NATIONAL AIRSPACE SYSTEM CAPITAL INVESTMENT PLAN

FY25–FY29

U.S. Department of Transportation

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Federal Aviation Administration – National Airspace System Capital Investment Plan for Fiscal Years 2025-2029

1 Capital Investment Plan (CIP) Overview

The Federal Aviation Administration (FAA) National Airspace System (NAS) Capital Investment Plan (CIP) identifies the capital investments required for a five-year period to sustain and modernize the infrastructure, systems, and services required for the safe and efficient operation of the NAS.

The FY 2025-2029 CIP Overview provides information on NAS programs and services. The CIP Overview includes the NAS Enterprise Architecture (EA) Roadmaps that highlight a 15-year view of NAS modernization and a list of capital investment programs associated with each roadmap.

In addition, the CIP briefly describes the Next Generation Air Transportation System (NextGen) portfolios and identifies aviation safety, facilities, and mission support programs. This CIP Overview, as well as previous versions, will be available at http://www.faa.gov/air_traffic/publications/cip.

1.1 CIP Development

The CIP is an integral part of the FAA's near-, mid-, and long-term planning and budgeting process. To develop the CIP, the FAA follows an annual process. Inputs come from the Agency's strategic plan, congressional direction, appropriation, and from programs that are adjusting their goals based on a variety of factors that affect their schedules. The FAA considers both current funding targets when developing the budget and potential funding levels for programs beyond the budget period. The CIP development process includes a full review of the NAS EA roadmaps to ensure that the established program schedules coincide with the President's Budget request and approved funding in the five-year CIP.

1.2 Economic Considerations

Aviation plays an important role in the health of the U.S. economy. Hence, effective planning for a reliable worldwide aviation network is critical for the future of the economy. Both domestic and international commerce rely heavily on ready access to aviation services for carrying passengers and freight to the cities around the world, which helps to sustain economic growth. According to the agency's Office of Aviation Policy and Plans, the economic impact of U.S. civil aviation remained high in 2022.[1] Preliminary data indicated that economic activity attributed to civil aviation-related goods and services totaled $1.7 trillion and generated

[1] Federal Aviation Administration, Office of Policy, International Affairs, and Environment: Office of Aviation Policy and Plans, Forecast & Performance Analysis; FAA Aerospace Forecast Fiscal Years 2024-2044 https://www.faa.gov/dataresearch/aviation/aerospaceforecasts/faa-aerospace-forecast-fy-2024-2044

9 million jobs with $483.5 billion in earnings. In total, U.S. aviation contributed 3.8 percent to the U.S. Gross Domestic Product. Other aviation related economic highlights for 2022 include:

- U.S. commercial air carriers transported 852.9 million passengers with over 909 billion revenue passenger miles
- U.S. commercial carriers accommodated more than 51.5 billion revenue ton-miles of freight in support of commercial activities
- Commercial airline operations enabled $338.3 billion of visitor expenditures on goods and services
- Civil aircraft manufacturing total output was $152.58 billion

1.3 Air Travel Demand

Historically, the demand for air travel is heavily influenced by changes in the economy. Figure 2-1 depicts the percentage change in annual Revenue Passenger Miles (RPM) and Gross Domestic Product (GDP, in constant 2012 dollars) since 1980. Prior to 2020, passenger demand for air travel in RPM had grown at a faster rate than the economy. In 2020, however, RPM declined more sharply than did GDP, resulting in lower total growth in RPM. Since 2021, both series have recovered.

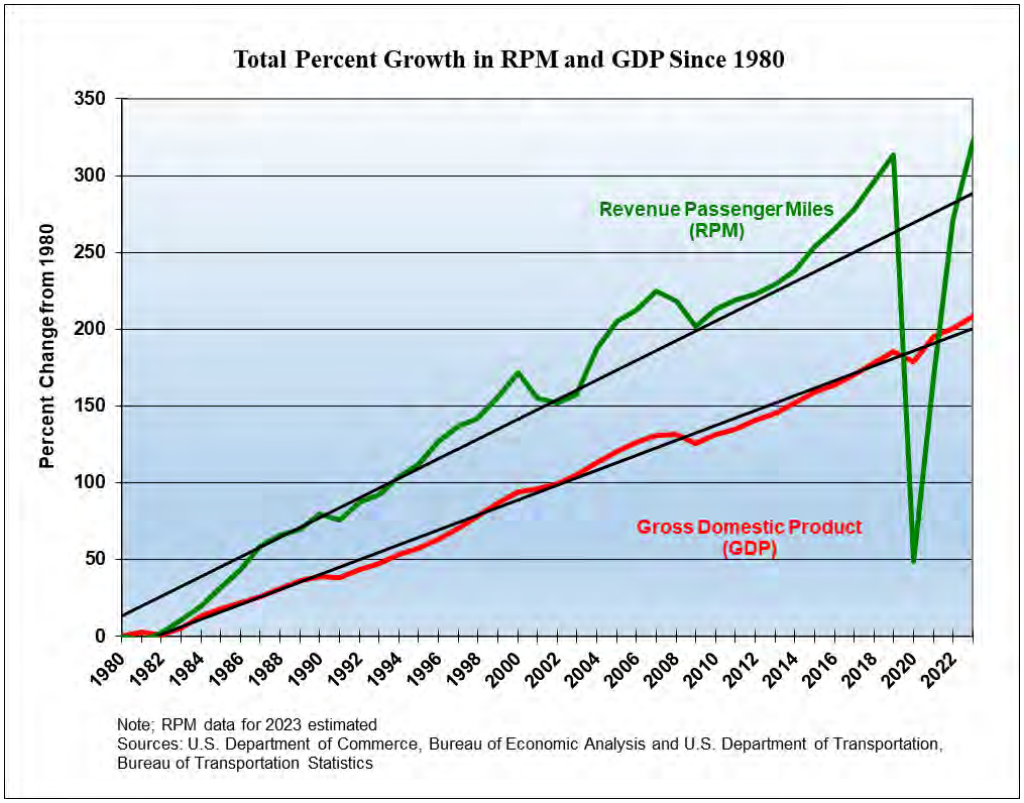

Figure 1-1 Air Travel Demand Relative to GDP

With growth in GDP and air travel, the U.S. inflation-adjusted real economic output long-term growth trend supports continued increases in air travel demand, despite the sharp decline of 2020. Recent economic data shows that GDP growth has returned, and the long-term correlation shown in Figure 1-1 suggests the demand for air travel, as measured by RPM, will resume its corresponding increase, yet at a slower rate.[2]

According to the latest FAA Aerospace Forecast for Fiscal Years 2024-2044, overall system RPMs are projected to increase at an average rate of 2.7 percent per year for fiscal years 2024 to 2044, a rate that reflects stabilized growth after recent post-COVID boosted recovery. Also, the 2024 FAA forecast calls for U.S. carrier passenger growth over the next 20 years to average 2.5 percent per year and growth in operations of 1.8 percent per year.[3]

2, 3 Source: FAA Aerospace Forecast Fiscal Years 2024–2044 https://www.faa.gov/dataresearch/aviation/aerospaceforecasts/faa-aerospace-forecast-fy-2024-2044

2 Capital Planning

The development of the CIP requires significant time to plan, define, and prioritize expected program outcomes for review and approval by decision makers. Maintaining a balanced portfolio of FAA's capital investments is critical to the long-term sustainment and modernization of the NAS to meet projected demand, deliver new services and capabilities, and improve system safety and efficiency.

In accordance with FAA's Acquisition Management System (AMS) policy, proposed capital investments must be presented to the Joint Resources Council (JRC) for review and approval before they can begin. Program offices and sponsors must develop business cases to justify the need for the programs, explain technical requirements and the approach to complete programs, develop lifecycle cost and schedule estimates, estimate personnel needs, and explain any interdependencies among programs.

The JRC consists of senior-level representatives from FAA's lines of business and staff offices and provides executive-level review, approval, and oversight of Facilities and Equipment (F&E) programs in the CIP.

The JRC responsibilities related to the CIP programs include:

- Annual review and approval of the FAA investment portfolio as part of the F&E budget submission process
- Annual review and approval of the FAA's EA Roadmaps
- Review and approval of program requests for investment decisions such as Concept and Requirements Definition Readiness Decision (CRDRD), Investment Analysis Readiness Decision (IARD), Initial Investment Decision (IID), and Final Investment Decision (FID)
- Approval for all required AMS program documents including program requirements, acquisition program baseline, business case, and the implementation strategy and planning document
- Approval for all Acquisition Program Baseline (APB) change decisions that may alter program performance, cost, and schedule baselines
- Quarterly acquisition program reviews to manage ongoing investment programs and oversight of the execution and reporting of acquisition programs

Program acquisitions approved by the JRC are also supported by the multi-year plan displayed in the EA Roadmaps and published in the CIP. These roadmaps include key acquisition milestones as defined by the AMS and various interdependencies among the programs. This approach helps to ensure appropriate planning and scheduling for the approval, funding, acquisition, and deployment of related systems, equipment, or capabilities.. Once funds are appropriated by Congress, program offices must then manage risk during execution to successfully deliver planned outcomes on budget and on schedule. Finally, before new systems or capabilities can receive approval to operate in the NAS, they must demonstrate compliance with applicable FAA reliability and safety standards.

2.1 Five-Year Capital Investment Plan Priorities

Maintaining a balanced portfolio of capital investments each year is necessary to ensure the continued sustainment and modernization of the NAS. This process is integral to deliver new capabilities that will meet projected air transportation demands. The CIP goes through a rigorous process to develop, plan, and prioritize expected program outcomes for review and approval by decision makers.

Selected Capital F&E Programs are highlighted below:

- **Aeronautical Information Management Modernization (AIMM) Enhancement 1 -** The AIMM program will develop and enhance systems and services that address future air traffic requirements. Digital aeronautical data enables near real-time processing of data to improve access to, and the quality of static and planned NAS data.

- **Surface Surveillance Portfolio Sustain 1 -** Surface Movement Radar (SMR) Replacement at existing Airport Surface Detection Equipment Model X (ASDE-X) systems at 35 airports and Airport Surface Surveillance Capability (ASSC) systems at nine airports are surface surveillance systems that use radar, multilateration (a surveillance technique based on measurement of the times of arrival of aircraft and vehicle transponder signals at multiple receivers), and Automatic Dependent Surveillance-Broadcast (ADS-B) to track aircraft and vehicles. These systems help air traffic controllers prevent surface collisions and reduce runway incursions by improving situational awareness.

- **Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements** - Major construction projects that will replace building systems include architectural elements, such as walls, roofing, and interior finishes; mechanical systems such as heating, ventilation, and air conditioning equipment, environmental control systems and plumbing; and electrical distribution, lighting, and fire protection systems.

- **Electrical Power System Sustain/Support** - This program sustains and supports the existing electrical power components and systems that include power conditioning, power regulation, power distribution, standby power, onsite prime power, grounding, monitoring, and electrical power cable infrastructure. Power systems' performance is critical to national airspace system operations, and any power disruptions are briefed daily to the Administrator and senior management.

- **Unstaffed Infrastructure Sustainment (UIS)** - The UIS program sustains national airspace supporting infrastructure at approximately 12,000 sites in the national airspace system. This will continue to enable the reliable and continuous operations of surveillance, navigation, communication, and weather equipment. Unstaffed infrastructure protects electronic equipment from weather hazards and unauthorized entry.

- **En Route Automation** -The En Route Automation Modernization (ERAM) enhancements include improvements to trajectory modeling, increased conflict detection and resolution capabilities to support separation management and expand the automated coordination of flight data and aircraft control with the Canadian Air Navigation Service Provider (Nav Canada).

- **Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation -** Continued implementation of ADS-B will provide more efficient use of airspace capacity, fewer flight delays, and more optimal routing for aircraft. Other efficiencies include

reduced weather deviations and fewer cancellations during inclement weather conditions. ADS-B increases access to some Alaskan regions and Gulf of Mexico oil platforms.

- **Data Communications (Data Comm) in support of NextGen** - Data Comm will reduce operational errors associated with communications, enhancing the safety and efficiency of the NAS. Data Comm will also reduce environmental impact of aviation operations due to less fuel burn and fewer emissions. The program will improve National Airspace System capacity and reduce delays resulting in passenger value of time savings.

- **Standard Terminal Automation Replacement System (STARS) - Sustainment 3 -** Standard Terminal Automation Replacement System (STARS) is the principal tool used by air traffic controllers in and around airport terminal facilities for controlling aircraft. STARS infrastructure can be expanded and extended to meet increased traffic demands, and to accommodate the introduction of new automation functions necessary for improved safety, efficiency, and capacity.

- **FAA Telecommunications Infrastructure (FTI) - Sustainment 2** - Telecommunications services are essential to the operations of the NAS and the FAA. The FTI Sustainment 2 program will provide technical refresh of the existing FTI services and infrastructure used by the FAA to support approximately 30,100 telecom services at more than 4,400 sites. FTI telecommunication services are designed, engineered, and provisioned to meet FAA-specific availability, latency, and security requirements. The FTI Sustainment 2 program will ensure the continued operation of telecommunication services until the successor program, FAA Enterprise Network Services (FENS) is operational.

- **Terminal and En Route Voice Switch and Recorder Portfolio** - Voice recorders are used by the FAA for recording voice conversations between air traffic controllers, pilots, and ground-based personnel. Recorded conversations are used in the investigation of accidents, incidents, and in the routine evaluation of air traffic operations. This program will address reliability and availability concerns associated with deployed voice recorder models which are becoming obsolete and unsupportable.

- **Landing and Lighting Portfolio** - This portfolio contains critical ground infrastructure that collectively enables all aircraft to navigate the established aircraft routes in the sky as well as the ability to safely descend and land on the airport runway. The work under this portfolio includes assessment of the systems to determine the need for system relocations, operational modifications, and sustainment work to maintain and/or improve system performance, and to procure and install systems as needed.

The FAA's FY 2025-2029 CIP provides a balanced portfolio of capital programs for the modernization and sustainment of systems and critical NAS infrastructure, integration of UAS operations into the NAS, and the operationalization of NextGen.

2.2 NAS Facility Modernization, Sustainment, and Infrastructure

The air traffic control system requires reliability and availability to maintain safe separation of aircraft operating in controlled airspace and on the airport surface. To ensure safe aircraft separation, reliable communication, navigation, and surveillance systems are required. Each system operating in the NAS maintains a high degree of redundancy to support system reliability

and availability to minimize risk of service disruptions. Before these systems reach the end of their service lives, planning for their replacements must be well underway. This reduces the risk of performance degradation or outages as replacement parts become obsolete or are otherwise difficult to obtain.

The air traffic control infrastructure is a complex system made up of several thousand components that control air traffic approaching, landing, and departing from airports. The FAA is responsible for the maintenance of 395 facilities, including:

- 348 FAA-maintained Terminal Air Traffic Control Towers and Terminal Radar Approach Control Facilities that include 104 federally owned contract towers
- 21 ARTCC
- 17 Flight Service Stations
- 4 CCF
- 4 unique facilities known as Enterprise Facilities that provide oversight for all NAS operations
- Air Traffic Control System Command Center (ATCSCC)

In addition, there are 203 airport sponsor-owned terminal facilities that control air traffic in the NAS. The daily flow of air traffic is dependent upon several hundred surveillance and weather radars, navigation systems for en route and airport approach guidance, and thousands of radios that allow pilots and air traffic controllers to be in continuous contact during an aircraft's flight. To sustain the high level of NAS reliability and availability required to ensure the safety and efficiency of flight, continued investment in the sustainment and improvement of these buildings, systems, and other legacy infrastructure is required.

The ATC Facilities Sustainment Portfolio focuses on the following budget line items for sustaining the NAS infrastructure:

- ARTCC and CCF Building Sustainment
- Air Traffic Control En Route Radar Facilities Improvements
- Terminal Air Traffic Control Facilities – Replace
- Air Traffic Control Tower (ATCT) / Terminal Radar Approach Control (TRACON) Facilities – Improve
- NAS Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance
- Fuel Storage Tank Replacement and Management
- Unstaffed Infrastructure Sustainment
- Real Property Disposition
- Electrical Power Systems – Sustain/Support
- Energy Management and Compliance (EMC)
- Hazardous Materials Management
- Facility Security Risk Management
- Mobile Assets Management Program

In addition to air traffic control infrastructure, the FAA has several other facilities that support the NAS. The Mike Monroney Aeronautical Center (MMAC) includes facility space used for air operations, engineering, training, NAS logistics, airmen/aircraft registration, Civil Aerospace Medical Institute (CAMI), safety, and business services.

The William J. Hughes Technical Center (WJHTC) supports research, development, test, and evaluation of safety systems and new equipment as well as field support for all deployed NAS equipment. The infrastructure at these locations requires building systems and telecommunication replacements.

3 Aviation Safety

The FAA Aviation Safety (AVS) organization sets, oversees, and enforces safety standards for all sectors of the aviation industry affecting every facet of domestic and international civil aviation safety. AVS is responsible for the certification, production approval, and continued airworthiness of aircraft and avionics as well as the certification of pilots, mechanics, and others in safety-related positions.

Capital Investment Programs for Aviation Safety include:

- Regulation and Certification Infrastructure for System Safety (RCISS) – Sustainment 4
- System Approach for Safety Oversight (SASO) – Phase 4
- Aviation Safety Information Analysis and Sharing (ASIAS)
- Aerospace Medical Equipment Needs (AMEN) Sustainment 4

4 Next Generation Air Transportation System (NextGen)

As part of its NextGen initiative, the FAA has nearly completed the fundamental infrastructure modernization of the NAS across communication, navigation, surveillance, automation, and information exchange domains. The initiative built key enabling technologies on that infrastructure, such as data communications between the controller and pilot, satellite navigation to enable aircraft to fly precisely defined three-dimensional flight paths, precise aircraft position reporting to ground automation systems and other aircraft through ADS-B, and data-sharing to provide the right information to the right people at the right time through System Wide Information Management (SWIM).

The FAA continues to integrate infrastructure and enable technologies with new decision-support tools and applications to accommodate and improve a wide range of operations across all phases of flight and time horizons. The FAA also continues to incorporate new entrants into the NAS and improve cybersecurity, adding new policies, procedures, and processes in an integrated fashion to produce a transformed system.

Trajectory Based Operations (TBO) is an Air Traffic Management (ATM) method for strategically planning, managing, and optimizing flights throughout the operation using time-based management, information exchange between air and ground systems, and an aircraft's ability to fly precise paths in space and time. Flights that are more efficient will yield more predictable schedules and more environmentally friendly operations.

In its NextGen efforts, the FAA employs a portfolio approach to manage goals and the investments needed to fulfill them. The portfolio approach supports and guides program level investment, planning, and analysis by providing an integrated view of capabilities and system dependencies required for NextGen.

More information on NextGen, including the NextGen Annual Report, can be found at https://www.faa.gov/nextgen

4.1 Portfolios and Supporting Capital Programs

The following portfolio descriptions define the research, engineering, and acquisition activities needed to achieve additional functionality in base and new systems, along with any complementary development of standards, guidance, and procedures that may be required. Each of the descriptions in this section is followed by a list of the capital programs that supports the portfolio.

4.1.1 Separation Management Portfolio

The Separation Management portfolio provides controllers and pilots with the necessary tools and procedures to perform separation management in all airspace and airports within the NAS. The aircraft separation assurance service is the cornerstone of ATC operations. The investments in this portfolio provide the tools, procedures, standards, and guidance to improve the management of aircraft in a mixed environment with varying navigation equipment and wake performance capabilities.

Capital Investment Programs for the Separation Management Portfolio include:

- ADS-B In Applications – Flight Interval Management Planning
- Wake Turbulence Re-Categorization
- Separation Automation System Engineering
- Closely Spaced Parallel Runway Operations
- Concept Development for Integrated NAS Design & Procedures Planning
- Space Integration Capabilities
- Unmanned Aircraft Systems (UAS) – Upper Airspace
- Common Trajectory Models
- Applications in Support of Air Traffic Control

4.1.2 Traffic Flow Management (TFM) Portfolio

The TFM portfolio will improve overall access, efficiency, and flexibility of the NAS by making the best use of available airspace and airport capacity through improved planning and coordination. Advanced traffic management automation tools will be used to improve flight and flow decision-making to optimize airspace and airport capacity. These tools will also assist with improved collaborative decision-making with the user community to meet their business objectives. The capabilities in the portfolio address the exchange of information between controllers, pilots, and air traffic managers throughout all phases of flight. The development of automation capabilities will increase airspace and airport access; and optimize available capacity by improving the flow of flights through integrated planning of departure, en route, arrival, and airport surface operations.

Capital Investment Programs for Traffic Flow Management Portfolio include:

- Surface Tactical Flow
- Strategic Flow Management Application
- Advanced Methods
- TBO Implementation
- Strategic Flow Management Engineering Enhancement (SFMEE)

4.1.3 On-Demand NAS Portfolio

The On-Demand NAS portfolio will provide flight planners, air traffic controllers and traffic managers, and flight crews with consistent and complete information related to changes in various areas of the NAS, such as temporary flight restrictions, temporary availability of special activity airspace, equipment outages, and runway closures. This portfolio ensures that NAS and other aeronautical information are consistently provided across all NAS applications and locations using common, net-enabled access to aeronautical and flight information utilizing global standards – Aeronautical Information Exchange Model and Flight Information Exchange Model.

Capital Investment Programs for On-Demand NAS Portfolio include:

- Flight Object

- Common Status and Structure Data
- Dynamic Airspace
- Flight Deck Collaborative Decision Making

4.1.4 NAS Infrastructure Portfolio

The NAS Infrastructure portfolio includes capabilities that address aviation weather issues. This portfolio supports the need to improve ATM decision-making during adverse weather conditions and improves the use of weather forecast information in the NAS. Furthermore, the portfolio evolves the existing aviation weather infrastructure such as, dissemination, processor, and sensor systems to standardize weather information and interfaces, and reduces operational costs. This work also includes new air traffic control management procedures, separation standards, and flexible airspace categories to increase throughput.

Capital Investment Programs for NAS Infrastructure Portfolio include:

- Weather Forecast Improvements
- NextGen Navigation Engineering
- New Air Traffic Management (ATM) Requirements
- Information Management

4.1.5 NextGen Support Portfolio

The NextGen Support portfolio explores new technologies at laboratories by providing the NAS environments required to validate a broad framework of concepts, technologies, and systems and to test the integration, development, and operations functions before they are introduced into the NAS. Operational Analysis supports a comprehensive evaluation of fielded improvements and reporting of post-implementation performance information.

The Capital Investment Program for the NextGen Support Portfolio is NextGen Laboratories.

4.1.6 Unmanned Aircraft Systems (UAS) Portfolio

UAS operations have increased dramatically in both the public and civil sectors. The rapid development of this technology includes the potential for providing transportation services within metropolitan areas, such as passenger and cargo services. For these operations to be integrated into the NAS, air traffic products, policies, and procedures must be reviewed and refined, or developed through supporting research, to permit safe and efficient UAS operations in the NAS.

Capital Investment Programs for Unmanned Aircraft Systems include:

- UAS – Concept Validation and Requirements Development
- UAS – Flight Information Management
- UAS – Urban Air Mobility

4.1.7 Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio

The Enterprise, Concept Development, Human Factors, and Demonstrations portfolio supports the research needed to determine the viability and benefits of future NAS concepts. Enterprise-

level activities are supported, including development of concepts across the NAS, human factors analysis of the future operational environment, and demonstrations of proposed system improvements. Concepts will be researched and assessed to identify issues, evaluate benefits, reduce risk, and develop preliminary operational requirements. Procedures will be evaluated to enhance safety, increase operational efficiency, airspace capacity, and expand current capabilities throughout the NAS.

Capital Investment Programs for Enterprise, Concept Development, Human Factors, & Demonstrations Portfolio include:

- Enterprise Concept Development
- Enterprise Human Factor Development
- Stakeholder Demonstrations

4.1.8 Performance-Based Navigation (PBN)

The PBN and Metroplex Portfolio uses area navigation (RNAV) and Required Navigation Performance (RNP) to improve access and flexibility in the NAS with the goal of providing the most efficient aircraft routes from departure runway to arrival runway with greater precision and accuracy.

The Capital Investment Program for Performance-Based Navigation Portfolio is the NextGen Distance Measuring Equipment (DME) Support for Performance Based Navigation (PBN) Strategy.

4.1.9 System Safety Management Portfolio

The System Safety Management portfolio develops data acquisition, storage, analysis, and modeling capabilities to meet the safety analysis needs of designers, implementers, and safety professionals. These resources will be used to ensure that new capabilities either improve or maintain current safety levels while improving capacity and efficiency in the NAS.

Capital Investment Programs for System Safety Management Portfolio include:

- Aviation Safety Information Analysis and sharing (ASIAS)
- Systems Safety Management Transformation (SSMT)

5 Enterprise Architecture Infrastructure Roadmaps

Upgrading the sophisticated systems used for air traffic control requires significant engineering development efforts and long-range planning to ensure the continued safety and efficiency of the NAS. The roadmaps are updated annually and reflect the results of studies, demonstration projects, and economic analyses related to the programs.

The EA roadmaps are intended to provide a high-level view of the NAS systems and programs. They highlight the duration that systems are planned to remain in service. In addition, the roadmaps include major programs that will sustain or enhance existing and future systems.

Some new systems or services shown on the roadmaps may require aviation users to add avionics or other equipment to their aircraft. This may also alert some users of the requirement to add or adopt new procedures and training.

In a typical roadmap, existing FAA systems and services are shown in light blue in the first column of the roadmaps. Within the other columns, a solid gray bar represents a NAS program, while a solid orange bar indicates a NextGen program. The length of each program bar represents the projected schedule in calendar years that a program is funded or requires funding. A solid line around the bar means that the program is funded within the CIP financial baseline. A dotted line around the bar means that the program has not been approved to receive funding from the CIP financial baseline. In addition, the solid red lines indicate the length of time that systems will remain in operation. The dotted red lines indicate that a system is scheduled to be replaced. The end date is indicated with an X. Figure 5-1 is the legend for all infrastructure roadmaps.

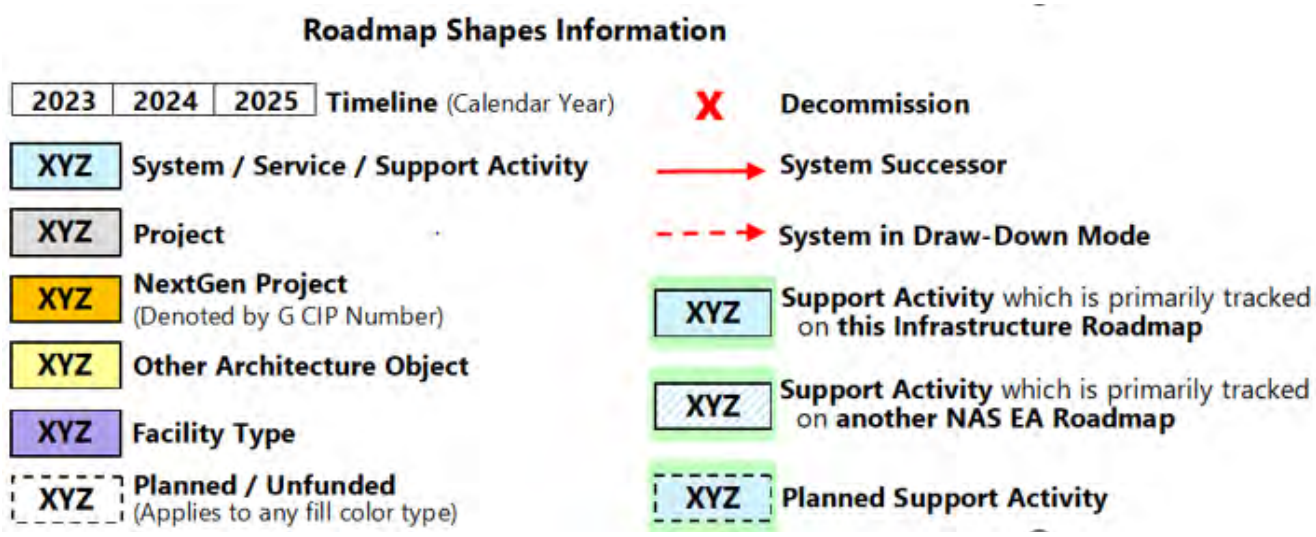

Figure 5-1 Infrastructure Roadmap Legend

The following selected EA Infrastructure Roadmaps depict existing systems and services currently operating in the NAS, and the planned and proposed timeframe for capital programs. They are organized by five functional areas or domains, and within each area there are several roadmaps for projects and programs:

- Automation
- Communications

- Surveillance
- Navigation
- Weather

A list of Acronyms and Abbreviations is presented at the end of this document.

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 speed, altitude, and direction for approximately 60,000 flights that are tracked and kept safely separated each day. Automation systems provide controllers with continuously updated displays that include aircraft identification, position, and whether the aircraft is level, climbing, or descending.

Traffic Flow Management System (TFMS) supports the FAA's ATM personnel in providing efficiency-critical NAS services. The system compares the projected traffic volume with the capacity of destination airports to determine if steps should be taken to manage traffic flow to prevent delays. Traffic Managers use the TFMS to maintain near real-time situational awareness and predict areas that may experience congestion due to capacity limitations resulting from weather conditions, airspace closures, or an unusual increase in traffic volume.

Automation implementation, including the plans to sustain, upgrade, replace, or decommission current systems from 2021 through 2035 are shown in the following NAS EA Roadmaps:

- Roadmap 1 (Figure 5-2) - Air Traffic Management and En Route/Terminal Automation
- Roadmap 2 (Figure 5-3) - Air Traffic Support and Oceanic Air Traffic Control
- Roadmaps 3 and 4 (Figure 5-4) - Flight Services, Aeronautical and Information Support

5.1.1 Air Traffic Management and En Route/Terminal Automation

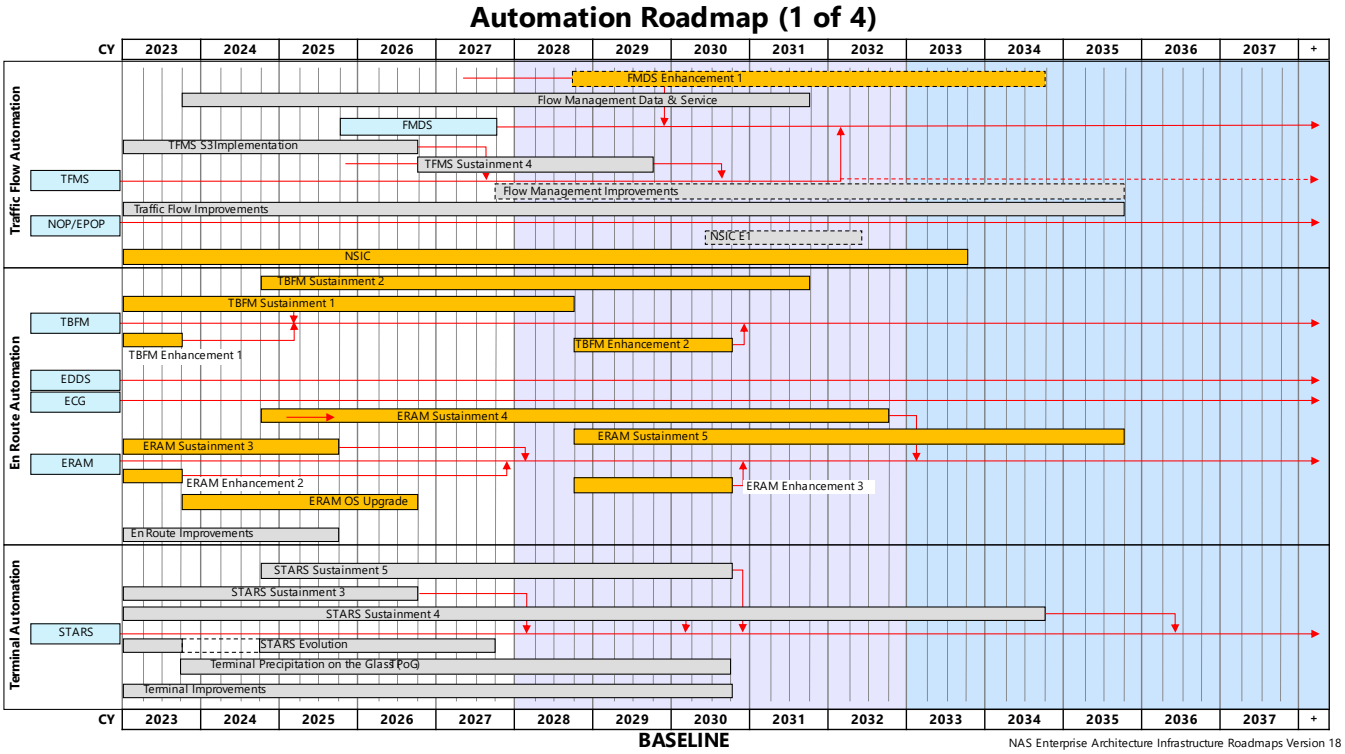

Figure 5-2 Air Traffic Management and En Route/Terminal Automation Roadmap

Capital Investment Programs for Air Traffic Management and En Route/Terminal Automation include:

- ERAM Sustainment 3
- ERAM Enhancement 4
- ERAM Enhancement 5
- Traffic Flow Management System (TFMS) Sustain 4
- Traffic Flow Improvements
- Time Based Flow Management (TBFM) Sustainment 2
- En Route Improvements
- STARS Sustainment 3
- STARS Sustainment 4

5.1.2 Air Traffic Support and Oceanic Air Traffic Control

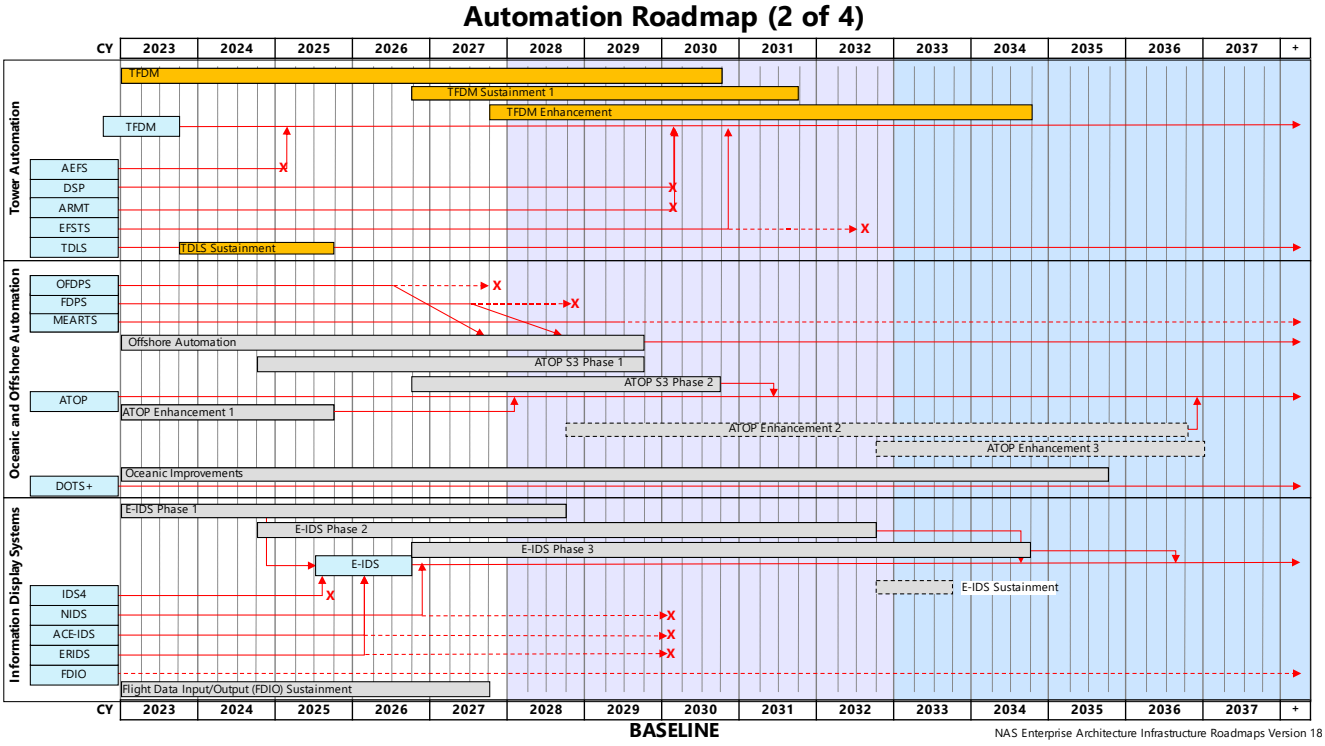

Figure 5-3 Air Traffic Support and Oceanic Air Traffic Control Roadmap

Capital Investment Programs for Air Traffic Support and Oceanic Air Traffic Control include:

- Oceanic Improvements
- Advanced Technologies & Oceanic Procedures (ATOP) Enhancement 1
- En Route Automation Program - Flight Data Input/Output (FDIO) Sustainment
- Enterprise Information Display System (E-IDS) Phase 1
- Terminal Flight Data Manager (TFDM)

5.1.3 Flight Services, Aeronautical and Information Support Roadmaps

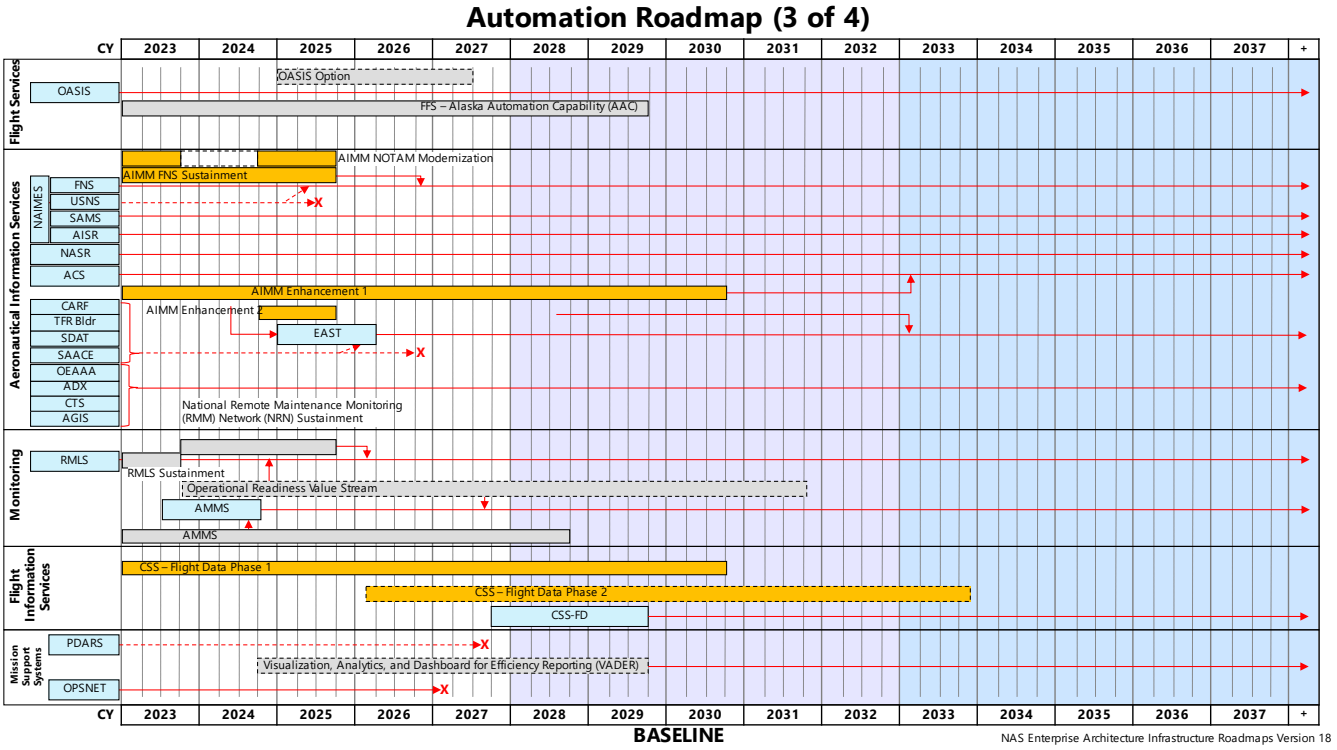

Figure 5-4 Flight Services, Aeronautical and Information Support Roadmap

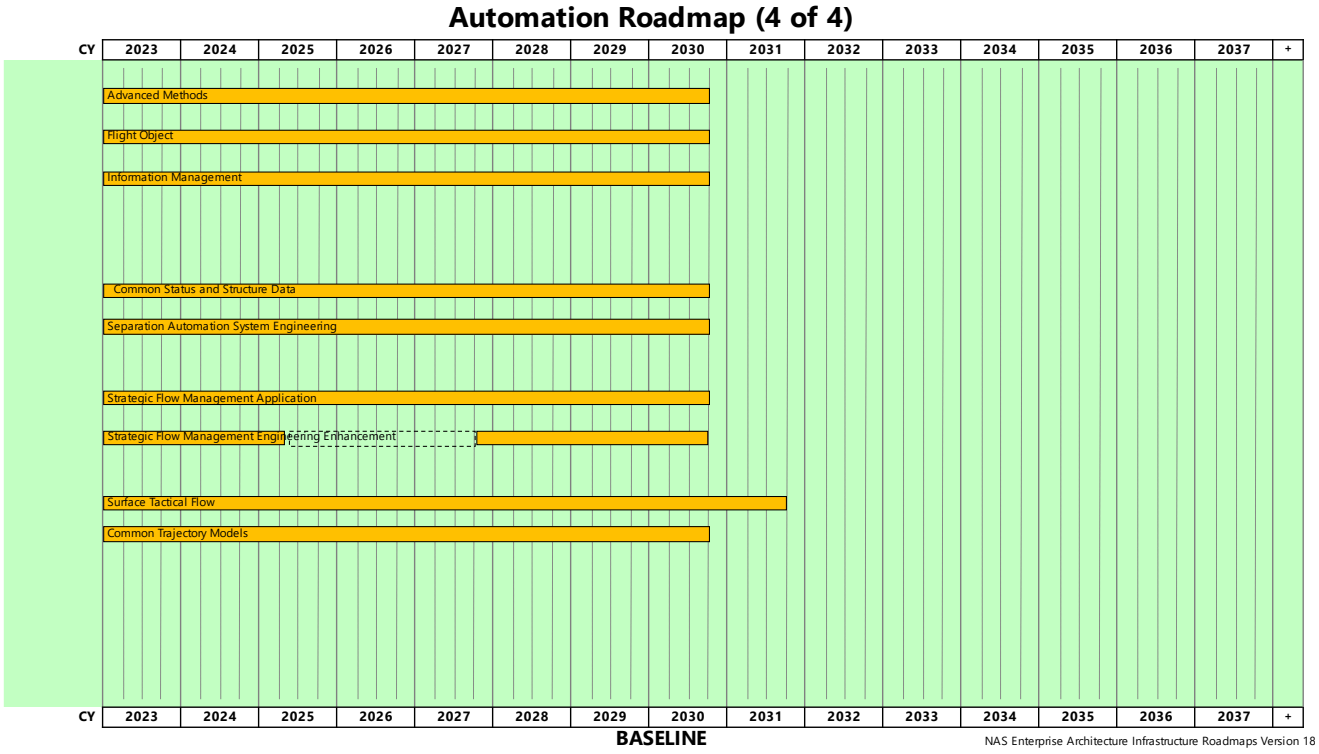

Figure 5-4 Flight Services, Aeronautical and Information Support Roadmaps (Continued)

Capital Investment Programs for Flight Services, Aeronautical and Information Support include:

- Common Support Services - Flight Data (CSS-FD)

- Operations Network (OPSNET)
- Remote Monitoring and Logging System (RMLS) Sustainment
- Automated Maintenance Management System (AMMS) Planning
- Aeronautical Information Management (AIM) Modernization Federal NOTAMS System Sustainment

5.2 Communication Roadmaps

Communication among pilots and controllers is an essential element of air traffic control and is primarily accomplished using voice radios. To ensure controllers can stay in contact with pilots, remotely located radio sites are used to provide continuous coverage. Controllers use electronic links through ground-based telecommunication lines to activate remote site radios that carry voice transmissions between air traffic controls and pilots. If ground links are unavailable, satellite communication links can be used. In the future, data link will be used for most routine communications. Backup systems are also available to ensure uninterrupted communication should a primary system fail.

Communication system implementation is broken down into five different NAS EA roadmaps:

- Roadmap 1 (Figure 5-5) - Telecommunications and Other Communications
- Roadmap 2 (Figure 5-6) - Voice Switches and Voice Recorders
- Roadmap 3 (Figure 5-7) - Air-to-Ground Voice and Oceanic Air-to-Ground Communications
- Roadmap 4 (Figure 5-8) - Air-to-Ground Data Communications
- Roadmap 5 (Figure 5-9) - System Wide Information Management Messaging Infrastructure

5.2.1 Telecommunications and Other Communications

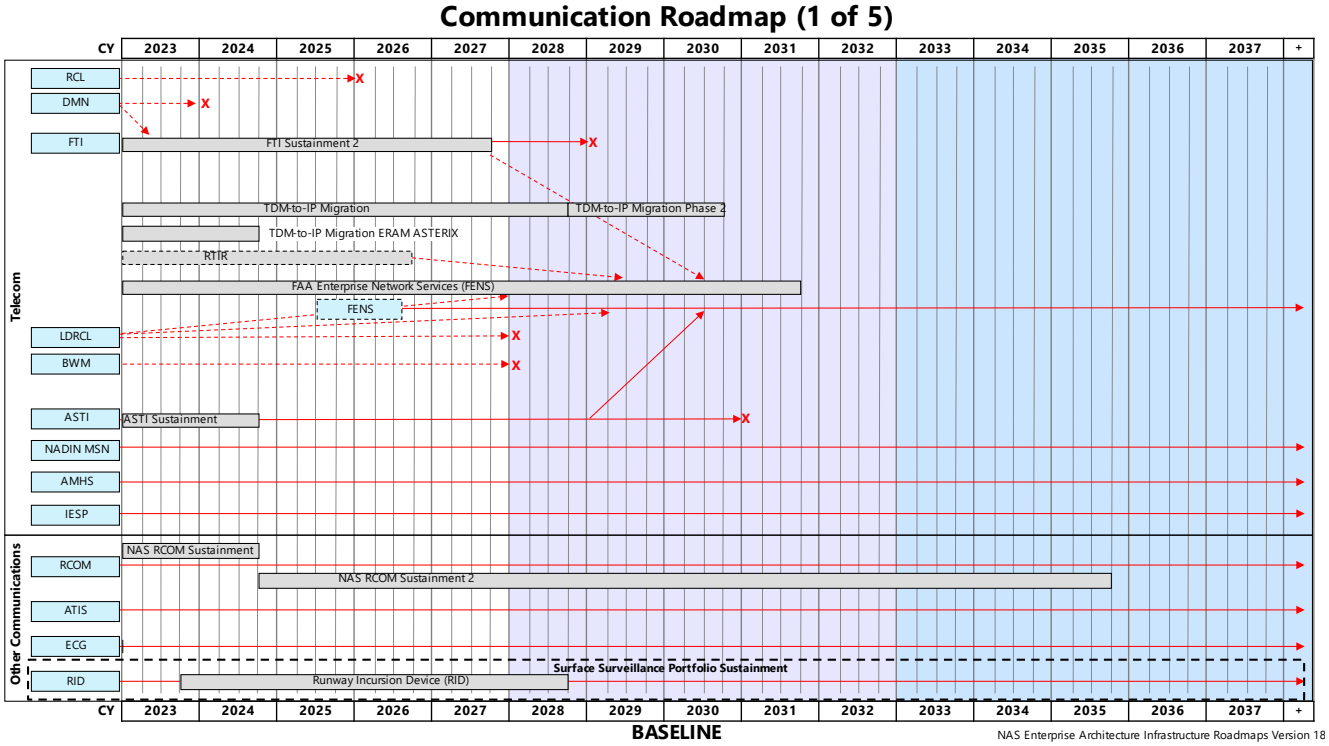

Figure 5-5 Telecommunications and Other Communications Roadmap

Capital Investment Programs for Telecommunications and Other Communications include:

- Communications Facilities Sustainment
- FENS
- Time-Division Multiplexing to Internet Protocol (TDM-to-IP) Migration
- NAS Recovery Communications (RCOM) Sustainment
- Runway Incursion Device (RID)

5.2.2 Voice Switches and Voice Recorders

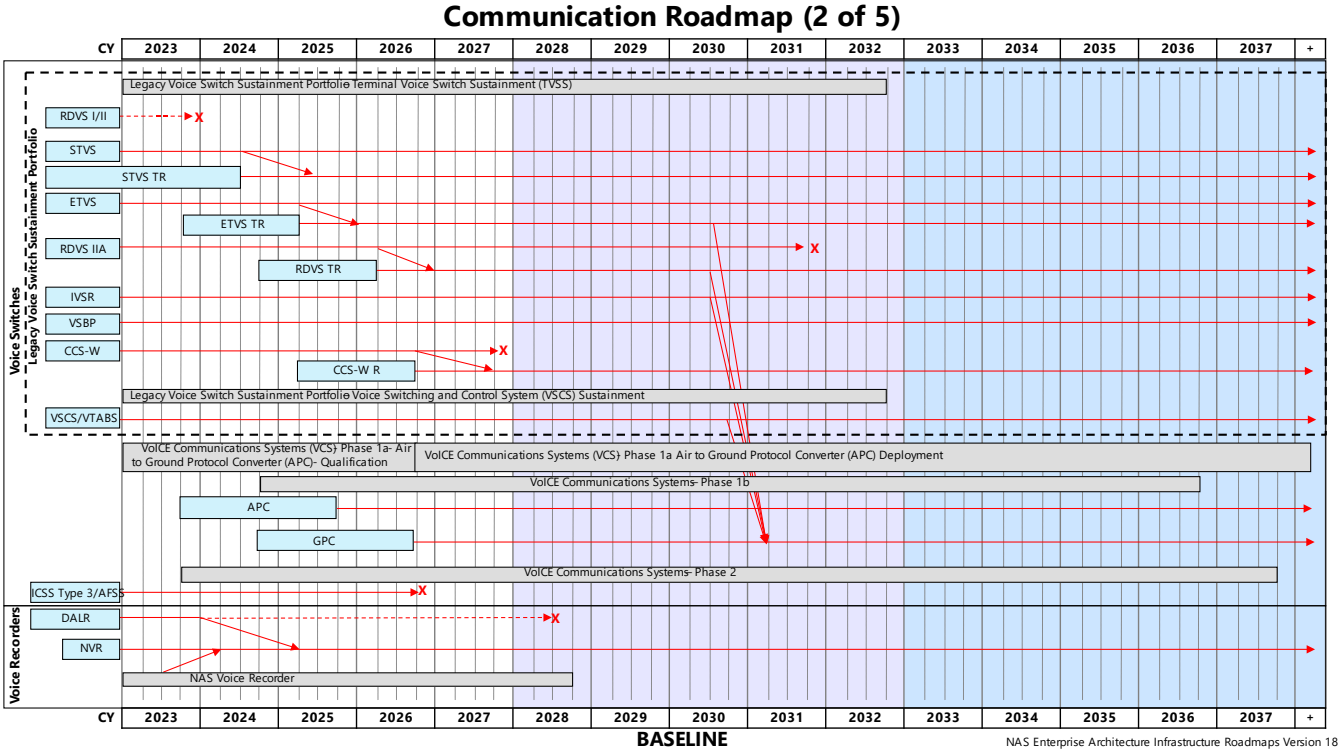

Figure 5-6 Voice Switches and Voice Recorders Roadmap

Capital Investment Programs for Voice Switches and Voice Recorders include:

- Terminal Voice Switch - Legacy Voice Switch Sustain
- Voice Switching and Control System (VSCS) - Sustainment
- Voice Communication Systems - Phase 1a
- Voice Communication Systems - Phase 1b
- NAS Voice Recorder

5.2.3 Air-to-Ground Voice and Oceanic Air-to-Ground Communications

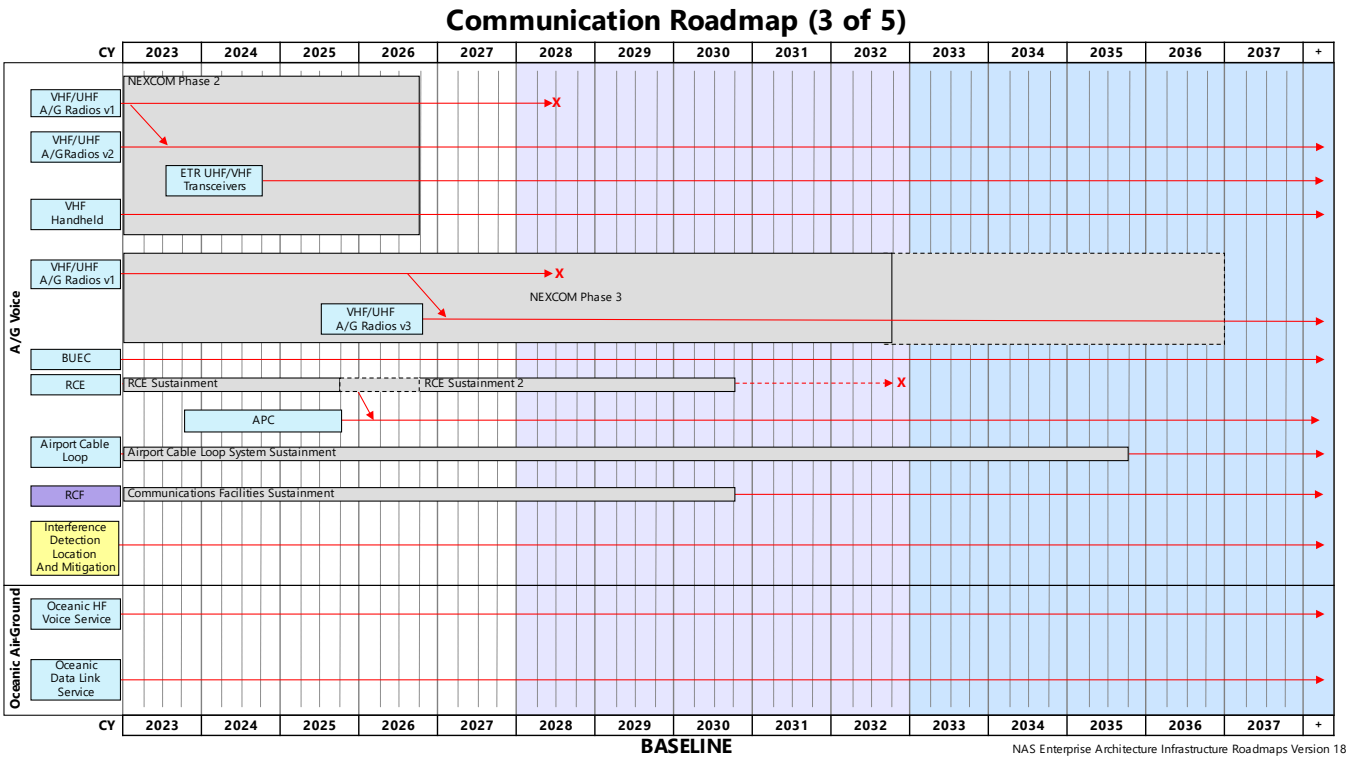

Figure 5-7 Air-to-Ground Voice and Oceanic Air-to-Ground Communications Roadmap

Capital Investment Programs for Air-to-Ground Voice and Oceanic Air-to-Ground Communications include:

- Radio Control Equipment (RCE)
- Communications Facilities Sustainment
- Next-Generation VHF and UHF A/G Communications (NEXCOM) – Phase 3
- Airport Cable Loop System

5.2.4 Air-to-Ground Data Communications

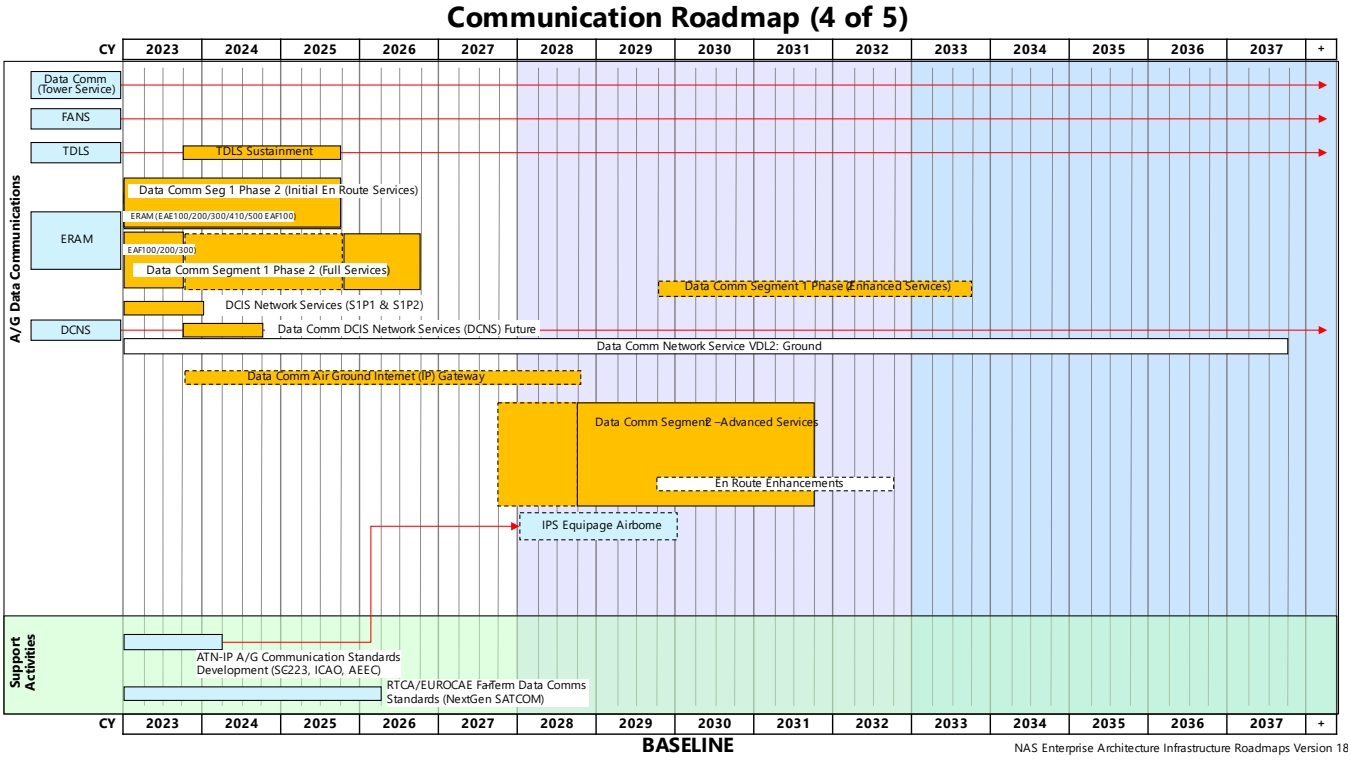

Figure 5-8 Air-to-Ground Data Communications Roadmap

Capital Investment Programs for Air-to-Ground Data Communications include:

- Data Communications – Segment 1 Phase 2 Initial En Route Services
- Data Communications – Segment 1 Phase 2 Full En Route Services
- Data Communications – Segment 1 Phase 1 & Phase 2 DCIS Network Services
- Data Communications – Segment 1 Phase 1 & Phase 2 DCIS Network Services Future

5.2.5 System Wide Information Management Messaging Infrastructure

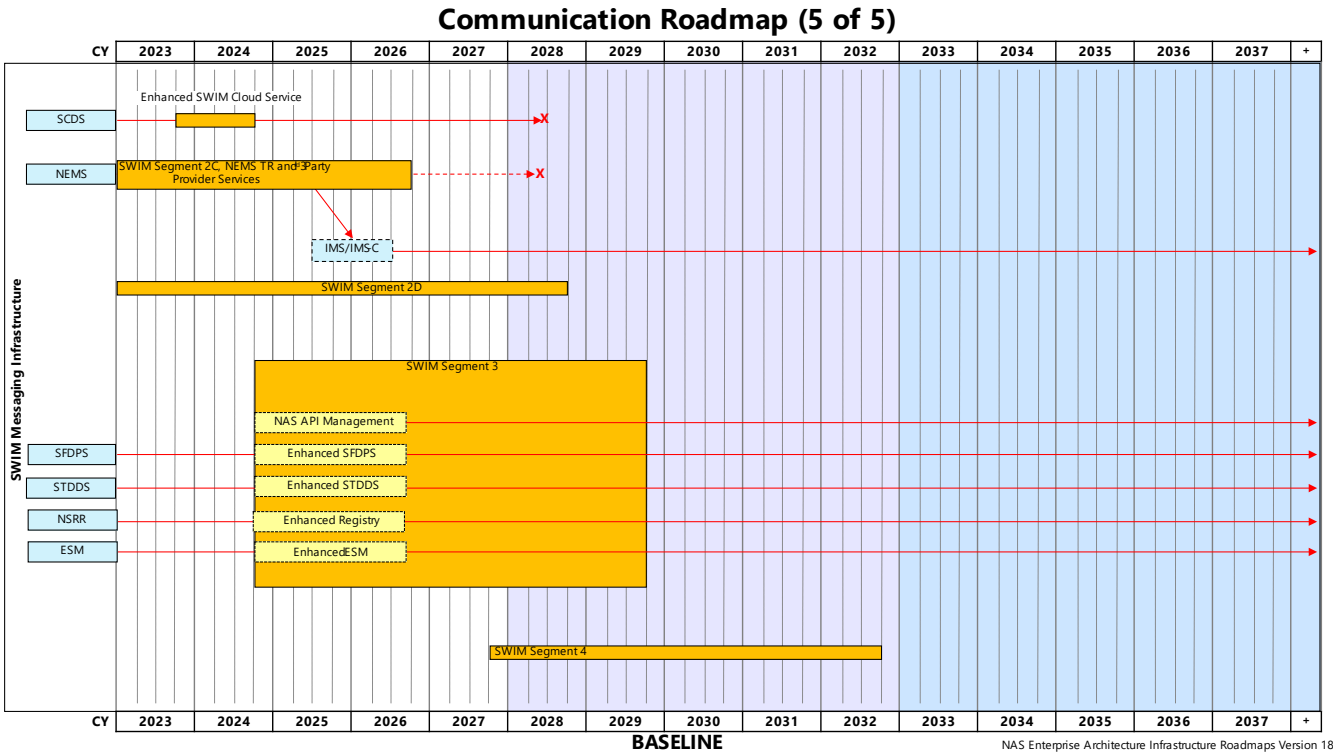

Figure 5-9 System Wide Information Management Messaging Infrastructure Roadmap

Capital Investment Programs for System Wide Information Management Messaging Infrastructure include:

- SWIM – Segment 2C
- SWIM – Enhanced SWIM Cloud Service
- SWIM – Segment 3
- SWIM – Segment 4

5.3 Surveillance Roadmaps

To provide separation services to aircraft, air traffic controllers must have an accurate display of all aircraft under their control. Surveillance data is provided by the following technologies:

- Non-Cooperative Surveillance (primary radar) – the radar beam is bounced off the aircraft and reflected to the radar receiver.
- Cooperative Surveillance (secondary radar) – a reply is generated by the aircraft transponder and sent 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.
- ADS-B – the aircraft determines its location using a Global Positioning System (GPS) receiver or other navigation equipment and broadcasts that information to an ADS-B ground station. The ground station relays the position information to automation systems that process the data and send it to controller displays.
- En Route and terminal facilities normally use secondary radars for traffic separation, either the Air Traffic Control Beacon Interrogators (ATCBI) or the Mode Select (Mode S). Using ATCBI or Mode S enhances the controller's ability to separate traffic because speed and altitude information supplement the position display for each aircraft.

Surveillance systems are shown on three different roadmaps:

- Roadmap 1 (Figure 5-10) - Broadcast Services and Cooperative Surveillance
- Roadmap 2 (Figure 5-11) - Non-Cooperative Surveillance and Interfaces
- Roadmaps 3 and 4 (Figure 5-12) - Surface and Approach Surveillance

5.3.1 Broadcast Services and Cooperative Surveillance

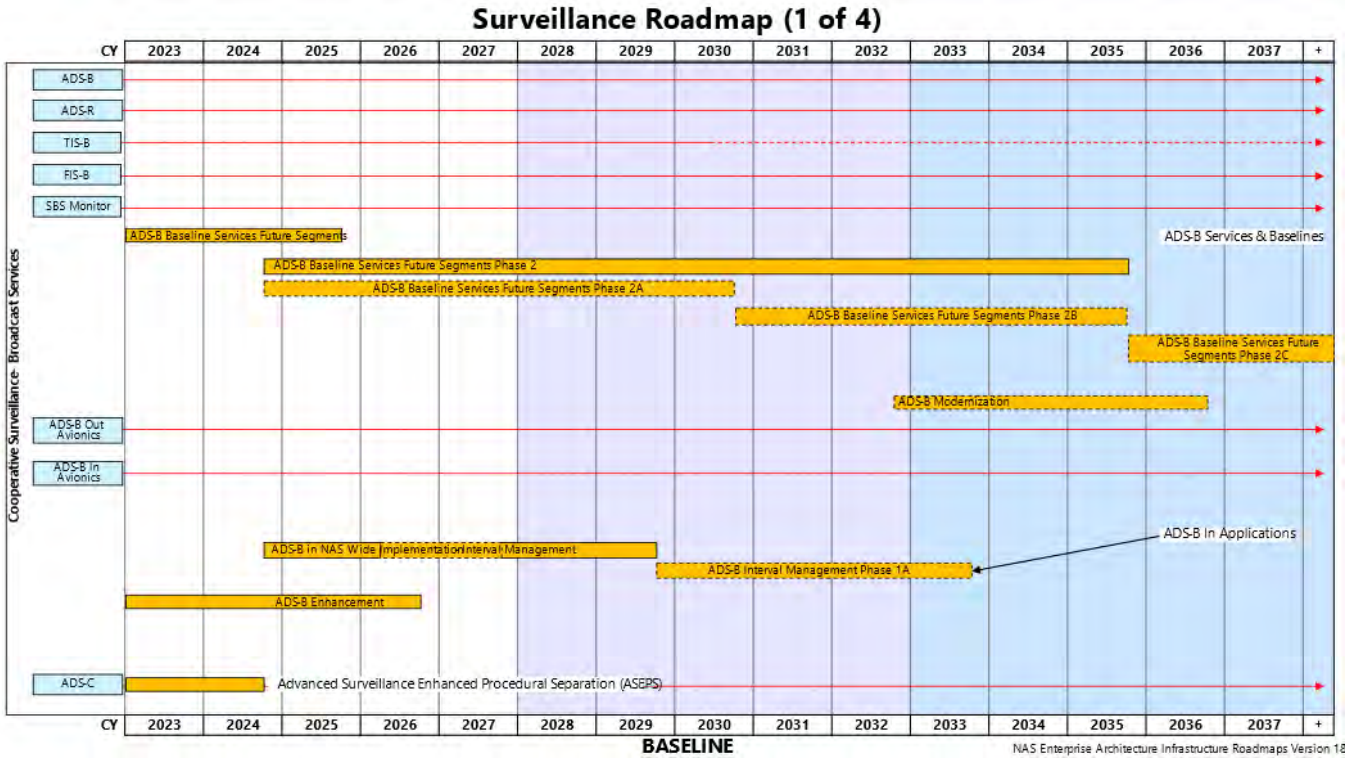

Figure 5-10 Broadcast Services and Cooperative Surveillance Roadmap

Capital Investment Programs for Broadcast Services and Cooperative Surveillance include:

- ADS-B Baseline Services Future Segments (BSFS)
- ADS-B NAS Wide Implementation – Enhancement

5.3.2 Non-Cooperative Surveillance and Interfaces

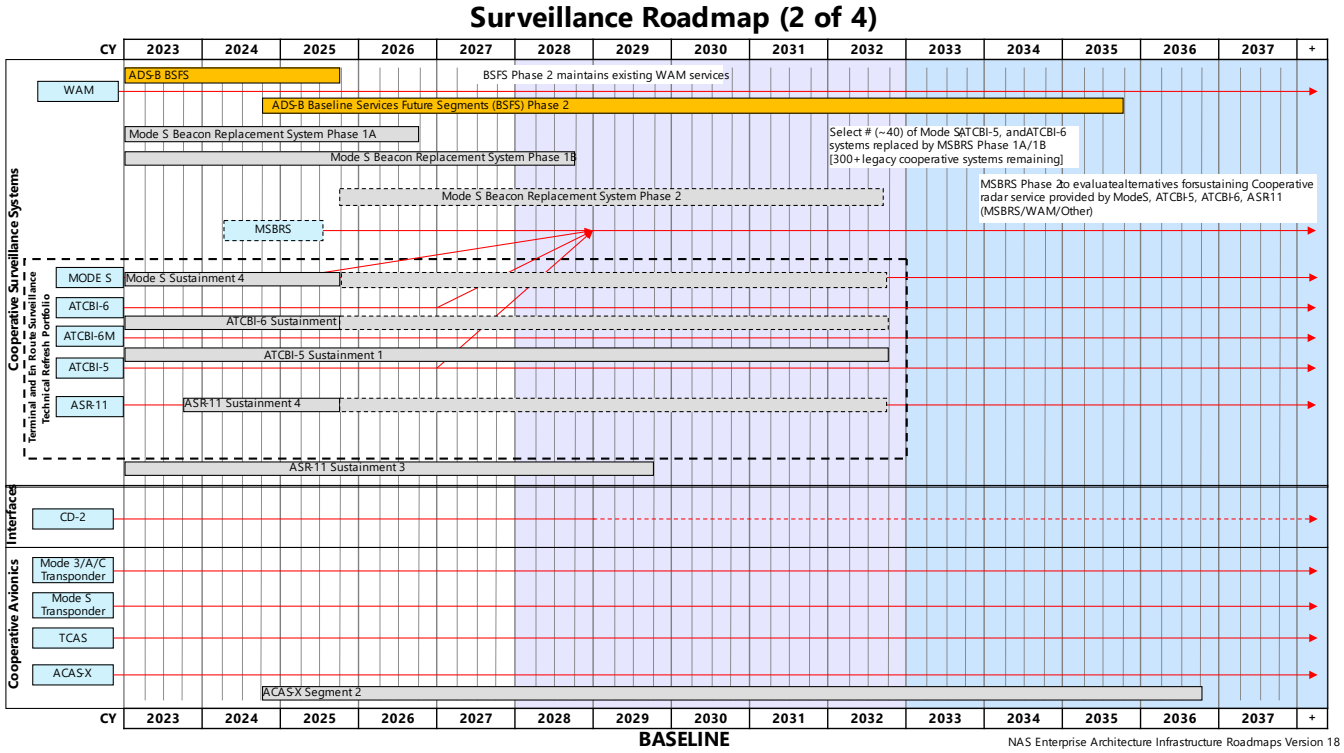

Figure 5-11 Non-Cooperative Surveillance and Interfaces Roadmap

Capital Investment Programs for Non-Cooperative Surveillance and Interfaces include:

- Mode S - Sustainment 4
- ASR-11 - Sustainment 3

5.3.3 Surface and Approach Surveillance

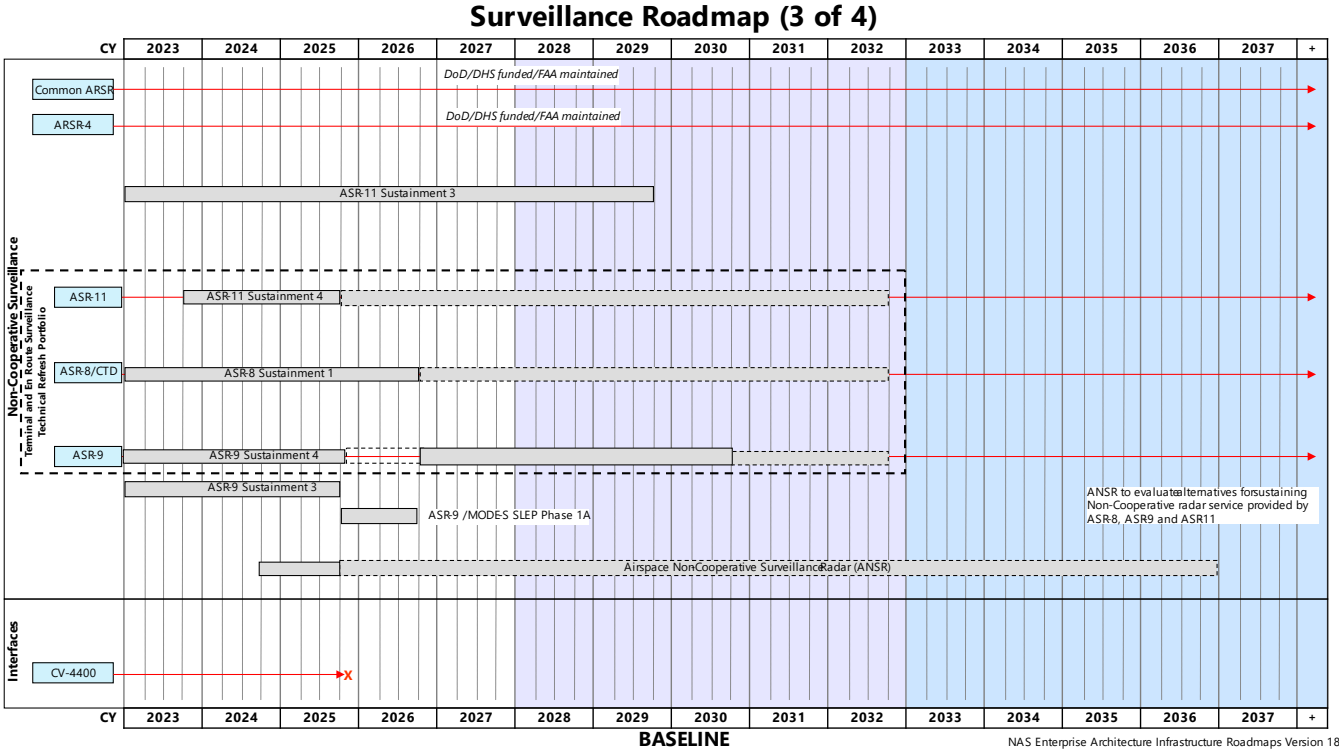

Figure 5-12 Surface and Approach Surveillance Roadmaps

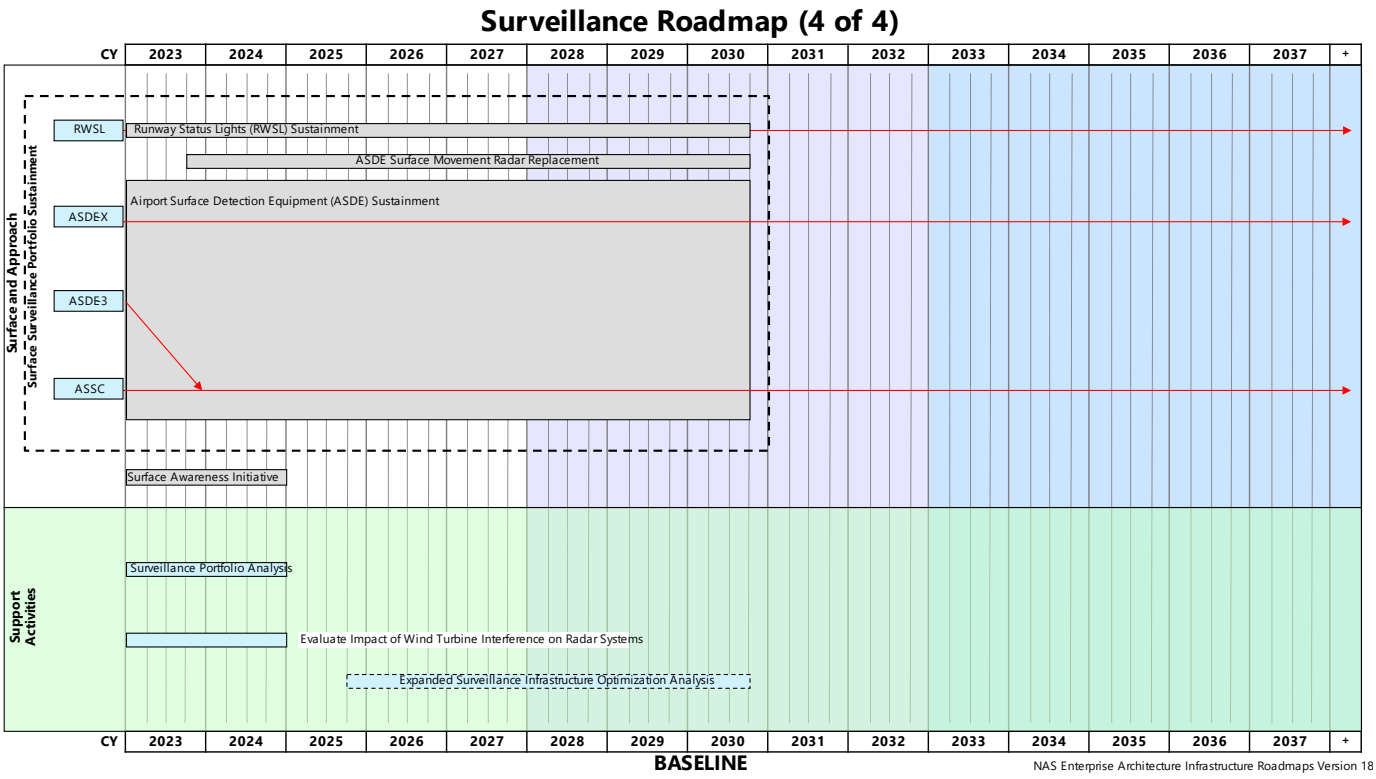

Figure 5-12 Surface and Approach Surveillance Roadmaps (Continued)

Capital Investment Programs that support Surface and Approach Surveillance include:

- Airport Surface Movement Detection (ASDE) Sustainment
- Runway Status Lights (RWSL) Sustainment

5.4 Navigation Roadmaps

Navigation Aids (NavAids) can be electronic or visual. En route and terminal NavAids include ground-based and satellite-based systems that emit radio navigation signals that enable pilots flying aircraft equipped with suitable avionics to determine their position to fly published routes and procedures. Conventional ground-based radionavigation systems include the Very High Frequency Omni-directional Range (VOR) with Distance Measuring Equipment (DME). Aircraft process signals from VOR/DME stations to determine their location relative to the ground station location to fly high altitude Jet Routes, low altitude Victor Airways, and published conventional Standard Terminal Arrival (STAR) and Standard Instrument Departure (SID) procedures. Satellite-based radionavigation systems include the U.S Global Positioning System (GPS) and the Wide Area Augmentation System (WAAS). Aircraft equipped with GPS and/or WAAS avionics determine their precise position relative to a geodetic reference frame enabling navigation on Area Navigation (RNAV) and Required Navigation Performance (RNP) routes and procedures. RNAV routes include high altitude Q-Routes, low altitude T/TK routes, Obstacle Departure Procedures (ODP), and RNAV SID/STARs. RNAV procedures enable direct routing between two waypoints, parallel tracks, and other options that maximize efficiency.

NavAids also have an important role in guiding pilots to a safe landing in low visibility conditions. They support two types of approaches - precision and non-precision. Precision approaches provide lateral and vertical guidance to accurately guide the aircraft to a decision altitude from which the pilot will land the aircraft visually. Precision and non-precision approach procedures can be enabled by conventional or satellite-based NavAids. Precision approach procedures are categorized into different levels depending on how low to the runway surface guidance is provided. Category 1 precision approaches guide the aircraft to a Decision Altitude (DA) 200 feet above the runway touchdown zone. Category 2/3 precision approaches guide the aircraft to a 100-foot DA or as low as the runway surface. Non-precision approaches require aircraft to descend to a minimum descent altitude (MDA), no lower than 250 feet above the controlling obstacle along the approach path. Conventional precision approach procedures are enabled by the Instrument Landing Systems (ILS) to allow pilots to descend to a decision altitude from which the pilot will land using Visual Guidance Landing Systems (VGLS). ILS systems can provide Categories 1, 2, & 3 service. Satellite-based precision approaches include the Localizer Performance Vertical (LPV) procedures that can guide the aircraft to Category 1 decision altitudes. Aircraft equipped with suitable WAAS avionics can fly LPV procedures. Non-precision approaches include conventional Localizer (LOC) which use the lateral guide from an ILS, VOR, and Non-directional Beacon (NDB). Satellite-based non-precision approaches include Lateral Navigation (LNAV) and LNAV with Vertical Navigation (LNAV/VNAV). LNAV/VNAV procedures provide vertical guidance using aircraft-based barometric sensors, which are not capable of meeting Category 1 performance. Aircraft equipped with GPS and/or WAAS can fly LNAV and LNAV/VNAV procedures.
Descending below the DA or MDA is performed visually using guidance provided by Visual Guidance Landing Systems (VGLS), which help the pilot align to the runway centerline and descend along a safe vertical path to the runway touchdown zone. VGLS systems include Precision Approach Path Indicator (PAPI), Visual Approach Slope Indicator (VASI), Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), High Intensity Approach Lighting System with Sequenced Flashers (ALSF-2), and other Approach Lighting Systems (ALS) installed at the runway.

Navigational aid programs are portrayed in two different roadmaps:

- Roadmap 1 (Figure 5-13) - Navigation Infrastructure, and Safety and Enhancements
- Roadmaps 2 and 3 (Figure 5-14) - En Route/Terminal Nav and Non-Precision/Precision Approach

5.4.1 Navigation Infrastructure, and Safety and Enhancements

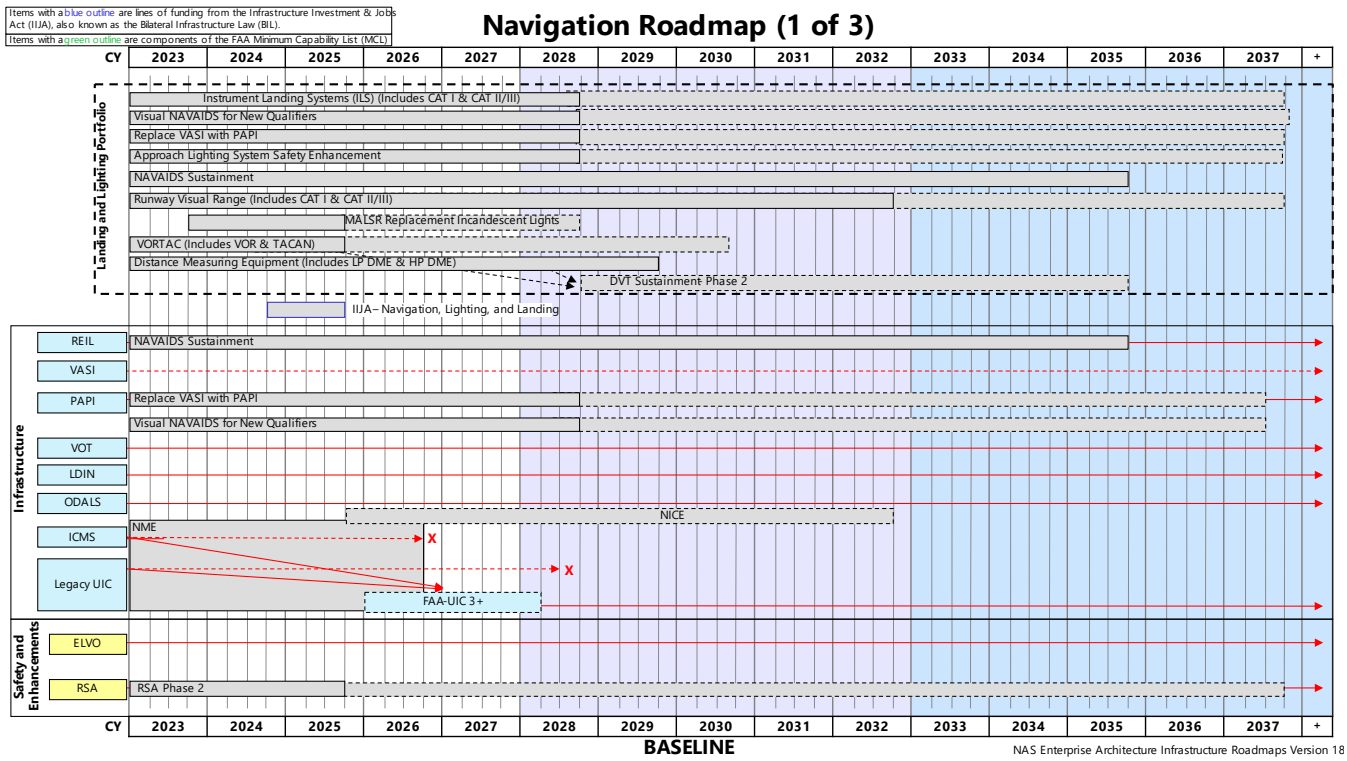

Figure 5-13 Navigation Infrastructure, and Safety and Enhancements Roadmap

Capital Investment Programs for Navigation Infrastructure, Safety and Enhancements include:

- Runway Safety Area (RSA) Phase 2
- NAVAIDS Sustainment
- Visual NAVAIDS - Visual NAVAIDS for New Qualifiers
- Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicators (PAPI)

5.4.2 En Route/Terminal/Non-Precision Approach, Cross Environment, Precision Approach

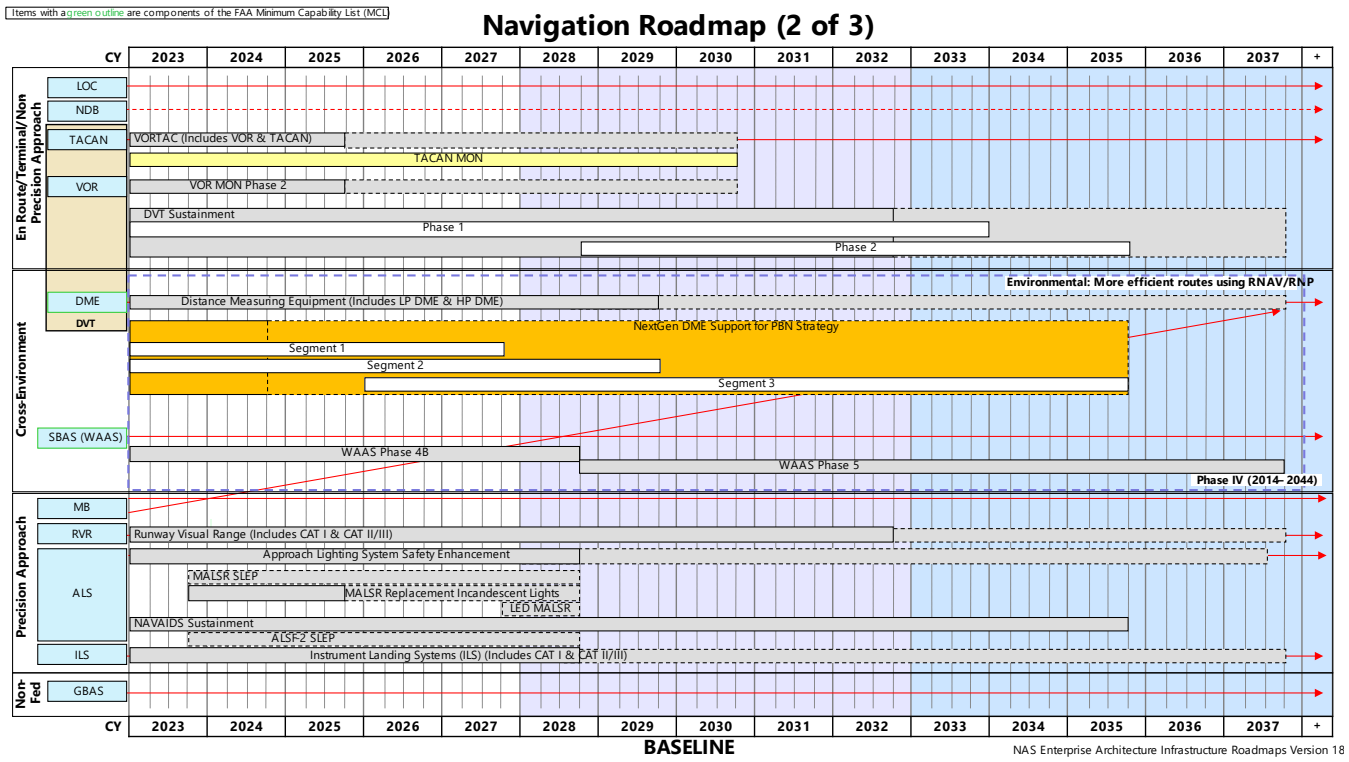

Figure 5-14 En Route/Terminal Nav and Non-Precision/Precision Approach Roadmaps

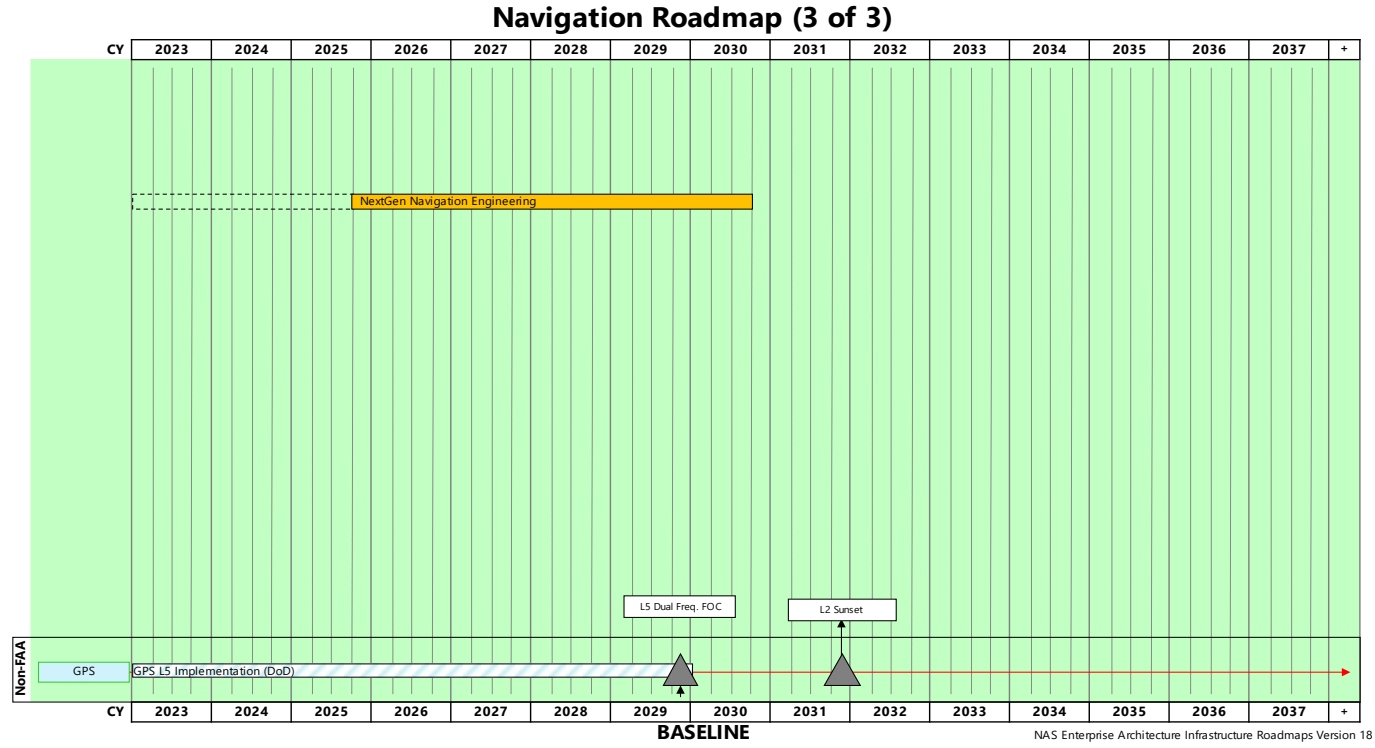

Figure 5-14 En Route/Terminal Nav and Non-Precision/Precision Approach Roadmaps (Continued)

Capital Investment Programs for En Route/Terminal Nav/Non-Precision/Precision Approach, Cross Environment, Precision Approach, and Non-Fed include:

- VOR - Minimum Operational Network

- WAAS - Phase 4A/4B Transition
- Very High Frequency Omni-Directional Range (VOR) Tactical Air Navigation (TACAN)
- ILS
- DME
- Runway Visual Range (RVR)
- Approach Lighting System Safety Enhancement
- DME

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. Weather information will be even more important when direct or user chosen trajectory 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 are 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 to avoid damage to the aircraft and the potential for injuring passengers. The FAA has a lead role in collecting and distributing aviation weather data, particularly hazardous weather data. The FAA distributes hazardous weather 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.

Weather sensors include weather radars and surface observation systems that measure atmospheric parameters, such as surface temperature, barometric pressure, relative humidity, cloud bases and tops, prevailing wind speed and direction, and occurrences of 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 that interpret broad weather trends affecting aviation operations. This information can then be sent to air traffic controllers, traffic flow managers, dispatchers, and pilots.

An extensive network of camera systems, which broadcasts near real-time weather images, works to improve aviation safety and efficiencies in the NAS, reduces weather-related aviation accidents and flight interruptions, and improves aviation flight decision making. General and commercial aviation pilots, dispatchers, helicopter operators, military, Flight Service Specialists, and NWS Forecasters are provided with up-to-date weather visuals at airports, mountain passes and other strategic locations along regular-use air routes, and areas with elevated accident rates. This service better enables informed flight planning and flight decision-making by increasing knowledge about whether it is safe to fly before becoming airborne and during flight. When combined with other available textual weather products, weather camera images on the internet become a powerful tool to aid to improve pilot situational awareness and flight decision-making.

Weather system implementation is broken down into two different roadmaps:

- Roadmap 1 (Figure 5-15) - Weather Sensors
- Roadmaps 2, 3 and 4 (Figure 5-16) - Weather Dissemination, Processing, and Display

5.5.1 Weather Sensors

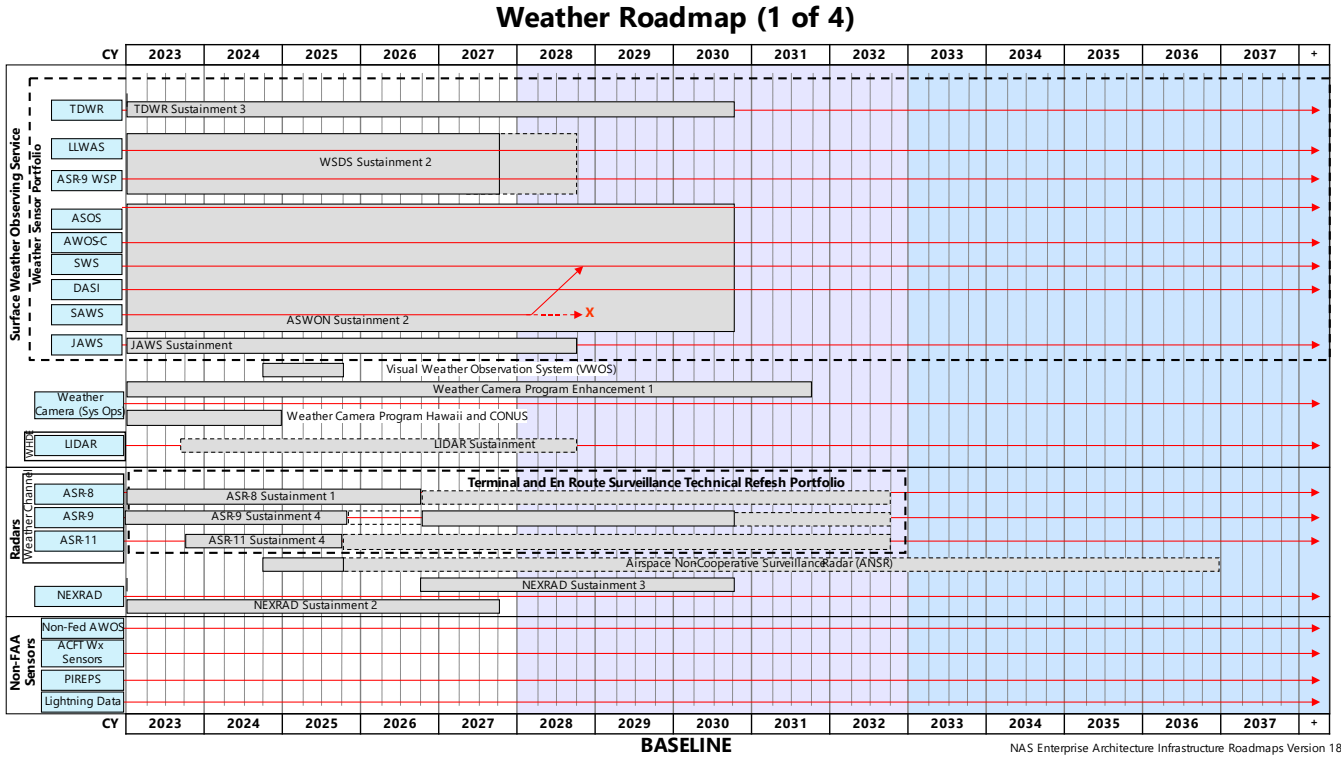

Figure 5-15 Weather Sensors Roadmap

Capital Investment Programs for Weather Sensors include:

- NEXRAD - Sustainment 2
- NEXRAD - Sustainment 3
- Aviation Surface Weather Observation Network (ASWON) – Sustainment 2
- Juneau Airport Wind System (JAWS) – Sustainment
- Weather Camera - Hawaii Enhancement 1
- Terminal Doppler Weather Radar (TDWR) - Sustainment 3
- Wind Shear Detection Service (WSDS) - Sustainment 2

5.5.2 Weather Dissemination, Processing, and Display

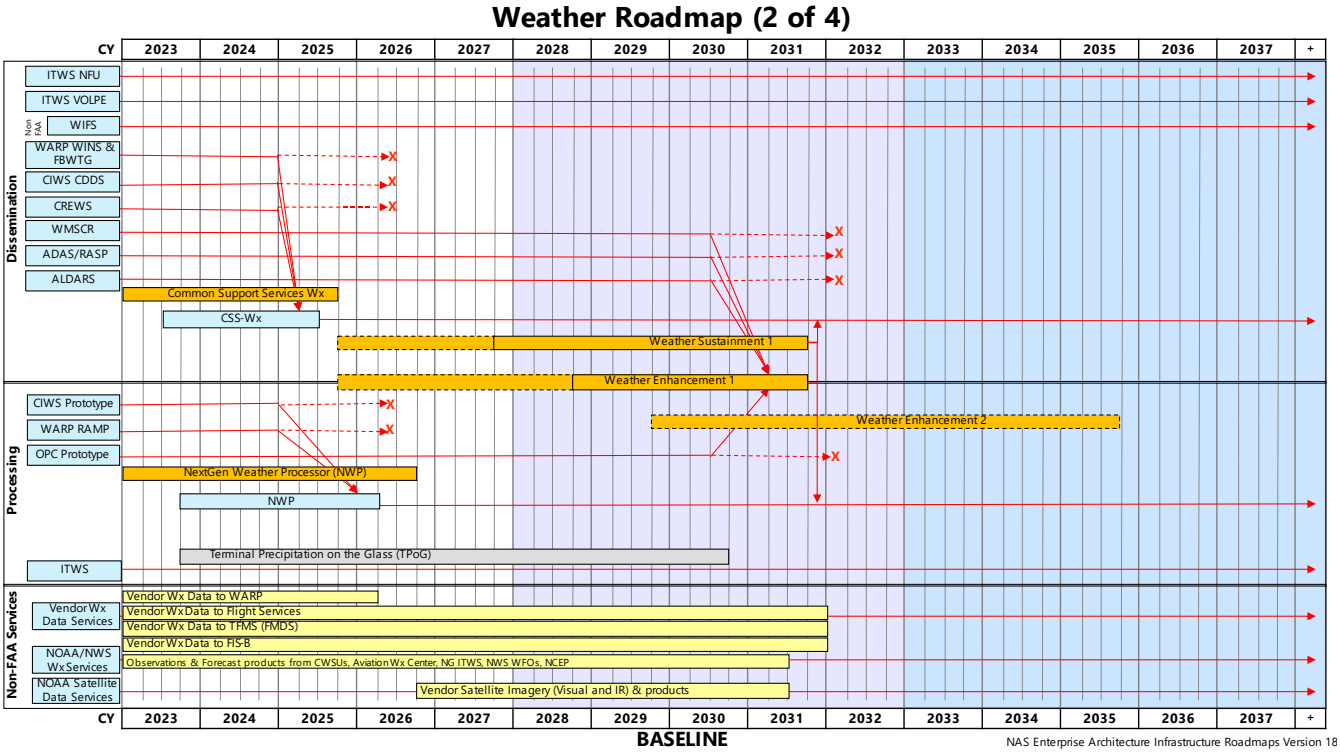

Figure 5-15 Weather Sensors Roadmap (Continued)

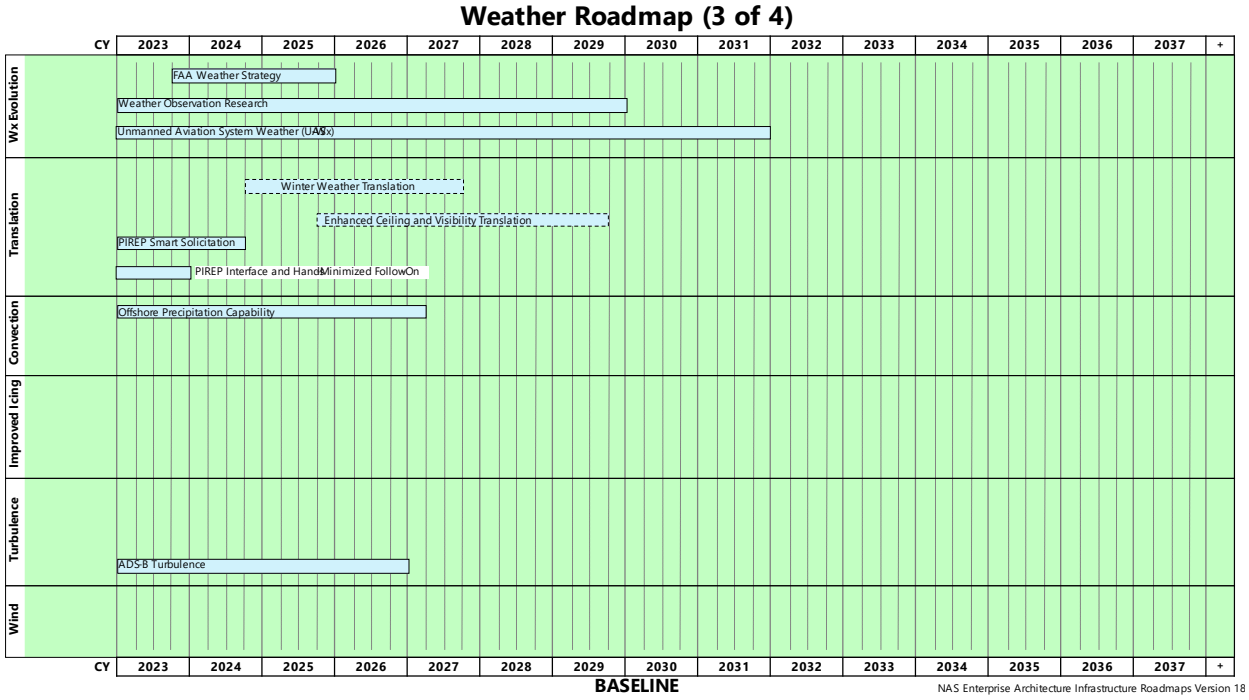

Figure 5-16 Weather Dissemination, Processing, and Display Roadmaps

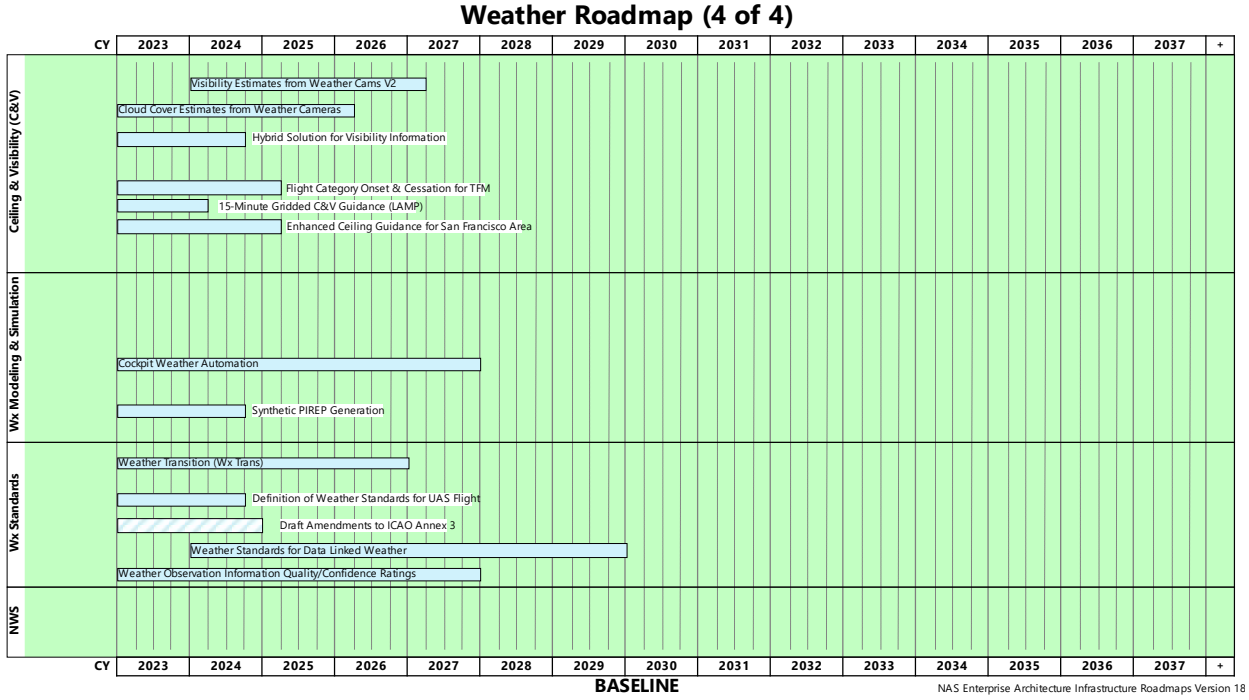

Figure 5-16 Weather Dissemination, Processing, and Display Roadmaps (Continued)

Capital Investment Programs for Weather Dissemination, Processing, and Display include:

- SWIM Common Support Services Weather (CSS-Wx)
- NextGen Weather Processor (NWP)

6 Facilities

The FAA has thousands of staffed and unstaffed operational facilities that must be maintained and modernized. The largest staffed facilities are the 21 En Route centers that house hundreds of employees and the systems and equipment to control aircraft in the en route environment. Other operational facilities with significant staff include 352 Terminal facilities that control arrival and departure traffic to and from airports and are maintained by the FAA. There are also four CCF facilities staffed and maintained by the FAA that provide a combination of services that may include controlling aircraft in the en route environment, arriving and departing the terminal environment, and landing at and departing from one or more airports.

More than 12,000 unstaffed facilities and shelters house systems essential for communications, navigation, surveillance, and weather monitoring. Much of this equipment are in remote areas and housed in aging buildings that require renovation. Many of these facilities have deteriorating steel towers and foundations. Some newer unstaffed buildings and structures require more frequent renovation because they are in harsher conditions near the ocean or on a mountaintop. Replacing roofing, electric power generators, heating/cooling, and structural and security components is essential to sustaining full operation of these facilities in the NAS.

Both the WJHTC in Atlantic City, NJ and the MMAC in Oklahoma City, OK have many buildings. Each year these complexes receive funds to conduct lifecycle sustainment of facilities, upgrade and/or replace infrastructure, and to improve and modernize buildings that support research and development, test and evaluation, independent operational assessments (IOA), operational and second level field support, training, logistics, and management functions. The MMAC operates under a lease from the Oklahoma City Airport Trust. The requested funds are used to pay for the cost of the annual leases and to renovate buildings and supporting infrastructure, such as electrical and mechanical equipment. The WJHTC provides the integrated NAS platform and campus infrastructure used for research, development, test, evaluation, and field support for all NAS and NextGen acquisition programs within the FAA. Annual funding is required to upgrade and reconfigure the laboratories to accommodate acceptance testing for new equipment and to test modifications to existing equipment. Funding will improve infrastructure lifecycle planning as well as update facilities and facilities support systems to ensure that the campus infrastructure and associated buildings operate properly and can handle the utility loads of the systems being tested.

Air traffic control facilities including towers, TRACONs, and ARTCCs serve as the backbone of our nation’s airspace and are pivotal in ensuring the safe and efficient flow of air traffic. Because of their age, many sites can no longer be satisfactorily maintained and require recapitalization/replacement. ATCT/TRACON replacements are large and complex projects and current funding levels cannot sustain the pace required to support these facility costs. The annual Facilities and Equipment (F&E) appropriations over the last decade only funded an average of one ATCT/TRACON replacement a year. The FAA is also actively engaged in a comprehensive plan to renew or replace critical ARTCC. With all 21 ARTCC at least 55-60 years old, each of these facilities is now due for either a major overhaul and upgrade, or a full replacement.
The current and proposed programs funded within this version of the CIP do not fully address the backlog of ongoing capitalization and sustainment needs. To complement these shortfalls, the

agency is proposing the Facility Replacement and Radar Modernization (FRRM) program that will expand on the initial investment from the success of the Bipartisan Infrastructure Law (BIL).[4]

FRRM will also support the procurement and installation of 377 radars across the nation, which represents 60 percent of the radar portfolio. The aging radars pose a significant challenge for air traffic management. As these radar systems age, they are more prone to technological obsolescence, making it increasingly difficult to maintain their performance and integrate them with modern aviation infrastructure. The potential for increased downtime due to repairs can negatively impact airport operations and compromise the efficiency of air traffic control. Moreover, aging radar systems struggle to keep pace with the growing demands of air travel and evolving regulatory standards.

The ARTCC and CCF Sustainment program supports en route air traffic operations and service-level availability by providing life cycle management of the physical plant infrastructure at the ARTCC and CCF facilities. The FAA upgrades and improves these facilities by replacing heating and cooling systems, upgrading electrical power distribution systems, replacing obsolete fire detection and protection systems, and sustaining other facility infrastructure components to meet current and new mission requirements.

Capital Investment Programs for Facilities include:

- WJHTC Laboratories
- WJHTC Building & Plant Sustainment
- ARTCC and CCF Sustainment
- Long Range Radar (LRR) Infrastructure Sustainment
- ATCT/TRACON Replacement
- ATCT/TRACON Sustainment
- Facility Realignment Implementation
- Environmental & Occupational Safety & Health (EOSH)
- Alaska Flight Service Facility Modernization (AFSFM)
- Fuel Storage Tank Sustainment
- Unstaffed Infrastructure Sustainment (UIS)
- FAA Employee Housing & Life Safety Shelter System Services
- Real Property Disposition
- Energy Management and Compliance (EMC)
- Power Systems Sustainment 3
- Childcare Center Sustainment
- Environmental Cleanup / Hazardous Materials (HAZMAT)
- Facility Security Risk Management (FSRM) Sustainment 3
- Mobile Asset Sustainment
- LSSF- LCSS Segment 2
- LSSF - LCSS Enhancement
- Aeronautical Center Infrastructure Sustainment
- Aeronautical Center Lease

4 Programs under the Bipartisan Infrastructure Law (BIL) are not included in the Capital Investment Plan (CIP). The BIL provided a $5 billion down payment over five years towards the FAA's unfunded infrastructure and ongoing sustainment needs (Federal Aviation Administration FY 2026 OMB Budget Submission – Overview).

7 Mission Support

Mission support capabilities are essential to accomplishing the FAA's mission, contribute to the safe and efficient operation of the NAS, and provide resources and support to other capital

programs. As the NAS continues to evolve, mission support programs play an important role in achieving the program objectives of CIP programs on schedule and on budget.

Some of the capabilities provided by mission support programs include: airspace analysis and design, tools for procedures development, improved cyber technology, and information security; acquisition of test equipment for maintenance of NAS systems; acquisition of aircraft to support FAA's mission; airborne flight inspection of navigational aids, surveillance systems, and instrument flight procedures; emergency response and transportation; analysis and modeling of operational data to improve system efficiency; enhancements to aviation safety; improved workforce training capabilities (such as distance learning); and services provided by the Technical Support Services Contract, NAS Integration Support Contract, and Center for Advanced Aviation System Development to meet requirements for other capital programs.

Capital Investment Programs for Mission Support include:

- Runway Incursion Reduction - Advanced Technology Development and Prototyping (ATDP)
- ATDP - System Capacity, Planning, and Improvements
- ATDP - Operations Concept Validation and Infrastructure Evolution
- Major Airspace Redesign - ATDP
- ATDP - Strategy and Evaluation
- ATDP - Dynamic Capital Planning - Resource Management Tool
- Enterprise, Management, Integration, Planning and Performance Evaluation for NextGen
- Operational Modeling Analysis and Data
- Enterprise Information Management (EIM) Platform
- Aircraft Related Equipment (ARE) Sustainment
- Flight Program Fleet Modernization
- Operational Analysis and Reporting System (OARS) Phase 1
- FAA Critical Infrastructure for System Safety (FCISS)
- Critical Infrastructure Cybersecurity Enhancement
- National Test Equipment Sustainment
- Configuration Management Automation (CMA) Phase 1
- Distance Learning
- Program Support Leases
- CIP Systems Engineering & Development Support - Systems Engineering Contract
- Provide ANF/ATC Support (Quick Response)
- NAS Regional/Center Logistics Support Services (LSS)
- NAS Implementation Support Contract (NISC)
- Technical Support Services Contract (TSSC)
- Resource Tracking Program (RTP)
- CIP Systems Engineering & Architecture - Center for Advanced Aviation System Development (CAASD)

8 Summary

The FAA's FY 2025-2029 CIP provides a balanced portfolio of capital programs that will modernize and sustain critical NAS infrastructure and deliver systems and capabilities in support of Air Traffic Services. Acquiring new generations of NAS systems present several challenges,

including the estimation of resources and time required to develop, design, engineer, test, and deliver emerging technologies. Ultimately, these systems will provide new or improved capabilities and benefits to the aviation industry, service providers, and the flying public. By successfully identifying, managing, and delivering new opportunities, the FAA will remain the global leader in civil aviation for the foreseeable future.

9 Acronyms and Abbreviations

Acronym	Acronym Definition
--Number--	
4D	four dimensional
--A--	
ACAT	acquisition category
ACE-IDS	ASOS controller equipment-information display system
ACFT	aircraft
ACS	aeronautical common services
ADAS	AWOS (automated weather observation system) data acquisition system
ADS-B	automatic dependent surveillance-broadcast
ADS-R	automatic dependent surveillance-rebroadcast
AEFS	advanced electronic flight strips
A/G	air-to-ground
AGIS	airport geographic information system
AIM	aeronautical information management
AIMM	aeronautical information management modernization
AIR	FAA Aircraft Certification Service
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
ALDARS	automated lightning detection and reporting system
ALS	approach lighting system
ALSF-2	approach lighting system with sequenced flashing lights
AMASS	airport movement area safety system
AMEN	aerospace medical equipment needs
AMMS	automated maintenance management system
AMS	acquisition management system
ANICS	Alaskan national airspace system interfacility communications system
ANSP	air navigation service provider
ARMT	airspace resource management tool
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ARTS IE/IIE	automated radar terminal system (model IE or IIE)
ASDE-3	airport surface detection equipment model 3 (primary radar)
ASDE-X	airport surface detection equipment model x
ASEPS	advanced surveillance enhanced procedural separation
ASOS	automated surface observing system
ASR-8, 9 or 11	airport surveillance radar model 8, 9 or 11
ASSC	airport surface surveillance capability
AST	FAA's Office of Commercial Space Transportation
ASTI	Alaskan satellite telecommunication infrastructure
ASWON	aviation surface weather observation network
ASIAS	aviation safety information analysis and sharing
ATC	air traffic control
ATCBI-5, 6	ATC beacon interrogator model 5or 6
ATCSCC	Air Traffic Control System Command Center
ATCT	air traffic control tower

Acronym	Acronym Definition
ATIS	automated terminal information service
ATM	air traffic management
ATN	aeronautical telecommunications network
ATO	Air Traffic Organization
ATOP	advanced technologies and oceanic procedures
AVS	FAA Office of Aviation Safety
AWIPS	advanced weather interactive processing system
AWOS	automated weather observation system
AWOS-C	AWOS model C
--B--	
BLI	Budget Line Items
BUEC	back up emergency communications
BWM	bandwidth manager
--C--	
CAMI	Civil Aerospace Medical Institute
CARF	central altitude reservation function
CARSR	common air route surveillance radar
CAST	commercial aviation safety team
CAT (I, II, or III)	category of precision approach capability
CCF	combined control facility
CCS-W	conference control system – Warrenton
CD-2	common digitizer – model 2
CDDS	CIWS data distribution system
CEA	compliance enforcement actions
CFR	code of federal regulations
CFS	communication facilities sustainment
CIP	capital investment plan
CIWS	corridor integrated weather system
CONUS	continental United States
COTS	Commercial-off-the-shelf
CPDLC	controller-pilot data link communications
CRDRD	concept and requirements definition readiness decision
CREWS	CTAS remote weather system
CSSD	common status and structure data
CSS-FD	common support services – flight data
CSS-Wx	common support services – weather
CTAS	center/TRACON automation system
CTD	common terminal digitizer
CTS	coded time source
CV-4400	allows use of terminal radar information in en route automation systems
--D--	
DALR	digital audio legal recorder
DASI	digital altimeter setting indicator
Data Comm	data communications
DCIS	data communications integrated services

Acronym	Acronym Definition
DCL	departure clearance
DCNS	data comm network services (air/ground)
DME	distance measuring equipment
DME/DME	RNAV using multiple DMEs
DMN	data multiplexing network or data exchange messaging nodes
DoD	Department of Defense
DOT	Department of Transportation
DOTS+	dynamic ocean tracking system plus
D-side	radar associate position controller
DSP	departure spacing program
DUATS	direct user access terminal system
DVARS	data visualization, analysis and reporting system
DVOR	Doppler VOR
--E--	
EA	enterprise architecture
ECG	en route communications gateway
ECS	emergency communication system
EDDS	en route data distribution system
EFSTS	electronic flight strip transfer system
E-IDS	enterprise information display system
ELITE	enhanced local integrated tower equipment
ELVO	enhanced low visibility operations
EMC	energy management and compliance
EOL	end-of-life
ERAM	en route automation modernization
ERIDS	en route information display system
E-Scan	electronic scan version of PRM (precision runway monitor)
ETR	emergency transmitter replacement
ETVS	enhanced terminal voice switch
EWD	enhanced weather information network server (WINS) distribution
--F--	
F-420	wind sensor series F-420
FAA	Federal Aviation Administration
FANS	future air navigation system
FBWTG	FAA bulk weather telecommunication gateway
FDIO	flight data Input/Output
FDP	flight data processing
FDPS	flight data processing system
FDP2K	flight data processing 2000
FENS	FAA enterprise network services
F&E	facilities and equipment
FFS	future flight services
FFSP	future flight services program
FID	final investment decision
FIS-B	flight information services – broadcast
FNS	federal NOTAM system

Acronym	Acronym Definition
FS	FAA's Flight Standards Service
FSS	flight service station
FTI	FAA telecommunications infrastructure
FY	fiscal year
--G--	
G1/G2	STARS generation 1/2
GA	general aviation
GAO	Government Accountability Office
GBAS	ground-based augmentation system
GDP	gross domestic product
GNSS	global navigation satellite system
GOM	Gulf of Mexico
GPS	global positioning system
--H--	
HF	high frequency or human factors
HOST	Host computer system
--I--	
IAM	identity and access management
IARD	investment analysis readiness decision
ICAO	International Civil Aviation Organization
ICMS	Interlock control and monitoring system
ICSS	integrated communication switching system
IDAC	integrated departure/arrival capability
IDS	integrated display system
IESP	integrated enterprise service platform
IID	initial investment decision
IFR	instrument flight rules
ILS (I, II, or III)	instrument landing system (category I, II, or III)
IM	interval management
IOA	independent operational assessment
IOC	initial operational capability
IP	internet protocol
IRU	inertial reference unit
ITWS	integrated terminal weather system
IVSR	interim voice switch replacement
--J--	
JAWS	Juneau airport wind system
JRC	joint resources council
--K--	
--L--	
L1 C/A	GPS legacy civil frequency
L5	GPS second civil frequency

Acronym	Acronym Definition
L1/L5	GPS dual frequency for WAAS users
LDIN	lead in light system
LDRCL	low-density radio communication link
LIDAR	light detection and ranging
LITE	local integrated tower equipment
LLWAS	low level wind shear alert system
LOC	localizer
LP	localizer performance or low power
LPV	localizer performance with vertical guidance
--M--	
MALSR	medium-intensity approach lighting system with runway alignment indicator lights
MASR	mobile airport surveillance radar
MB	marker beacons
MDR	multimode digital radios
Micro-EARTS	microprocessor en route automated radar tracking system
MMAC	Mike Monroney Aeronautical Center
Mode S	mode select
MON	minimum operating (or operational) network
MSN	message switching network
--N--	
NADIN MSN	national airspace data interchange network – message switching network
NADIN PSN	national airspace data interchange network – package switching network
NAIMES	NAS aeronautical information management enterprise system
NAS	national airspace system
NASE	NAS adaptation services environment
NAS EA	NAS enterprise architecture
NASR	national airspace system resources
Navaids	navigation aids
NDB	non-directional beacon
NEMS	NAS enterprise messaging service
NEXCOM	next generation air/ground communications
NEXRAD	next generation weather radar
NextGen	next generation air transportation system
NIDS	NAS information display system
NM	nautical miles
NME	navaids monitoring equipment
NOAA	National Oceanic and Atmospheric Administration
NOP	national offload program
NOTAM	notices to missions
NSG	navigation service group
NVR	NAS voice recorder
NVS	NAS voice system
NWP	NextGen weather processor
NWS	National Weather Service

Acronym	Acronym Definition
--O--	
OASIS	operational and supportability implementation system
ODALS	omnidirectional airport lighting system
OEAAA	obstruction evaluation/airport airspace analysis
OFDPS	offshore flight data processing system
OMB	Office of Management and Budget
OPC	offshore precipitation capability
OPSNET	operations network
OSHA	Occupational Safety and Health Administration
--P--	
PAPI	precision approach path indicator
PBN	performance-based navigation
PC	personal computer
PDARS	performance data analysis and reporting system
PDC	pre-departure clearance
PIREPS	pilot reports
PRM E-SCAN	precision runway monitor – electronic scan radar
PSN	package switching network
--Q--	
--R--	
RAMP	radar acquisition and mosaic processor
RASP	regional AWOS data acquisition system (ADAS) service processor
RCAG	remote center air/ground
RCE	radio control equipment
RCF	remote communication facilities
RCISS	regulation and certification infrastructure for system safety
RCL	radio communication link
RCO	remote communications outlet
RCOM	NAS recovery communications
RDVS	rapid deployment voice switch
REIL	runway end identifier lights
RMLS	remote monitoring and logging system
RNAV	area navigation
RNP	required navigation performance
RPM	revenue passenger miles
RSA	runway safety area
R-Side	radar position controller
RTR	remote transmitter/receiver
RVR	runway visual range
RWSL	runway status lights
--S--	
S1P1	segment 1, phase 1
S1P2	segment 1, phase 2
SAA	special activity airspace

Acronym	Acronym Definition
SAMS	special use airspace management system
SAS	safety assurance system
SASO	system approach for safety oversight
SAWS	standalone weather sensors
SBA	space-based ADS-B
SBAS	satellite based augmentation system
SDAT	sector design and analysis tool
SDI	space data integrator
SENSR	spectrum efficient national surveillance radar
SFMEE	strategic flow management engineering enhancement
SIGMETS	significant meteorological information
SLEP	service life extension program
SMA	surface movement advisor
SMS	safety management system
SOA	service oriented architecture
SSTM	system safety management and transformation
STARS	standard terminal automation replacement system
STARS E	STARS enhanced local integrated tower equipment (ELITE)
STVS	small tower voice switch
SWIM	system wide information management
SWS	surface weather system
--T--	
TACAN	tactical air navigation
TAMR	terminal automation modernization replacement
TBFM	time based flow management
TBO	trajectory based operations
TCW	terminal control workstation
TDLS	tower data link service
TDM	time division multiplexing
TDM-to-IP	time division multiplexing to internet protocol
TDW	tower display workstation
TDWR	terminal Doppler weather radar
TDX-2000	target data extractor–2000 (converts analog radar data to digital)
Tech Ops	Technical Operations (part of ATO)
TFDM	terminal flight data manager
TFM	traffic flow management
TFM-I	TFM improvements
TFMS	TFM system
TFR Bldr	temporary flight restriction builder
TIS-B	traffic information services-broadcast
TMI	traffic management initiatives
TMU	traffic management units
TR	technology refresh
TRACON	terminal radar approach control
TSAS	terminal sequencing and spacing
TVS	terminal voice switch

Acronym	Acronym Definition
--U--	
UAS	unmanned aircraft systems
UHF	ultra-high frequency
UIC	universal interlock controller
USNS	United States NOTAM (notice to airmen) system
--V--	
VASI	visual approach slope indicator
VCS	voice communications systems
VDL	VHF data link
VHF	very high frequency
VoIP	voice over internet protocol
Volpe	Volpe National Transportation Center in Cambridge, MA
VOR	very high frequency omnidirectional range
VOT	VOR test
VORTAC	VOR collocated with TACAN
VSCS	voice switching and control system
VSBP	voice switch bypass
VTABS	VSCS training and backup switch
--W--	
WAAS	wide area augmentation system
WAFS	world area forecast system
WAM	wide area multilateration
WARP	weather and radar processor
WCAM	weather camera system
WEF	wind equipment series F-420
WIFS	WAFS internet file service
WINS	weather information network server
WJHTC	William J. Hughes Technical Center
WME	wind measuring equipment
WMSCR	weather message switching center replacement
WP	work package
WSDD	web service description documents
WSDS	wind shear detection services
WSP	wind shear processor
WSRF	water survival research facility
Wx	weather
–X–	
–Y–	
–Z–	