	future airport capacity task
FAF	final approach fix
FANS	future air navigation system
FAROS	final approach runway occupancy signal
FAS	flexible analysis system
FAT	factory acceptance test
FBW	fly by wire
FBWTG	FAA bulk weather telecommunications gateway
FCI	facility condition index
FCT	federal contract tower
FDCC	federal desktop core configuration
FDCCI	federal data center consolidation initiative
FDIO	flight data input/output
FDP2K	flight data processing 2000
FDPS	flight data publication service
F&E	facilities and equipment
FEAF	federal enterprise architecture framework
FFOV	forward field of view
FFRDC	federally funded research and development center
FFSP	future flight service program
FI	flight inspection
FIA	final investment analysis
FICAM	federal identify credential and access management
FIAPA	flight inspection airborne processor application
FID	final investment decision
FIM-S	flight deck based interval management - spacing
FIR	flight information region
FIS-B	flight information service – broadcast
FISMA	federal information security management act
FIXM	flight information exchange model
FLEX	flexible terminal environment
FM	frequency modulated
FMC	flight management computer
FMS	flight management system
FNS	federal NOTAM system
FOC	final operating capability
FOC	flight operations center
FOMS	flight operations management system
FOQA	flight operation quality assurance
FOTT	fiber optic tie trunk
FOWG	flight object working group
FOXS	flight object exchange service
FPDS-NG	federal procurement data system- next generation
FPPS	facility power panel schedule
FPS	fixed position surveillance

FRD	final requirements document
FS21	flight service automation system
FSAM	federal segment architecture methodology
FSDO	flight standards district office
FSEP	facility service and equipment profile
FSRM	facility security risk management
FSS	flight service station
FST	fuel storage tank
FTB	Florida NextGen test bed
FTE	full time equivalent
FTI	FAA telecommunications infrastructure
FTSN	flexible terminal sensor network
--G--	
GA	general aviation
GAO	Government Accountability Office
GAST-C	GBAS approach service type C
GBAS	ground-based augmentation system
GCCS	geo stationary communication and control segment
GEO	geosynchronous communication satellite
G/G	ground to ground
GIM-S	ground based interval management - spacing
GIS	geographic information system
GLS	GPS landing system
GNAS	general NAS maintenance area
GNSS	global navigation satellite system
GOMEX	Gulf of Mexico
GPS	global positioning system
GRIB	gridded binary (data format)
GSA	General Services Administration
GSD	global sciences division
GTGS	graphical turbulence guidance version 3
GUFI	globally unique flight identifier
GUI	graphical user interface
--H--	
HADDS	HOST ATM data distribution system
HAZMAT	hazardous materials
HCS	HOST computer system
HD	arrivals/departures at high density airports
HF/SSB	high frequency/single side band
HF	human factors
HGOPA	high gain open planar array
HIE	health information exchange
HITL	human-in-the-loop
HLA	high level architecture
HOST	en route computer system
HPSB	high performance sustainable building
HRJ	Hydro-treated renewable jet (fuel)
HSD	Homeland Security data network
HSI	human system integration

HSPD	Homeland Security Presidential Directive
HUD	heads-up-display
HUR	high update radar
HVAC	heating, ventilating and air conditioning
--I--	
I2I	idea to in-service
IA	investment analysis
IAA	interagency agreement
IAPA	instrument approach procedures automation
IARD	investment analysis readiness decision
IATA	International Air Transport Association
IATI	international air traffic interoperability
IBR	integrated baseline review
ICAO	International Civil Aviation Organization
ICD	interface control document
ICF	integrated control facility
IGCE	independent government cost estimate
ICMS	integrated control and management system
ICSS	integrated communications switching system
IDA	investment decision authority
IDAC	integrated departure arrival capability
IDIQ	indefinite delivery/indefinite quantity
IDLM	interference detection, location and mitigation
IDR	incident detection and response
IDS	information display system
IDS	integrated display system
IEEE	Institute of Electrical and Electronic Engineers
IFI	in flight icing
IFIS	integrated flight information system
IFP	instrument flight procedures
IFPA	instrument flight procedures automation
IFR	instrument flight rule
IG	Inspector General
IGCE	independent government cost estimate
IID	initial investment decision
IKM	identity and key management
ILS	instrument landing system
IM	interval management
IMC	instrument meteorological conditions
IMS	interval management spacing
IOA	independent operational assessment
IOC	initial operating capability
IOT&E	independent operational test and evaluation
IP	internet protocol
IPDS	instrument procedure development system
IPE	internal policy enforcement
IRD	interface requirement document
IRIS	integrated reporting information system
IRU	inertial reference unit
ISAM	integrated safety assessment model
ISAT	implementation service acceptance testing

ISD	in service decision
ISO	International Standards Organization
ISPD	implementation strategy and planning document
ISS	information systems security
I&T	integration and test
IT	information technology
IT	integration testing
ITI	immediate transportation initiative
ITP	in-trail procedures
ITU	International Telecommunication Union
ITWS	integrated terminal weather system
IVSR	interim voice switch replacement
IWP	integrated work plan
--J--	
JAI	joint acceptance inspection
JAWS	Juneau airport wind system
JPALS	joint precision approach and landing system
JPDO	joint planning and development
JPE	joint planning environment
JRC	joint resources council
--K--	
KW	kilowatts
--L--	
LAAS	local area augmentation system
LAHSO	land and hold short operations
LAN	local area network
L-Band	Radar frequency band 1-2 giga-Hertz
LCGS	low cost ground surveillance
LCSS	logistical center support system
LDACS	L-Band digital aeronautical communication system
LDAP	lightweight directory assistance protocol
LDIN	lead in light system
LDRCL	low-density radio communication link
LED	light emitting diode
LIDAR	light detection and ranging
LIS	logistics and inventory system
LITE	local integrated tower equipment
LLWAS	low-level wind shear alert system
LNAV	lateral navigation
LOA	letters of agreement
LOB	line of business
LOC	localizer
LP	localizer performance
LPDME	low power distance measuring equipment
LPGBS	lightning protection, grounding, bonding, and shielding
LPV	localizer performance with vertical guidance
LRR	long-range radar
LRU	line replaceable units

LSS	logistics support services
LSSF	logistics support system and facilities
--M--	
MALSR	medium-intensity approach light system with runway alignment indicator lights
MAMP	mobile asset management program
MASR	mobile/transportable airport surveillance radar
MASS	maintenance automation system software
MATCT	mobile air traffic control tower
MB	marker beacon
MDR	multimode digital radio
MEARTS	microprocessor en route automated radar tracking system
MHz	megahertz
MIT/LL	Massachusetts Institute of Technology Lincoln Laboratory
MITRE	MITRE Corporation
MLAT	multilateration
MMAC	Mike Monroney Aeronautical Center
MOA	memorandum of agreement
MOB	contract award mobility
MOC	mid term operational capability
MOCC	midstates operations control center
Mode S	mode select
MOIE	mission oriented investigation and experimentation
MON	minimum operational network
MOPS	minimum operational performance standards
MPAR	multi-function phased array radar
MPS	maintenance processor subsystem
MPT	meter point time
MSAD	monitor safety and analyzed data
MSRD	monitor safety related data
MSSR	monopulse secondary surveillance radar
MTSR	maintenance test system replacements
MWS	maintenance work station
MX	mobile engine generator
--N--	
NADIN	national airspace data interchange network
NADIN MSN	national airspace data interchange network – message switching network
NADIN PSN	national airspace data interchange network – package switching network
NAFIS	next generation flight inspection system
NARP	national aviation research plan
NAS	national airspace system
NASA	National Aeronautics and Space Administration
NASDOC	national airspace system document
NASE	NAS adaptive services environment
NASPAC	national airspace system performance analysis capability
NASR	national airspace system resources
NAVAIDS	navigation aids
NAV Lean	navigation procedures implementation plan
NCAR	National Center for Atmospheric Research
NCO	national coordination office

NCP	noise compatibility program
NCP	NAS change proposal
NCR	NAS common reference
NDB	non-directional beacon
NEMC	NAS enterprise management centers
NEMS	NAS enterprise messaging service
NEPA	National Environmental Policy Act
NEXCOM	next generation air/ground communications
NEXRAD	next generation weather radar
NextGen	next generation air transportation system
NG-VRRP	next generation voice recorder replacement program
NEXTOR	National Center of Excellence for Aviation Operations Research
NGIP	NextGen Implementation Plan
NHIN	national health information network
NIEC	NextGen integration and evaluation capability
NIPRNET	non classified internet protocol router network
NISC	national airspace system implementation support contract
NLIHA	NEXRAD legacy, icing, and hail algorithm
NLN	national logging network
NMAC	near mid-air collision
NMCS	network management control system
NMR	NADIN MSN rehost
NNEW	NextGen network enabled weather
NOAA	National Oceanic and Atmospheric Administration
NOCC	national operations control center
NOP	national offload program
NORDO	no radio
NOTAM	notice to airmen
NPI	NEXRAD product improvement
NPS	NextGen performance snapshots
NRCS	national radio communications system
NRN	national remote maintenance monitoring network
NSIP	NextGen system implementation plan
NSOS	national security officer service
NSPD	National Security Presidential Directives
NSWRC	next generation surveillance and weather radar capability
NTEP	national test equipment program
NTML	national traffic management log
NTP/PTP	network time protocol/precision time protocol
NTSB	National Transportation Safety Board
NVS	national airspace system voice system
NWP	NextGen weather processor
NWS	National Weather Service
--O--	
OA	operational analysis
OAPM	optimization of airspace and procedures in the metroplex
OARS	operational analysis and reporting system
OASIS	operational and supportability implementation system
OCAT	oceanic conflict advisory tool
OCS	operational control segment
OCS(X)	modernized operational control segment

ODALS	omni-directional airport lighting system
ODNI	Office of the Director of National Intelligence
OE	operational error
OEAAA	obstruction evaluation/airport airspace analysis
OEM	original equipment manufacturer
OEP	operational evolution partnership
OFDPS	offshore flight data processing system
OGS	open geospatial consortium
OI	operational improvement
OLS	operational land switch
O&M	operation and maintenance
OMB	Office of Management and Budget
OPS	operations
ORD	operational readiness demonstration
OSA	operational safety assessment
OSD	operational suitability demonstration
OSF	operational support facilities
OSHA	Occupational Safety and Health Administration
OSPe	oversee system performance - external
OSPi	oversee system performance - internal
OST	Office of the Secretary of Transportation
OSTP	Office of Science and Technology Policy
OT	operational improvement
OTA	other transactions agreements
OT&E	operation test and evaluation
OTM	oceanic trajectory management
OTTM	oceanic tactical trajectory management
OTW	out the window
--P--	
P3I	pre-planed product improvement
PA&I	predictive analysis and intervention
PANYNJ	Port Authority of New York and New Jersey
PAPI	precision approach path indicator
PBN	performance based navigation
PBWP	product based work plan
PCB	polychlorinated biphenyl
PCB	protocol converter box
PCPS	purchase card purchasing system
PDARS	performance data analysis and reporting system
PDD	presidential decision directive
PDMP	predefined metering points
PDR	preliminary design review
PDU	power distribution unit
PER3	post ERAM release 3
PfLAS	portfolio level agreements
PGW	protocol gateway
PIREPS	pilot reports
PIV	personal identification verification
PLM	programming language for microcomputers
PME	prime mission equipment
PNT	position, navigation and timing

POCC	pacific operations control center
PPS	precise positioning service
PR	procurement request
PRISM	FAA purchasing management system
PRM-A	precision runway monitor – alternate
PRM-E	precision runway monitor – electronic scan radar
PRM-R	precision runway monitor - replacement
PS3	power systems sustain support
PSP	program safety plan
PTR	problem trouble report
PX	prime generators
--Q--	
QA	quality assurance
QMS	quality management system
QoS	quality of service
--R--	
RA	resolution advisory
RAIM	reliability and integrity monitor
RAPCON	radar approach control
RAPPI	random access planned position indicator
RAPT	route availability planning tool
RASP	regional ADAS service processor
RBRT	risk based resource targeting
RCAG	remote communication air to ground
RCE	radio control equipment
RCF	radio communication facilities
RCISS	regulation and certification infrastructure system safety
RCL	radio communication link
RCLR	radio communications link repeater
RCLT	radio communications link terminal
RCM	reliability centered maintenance
RCO	remote communications outlet
RCOM	recovery communications
R&D	research and development
RDA	radar data acquisition
RDHFL	research and development human factors lab
RDVS	rapid deployment voice switch
RE&D	research, engineering, and development
REIL	runway end identifier lights
REL	runway entrance lights
RepCON	replacement documentation and configuration identification system
RF	radio frequency
RFFA	radio-frequency filter amplifier
RFI	radio frequency interference
RFI ELIM	radio frequency interference elimination
RFP	request for proposal
RFW	router firewall
RI	runway incursion
RID	runway incursion device
RIL	runway intersection lights

RIRP	runway incursion reduction program
RMA	reliability maintainability availability
RMLS	remote monitoring and logging system
RMLS NRN	remote monitoring and logging system national RMM network
RMM	remote maintenance monitoring
RMMC	remote maintenance monitoring and control
RMMS	remote maintenance and monitoring system
RMP	resource and management plan
RMSET	remote maintenance system engineering team
RMT	resource management tool
RNAV	area navigation
RNP-4	required navigation performance-4 nm
ROC	radar operations center
ROC	regional operations center
RPG	radar product generator
RPM	revenue passenger mile
RSA	runway safety areas
RSA	runway safety assessment
R-side	radar controller position
RTA	required time of arrival
RTCA	Radio Technical Commission for Aeronautics
RTP	resource tracking program
RTR	remote transmitter/receiver
RUC	rapid update cycle
RVP	radar video processors
RVR	runway visual range
RWI	reduce weather impact
RWSL	runway status lights
RX	receiver
--S--	
SA	special authorization
SAA	special activities airspaces
SAAR	special aircraft and aircrew authorization required
SAIDS	system atlanta information display system
SAMS	special use airspace management system
SAPA	simplified aircraft-based paired approach
SAR	search and rescue
SARA	Superfund Amendment and Reauthorization Act
SARPS	standards and recommended practices
SAS	safety assurance system
SAS	single authoritative source
SASO	system approach for safety oversight
SATNAV	satellite navigation
SAWS	standalone weather sensors
SBAS	satellite based augmentation system
SBS	surveillance and broadcast services
SC	special committee
SCM	surface conformance monitoring
SCS	secure conference system
SDA	system design approval
SDAT	sector design and analysis tool

SDD	software design document
SDO	super density operations
SDP	signal data processor
SDR	system design review
SE2020	system engineering 2020 contract
SecFac	secure facsimile
SESAR	Single European Sky ATM Research
SFA	special flight authorizations
SFME	strategic flow management enhancement
SFMI	strategic flow management integration
SGS-T	signal generator subsystem – type
SID	standard instrument departure
SIM	surveillance interface modernization
SIP	SWIM implementing programs
SIPRNET	secret internet protocol router network
SIR	screening information request
SITS	security integrated tool set
SLEP	service life extension program
SMA	surface movement advisor
SMGCS	surface movement guidance control system
SMR	surface movement radar
SMS	safety management system or surface management system
SNT-SMA	staffed NextGen tower – small and medium airports
SO	staff offices
SOA	service oriented architecture
SOP/LOA	standard operating procedure/letters of agreement
SOW	scope of work
SpclAC	special airworthiness certifications
SPMO	special program management office
SPO	safety policy
SPR	safety promotion
SPS	standard positioning service
SRM	safety risk management
SRMD	safety risk management document
SRMTS	safety risk management tracking system
SRS	software requirements specification
SSA	system safety assessment
SSB	single sideband
SSD	significant standards difference
SSDI	system security design and integration
SSE	safety security and environment
SSM	support modification
SSMIMO	subscriber station multi-input multi-output
SSMT	system safety management transformation
SSPP	strategic sustainability performance plan
SSS	system segment specification
SSV	standard service volume
STAR	standard terminal arrival routes
STARS	standard terminal automation replacement system
STARS/SL	STARS Lite
STBO	surface trajectory based operation
STDDS	SWIM terminal data distribution system

STE	secure telephone equipment
StdAC	standard airworthiness certifications
STEM	science technology engineering math initiation
STEP	sustainment and technology evolution plan
STM	surface traffic management
STMP	special traffic management program
STN	satellite telephone network
STVS	small tower voice switch
SUA	special use airspace
SVS	synthetic vision system
SW	software
SWAC	system-wide analysis capability
SWIM	system-wide information management
SWS	support work station
SX	standby generator
--T--	
TACAN	tactical air navigation antenna
TAMR	terminal automation modernization replacement
TARP	traffic analysis and review program
TBD	to be determined
TBFM	time-based flow management
TBM	time based metering
TBO	trajectory based operations
TCAS	traffic alert and collision avoidance system
TCM	taxi conformance monitoring
TCS	terrestrial communication subsystem
TCWF	terminal convective weather forecast
TDDS	terminal data distribution system
TDLS	tower data link service
TDWR	terminal Doppler weather radar
TE	test equipment
TechNET	technicians network
TERPS	terminal instrument procedures
TFDM	tower flight data manager
TFM	traffic flow management
TFM-M	traffic flow management modernization
TFMS	traffic flow management system
TFR Bldr	temporary flight restriction builder
TGF	target generator facility
THL	takeoff hold lights
TIS-B	traffic information service-broadcast
TMA	traffic management advisor
TMC	traffic management coordinator
TMI	traffic management initiative
TMU	traffic management unit
TOPA	TCAS operational performance assessment
TOps	trajectory operations
TPC	TFM processing center
TR	technology refresh
TRACON	terminal radar approach control
TRAMS	TCAS resolution advisory (RA) monitoring system

TRS-R	TFM remote site – reengineering
TSA w/A (TSSA)	traffic situation awareness with alerts
TSD	traffic situation display
TSO	technical standard order
TSSC	technical support services contract
TTA	time to alarm
TVSR	terminal voice switch replacement
TWIP	terminal weather information for pilots
--U--	
UAS	unmanned aircraft system
UAT	universal access transceiver
UAV	unmanned aerial vehicles
UCS	unified contracting system
UFPF	unified flight planning and filing
UHF	ultra high frequency
UIS	unstaffed infrastructure sustainment
UPM	uninterruptable power module
UPS	uninterruptible power source
URET	user request evaluation tool
USGCB	U.S. government configuration baseline
USNS	U.S. Notices to Airmen system
--V--	
v	version
VASI	visual approach slope indicator
VDL	VHF data link
VDMR	VSCS display module replacement
VEM	VSCS electronics module
VFR	visual flight rules
VHF	very high frequency
VIL	vertical integrated liquid
VITS	VSCS integrated test suite
VMC	visual meteorological conditions
VNAV	vertical navigation
VOIP	voice over internet protocol
VOR	very high frequency omni-directional range
VORTAC	very high frequency omni-directional range collocated with tactical air navigation
VOT	VOR test range
VRTM	verification requirements traceability matrix
VSCS	voice switching and control system
VSBP	voice switch bypass system
VSRS	voice switch replacement system
VTABS	VSCS training and backup switch
VTCR	VTABS test controller replacement
--W--	
WAAS	wide-area augmentation system
WAM	wide are multilateration
WAM-MLAT	wide are multilateration – multilateration
WARP	weather and radar processor

WAT	work activity tracking
WBS	work breakdown structure
WCS	web coverage services
WE-CTP	web enabled - collaborative trajectory planning
WebCM	web configuration management
WFS	web features services
WiMAX	worldwide interoperability for microwave access
WINS	weather information network server
WIT	workplace inspection tool
WJHTC	William J. Hughes Technical Center
WME	wind measuring equipment
WMS	web map services
WMSCR	weather message switching center replacement
WMSS	WARP maintenance and sustainment services
WOCC	Washington operations center complex
WOI	weather observation improvements
WP	work package
WRR	weather radar replacement
WSDD	web service description documents
WSDS	wind shear detection services
WSP	weather systems processor
WTMA-P	wake turbulence mitigation for arrivals - procedures
WTMD	wake turbulence mitigation for departures
WTS-BMgmt	work tracking software - budget management
WTS-RBRT	work tracking software – risk based resource tracking
WTS-WAT	work tracking software – work activity tracking
Wx	Weather
WXXM	weather information exchange model

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