Federal Aviation Administration

NextGEN

NEXTGEN ADVISORY COMMITTEE
NEXTGEN PRIORITIES
JOINT IMPLEMENTATION PLAN
CY2019–2021

This *NextGen Advisory Committee, NextGen Priorities Joint Implementation Plan CY2019–2021* is prepared and signed by:

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for Ali Bahrami, Associate Administrator for Aviation Safety — Date: June 19, 2019

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EXECUTIVE SUMMARY

Since 2009, the Federal Aviation Administration (FAA) and the aviation community have been collaborating on the successful implementation of NextGen in the National Airspace System (NAS). In 2015, the FAA formalized the process of publishing a joint plan between FAA and the aviation community. The joint plan focuses on delivering tangible implementation benefits across all NextGen focus areas, and aligns the agency's and aviation community's priorities.

The FAA received documented advice from the NextGen Advisory Committee (NAC) in order to develop this *NextGen Priorities Joint Implementation Plan CY2019–2021*:

- *NextGen Integration Working Group Rolling Plan 2019–2021 Final Report*[1] (Appendix A), presented by the NAC in October 2018
- *Phase 2 Addendum to Priorities for Improving Operational Performance in the Northeast Corridor (NEC) through Calendar Year (CY) 2021*[2] (Appendix B), presented by the NAC in June 2018.

The commitments herein roll the *NextGen Advisory Committee NextGen Priorities Joint Implementation Plan CY2019–2021* forward through calendar year 2021 with capabilities that meet the NAC's "high benefit, high readiness"[3] criteria for prioritizing work. This report includes the four original focus areas from 2014: Multiple Runway Operations (MRO), Performance Based Navigation (PBN), Surface and Data Sharing, and Data Communications (Data Comm), and adds the Northeast Corridor (NEC) as a fifth focus area in an effort to enhance operations in the most congested airspace in the NAS. Per the NAC's recommendations in the reports listed above, remaining CY2019 commitments from the *NextGen Priorities Joint Implementation Rolling Plan Executive Report 2017–2019* are superseded.

The FAA will oversee and report progress on these commitments through internal agency meetings and jointly with the aviation community through the NAC, a federal advisory committee. Moreover, the aviation community will report on risks and mitigations on industry milestones at joint meetings. The joint collaboration and risk mitigation process have been key to implementing past commitments, improving operational capabilities, and delivering benefits within the NAS.

The FAA and industry are further committed to jointly evaluating the benefits of these commitments through the NAC Joint Analysis Team (JAT). The JAT is a joint government-industry working group the FAA tasked through the NAC with reaching a "common statement of fact" regarding NAS performance gains attributed to NextGen capabilities. Below is a snapshot of recent performance analyses undertaken by the JAT.

[1] https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/media/NAC_Recommendation_NIWG_Rolling_Plan_Report_2019-2021.pdf
[2] https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/media/NEC_Report_Jun2018.pdf
[3] https://www.faa.gov/nextgen/media/ng_priorities.pdf

- **Northeast Corridor**
  Implementations include a focus on increasing low visibility arrival capacity at Philadelphia International Airport, improving departures out of the New York City area during poor weather conditions and deploying key functionality for initial Trajectory Based Operations.

- **Multiple Runway Operations**
  JAT analysis on Wake Recategorization finds aircraft flying into Indianapolis and Philadelphia airports saved an estimated $2.4 million and $765,000, respectively, per year in aircraft operating costs, which includes airborne and taxi-out time and fuel savings.[4]

- **Performance Based Navigation**
  Optimized Profile Descents (OPD) are improving descent profiles at Boston Logan International Airport, as evidenced by more continuous descents, with less time and distance in level flight, according to analysis by the JAT. Approximately 30 kilograms (kg) of fuel savings per flight are attributable to OPDs for flights that reach cruise altitude outside 200 nautical miles from Boston, and approximately 20–25 kg for flights that reach cruise altitude inside 200 nautical miles.[5]

- **Surface and Data Sharing**
  NASA, in collaboration with the FAA and industry, launched the second of three phases of the Airspace Technology Demonstration 2 (ATD-2) effort in September 2018. The second phase fuses strategic and tactical surface metering and will be completed in the fall of 2019. The first phase began in September of 2017 and involved baselining the ATD-2 Integrated Arrival/Departure/Surface (IADS) Traffic Management System. The phase 1 technology has since been transferred to the FAA and industry partners. Preliminary results from phases 1 and 2 of the demonstration suggest using IADS for departure metering saves fuel and emissions, reduces congestion on taxiways and improves compliance with scheduled takeoff times for managing aircraft into the overhead stream.

- **Data Communications**
  Delivering route revision clearances through Data Comm is resulting in reduced workload for pilots and controllers, and shorter taxi-out times for airlines compared to those that use voice. JAT analysis shows on average, taxi-out time savings are between 0.2 and 8.5 minutes for Data Comm equipped aircraft with route revisions during May and June 2017 at Baltimore Washington International, Newark Liberty International, Dallas/Fort Worth International, Chicago Midway International, and Phoenix Sky Harbor International airports.[6]

[4] https://www.faa.gov/nextgen/snapshots/priorities/jat/media/JAT_IND_PHL_ReCat_Fuel_fnl_508_comp.pdf
[5] https://www.faa.gov/nextgen/snapshots/priorities/jat/media/JAT_BOS_GYY_OPDs_Datacomm_Report.pdf
[6] https://www.faa.gov/nextgen/snapshots/priorities/jat/media/JAT_BOS_GYY_OPDs_Datacomm_Report.pdf

CONTENTS OF THE PLAN

The FAA and aviation community have agreed on three categories of high-level commitments summarized in this plan:

- **Implementation:** FAA commitments for operational implementations at specific locations, as applicable, that will be available for use upon completion
- **Pre-Implementation:** FAA pre-implementation activities, such as safety analyses, engineering studies and investment analyses, for capabilities that the agency and aviation community are mutually interested in pursuing
- **Industry:** Industry's completion of activities required for successful implementation

Each focus area section includes a graphic listing the capability milestones and dates, accompanied by a brief description of the commitment.

BACKGROUND

The *NextGen Advisory Committee NextGen Priorities Joint Implementation Plan CY2019-2021* is the set of activities the FAA and aviation community are committed to implementing in the three-year period defined by the plan. The plan represents a set of commitments that industry stakeholders recommend as the highest priority to the aviation community. These commitments are selected under the criteria defined as having high benefit and high readiness to implement.

The FAA presented the original plan to the U.S. Congress in 2014. The plan included the collaborative work between the FAA and NAC industry stakeholders to commit to milestones across four focus areas. MRO, PBN, Surface and Data Sharing, and Data Comm commitments were codified in the original plan.

Work began on a fifth focus area, the NEC, in February 2017. Later that year in October, the initial industry recommendations to implement activities over an 18-month period were presented.

In June 2017, the NAC was tasked by the FAA and presented another set of recommendations to include in the *NextGen Advisory Committee NextGen Priorities Joint Implementation Plan CY2019-2021*, advancing the time period out to 2021.

The result of this government-industry collaboration is a plan that captures FAA implementation, pre-implementation and industry milestones. The FAA and aviation community are committed to reporting regularly to track the completion of the milestones, identify risks and mitigations, and analyze benefits through the JAT.

PLAN MANAGEMENT

Activities in this plan require resources from three FAA accounts: Facilities and Equipment; Research, Engineering and Development; and Operations. The agency's ability to complete this plan's commitments depends on maintaining an adequate and stable funding stream.

The FAA's budget requests also cover the cost of pre-implementation commitments, but pursuing any additional implementation commitments resulting from this work may require extra resources. The agency's agreement to assess a capability does not imply an agreement to implement the capability because the FAA must make a business case to justify the full lifecycle costs.

FAA planning and lifecycle management processes will govern development and implementation of future capabilities. These processes include strategic planning, management and budgeting, enterprise architecture, portfolio management and ultimately, program management. For example, new operational capabilities must be planned and managed through the NAS Enterprise Architecture Service Roadmaps. The FAA Acquisition Management System governs capabilities requiring procurement decisions. During implementation, changes within programs are then governed by internal program management processes.

Finally, the FAA must comply with its NAS Configuration Control process to adjust the NAS baseline to reflect the equipment changes required to support any new capability. These existing FAA processes ensure that all NAS changes are operationally, technically and financially responsible and feasible, and that the required documentation is in place to adequately reflect the change to the NAS and the reasons for it.

MONITORING AND OVERSIGHT

Management and oversight of the commitments in this plan include internal monitoring and oversight activities, risk management, continued aviation community engagement, and reporting of the commitments to the NAC and NAC Subcommittee. The agency will provide further oversight by conducting bi-monthly internal meetings to monitor progress, and the NAC will work with aviation community stakeholders to meet their commitments.

Progress will be reported through the NAC at public meetings three times per year. Notices for NAC meetings are published in the Federal Register.

The FAA has several established forums through which the agency will continue to collaborate with aviation community partners, including the Performance Based Operations Aviation Rulemaking Committee (PARC)[7], Data Comm Implementation Team (DCIT)[8], System Wide

[7] The PARC provides a forum for the aviation community to discuss, prioritize and resolve issues, provide direction for U.S. flight operations criteria and produce U.S. consensus positions for global harmonization, to help the FAA transition to a performance based NAS.

[8] The DCIT provides a forum related to integration of ground automation, communication networks, and avionics systems design and certification, as well as Data Communications procedures and enables users to have a stake in the success of the Data Comm program. The DCIT includes airframe and avionics manufacturers, the FAA, NAS users and related industry associations and business groups.

Information Management (SWIM) Industry-FAA Team (SWIFT)[9] and Collaborative Decision-Making Stakeholders Group (CSG)[10].

The FAA is committed to delivering benefits by implementing the NextGen Priorities. At the NAC's request, the agency has placed a special focus on the NEC in both the concentration of milestones and the measurement of benefits. The FAA tasked the JAT to analyze the performance effects across several NEC implementations. This analysis will provide a joint perspective and examine each implementation to measure the operational performance and inform future work.

[9] The SWIFT provides a collaboration forum to help improve aviation data exchange between the agency and its airspace users.
[10] The CSG provides oversight and governance of joint FAA/industry collaborative decision-making initiatives and provides the FAA with input on prioritization and tasking for possible technologies, tools and/or procedures that will increase the efficiency of the NAS. The CSG includes representatives from the Airlines for America, National Business Aviation Association (NBAA), Regional Airline Association (RAA) and the current industry lead of the CDM program, Delta Air Lines.

FOCUS AREA: MULTIPLE RUNWAY OPERATIONS

New technology in the cockpit and due diligence in examining safety standards for closely spaced parallel runway (CSPO) operations have enabled the FAA to advance its procedures and tools to improve runway capacity in all weather conditions. The FAA can now implement a suite of Multiple Runway Operations (MRO) capabilities to increase arrival and departure rates. These are based on new procedures and data-driven changes to wake turbulence separation standards through Consolidated Wake Turbulence (CWT).

The capabilities in MRO have:

- Enabled the use of simultaneous approaches — two or more aircraft arriving side by side — during periods of reduced flight visibility
- Decreased the required separation between aircraft on dependent approaches, including staggered aircraft arrivals on parallel runways
- Optimized wake turbulence separation standards

These capabilities can increase capacity for more flight opportunities, improve reliability and predictability, and reduce delays. The following commitments are a subset of the overall series of programs and activities the FAA has planned within MRO.

MRO: Implementation Commitments

- **BOS and DFW CWT separation standards, Q2 CY2019:** The FAA commits to completing these two locations as part of the initial transition between Wake Recategorization (Recat) and CWT. The Boston (BOS) Terminal Radar Approach Control Facility (TRACON) and the Dallas/Fort Worth (DFW) TRACON will be completed Q2 CY2019.
- **CWT separation standards:** The distance between two aircraft needed to avoid wake turbulence was initially determined by aircraft weight. Under the Wake Recat Phase 1.5 program, aircraft are classified according to wingspan and the aircraft's ability to withstand a wake encounter, along with the certificated takeoff weight. Wake Recat Phase 2 developed a leader-follower pairwise separation matrix for the most common aircraft that comprise 99 percent of the operations at 32 airports within the United States. CWT aims to use the optimum set of separation standards derived from these sets. The

FAA commits to converting legacy Wake Recat 1.5 (12 locations) and Wake Recat Phase 2 (five locations) standards to CWT standards at five sites in **Q4 CY2019**, seven sites in **Q4 CY2020** and five sites in **Q3 CY2021**. When completed, CWT will be in effect at 107 airports throughout the NAS.

MRO: Pre-implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CSPO collision risk safety study for high update rate surveillance		■										
Operator guidance material on wake turbulence encounter reporting			■									
CSPO feasibility and initial safety analysis for departures			■									
Dynamic wake separation research				■								
ORD wake encounter and mitigation analysis				■								
Analysis of use of RNAV (VNAV) approaches for 7110.308 at SFO					■							
Reduced minimum radar separation feasibility study					■							
CSPO feasibility and initial safety analysis for arrivals and departures							■					

- **CSPO collision risk safety study for HUR, Q2 CY2019:** The FAA commits to completing a collision risk safety study of CSPO by Q2 CY2019 using high update rate (HUR) surveillance in the more congested airspace around airports. This safety study provides analysis of the minimum runway spacing requirement for simultaneous independent operations to parallel runways while using HUR surveillance. Collision risk is assessed as a function of HUR surveillance capabilities and runway centerline spacing to simultaneous independent dual and triple straight-in and offset final approach courses for Instrument Landing System (ILS) and Global Positioning System (GPS) equipped Area Navigation (RNAV)/Required Navigation Performance (RNP) aircraft. This capability may have systemic utility for simultaneous dual and triple approaches using straight-in procedures versus the current standard that requires an offset approach with runway separations below 3,600 feet.
- **Operator guidance material on wake turbulence encounter reporting, Q3 CY2019:** The FAA commits to developing and providing additional guidance material to operators by Q3 CY2019 on wake turbulence encounter reporting.
- **CSPO feasibility and initial safety analysis for departures, Q3 CY2019:** This analysis, to be completed by Q3 CY2019, will investigate procedures to recover lost

capacity through reduced separation standards and increased applications of CSPO departure operations.

- **Dynamic wake separation research, Q4 CY2019:** Dynamic spacing allows static pair-wise wake separation standards of Wake Recat Phase 2 to be based on real-time airspace conditions, such as wind speed and direction. The FAA commits to continuing and completing research by Q4 CY2019 for dynamic wake separation concepts.
- **ORD wake encounter and mitigation analysis, Q4 CY2019:** The FAA commits to completing a wake encounter and mitigation analysis by Q4 CY2019 of arrivals at Runway 28C and departures from Runway 22L at Chicago O'Hare International Airport (ORD).
- **Analysis of use of RNAV (VNAV) approaches for 7110.308 at SFO, Q1 CY2020:** The FAA commits to completing an analysis of the use of RNAV Vertical Navigation (VNAV) approaches for Runways 19L and 28s at San Francisco International Airport (SFO) in Q1 CY2020. These runways fall under Order 7110.308, the standards for Simultaneous Dependent Approaches to Closely Spaced Parallel Runways in which aircraft must keep a minimum diagonal separation.
- **Reduced MRS feasibility study, Q1 CY2020:** The FAA commits to completing a feasibility study by Q1 CY2020 on the use of reduced minimum radar separation (MRS) on final approach within 20 nautical miles (nm) of the runway threshold, including collision risk, impacts on the go-around rate and runway occupancy restrictions.
- **CSPO feasibility and initial safety analysis for arrivals and departures, Q3 CY2020:** The FAA commits to performing CSPO analysis of feasibility and initial safety for integrated arrival/departure concepts by Q3 CY2020. This analysis will look for opportunities to reduce the required separation between a departing aircraft on one runway and an arrival on a closely spaced parallel runway, which will increase airport throughput in less-than-visual conditions. An analysis of lateral and vertical behavior for aircraft when executing a missed approach or divergent departure next to an active parallel runway will assist with determining whether improvements can be safely implemented.

MRO: Industry Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Provide input and review feasibility and initial safety analysis for CSPO departure concepts				■								
Wake turbulence encounter reporting					■							
Provide input and review feasibility study of reduced minimum radar separation						■						
CWT benefits analysis								■				

- **Provide input and review feasibility and initial safety analysis for CSPO departure concepts, Q4 CY2019:** Industry commits to reviewing and providing input on a feasibility study and initial safety analysis by Q4 CY2019 for using CSPO during departures.
- **Wake turbulence encounter reporting, Q1 CY2020:** Industry will support and distribute FAA guidance material relating to wake turbulence encounter reporting through appropriate means of communication to flight crews by Q1 CY2020.
- **Provide input and review feasibility study of reduced MRS, Q2 CY2020:** Industry commits to reviewing and providing input by Q2 CY2020 on a feasibility study on the use of reduced MRS on final approach within 20 nautical miles of the runway threshold, including collision risk, impacts on the go-around rate and runway occupancy restrictions.
- **CWT benefits analysis, Q4 CY2020:** Operators will analyze benefits from implementations at initial CWT locations and existing Wake Recat Phase 1.5 and 2.0 sites by Q4 CY2020.

Cost

The specific commitments in this plan are part of the larger MRO program and are funded in the Fiscal Year (FY) 2019 President's Budget Request and the supporting Capital Investment Plan (CIP). These efforts are also supported each year by the FAA's annual operating budget. Funding for these commitments is included as part of the Facilities and Equipment (F&E) plan that totals $1.0 million for FY2019. In addition, the FAA plans to fund the NextGen Wake Turbulence research program for $3.1 million in FY2019.

Cost estimates are developed based on engineering analysis and known historical costs for wake and closely spaced parallel runway operations procedure conceptual design, data collection, analysis and training. Dynamic Wake Separation research will be funded through research, engineering and development (RE&D) funding. If development progresses, the research products will be transitioned to the Wake Recat F&E CIP to support acquisition and implementation efforts. MRO commitments leverage operational analyses and engineering studies funded and

conducted in prior years. Through FY2018, the FAA spent $83.5 million in the F&E account on the MRO program. Using this funding, the agency performed analyses that led to the authorization of Wake Recat Phases 1.5 and 2.0, which have been implemented at 31 airports.

The agency revised blunder assumptions and performed analyses to reduce required separation standards for simultaneous independent and dependent approaches, which have been implemented at 10 sites. The FAA also performed analyses and authorized procedural and system solutions to reduce wake separation requirements on arrival and departure for closely spaced parallel runway operations. As a result, the agency implemented 7110.308c — an order providing criteria for simultaneous dependent approaches to parallel runways separated by less than 2,500 feet, and authorized Wake Turbulence Mitigation for Departures solutions at five sites to date.

Risks

These commitments are subject to cost, schedule and performance risks. The FAA is committed to providing executive oversight to mitigate risks and adhere to these commitment timelines. Senior leadership will closely monitor the significant interdependencies this focus area shares with other FAA projects. All changes to separation requirements require completion of safety analyses to ensure the proposed procedures meet the target level of safety; therefore, plans are subject to change based on the results of these analyses.

Changes to MRO plans can also occur due to unplanned runway closures and changes in deployment of other programs. Such changes can also affect the benefits case for planned implementations, leading to removal of a site from the plan in favor of another site, which will net greater benefits. In some cases, there is dependence on the development of new Performance Based Navigation procedures and there may be environmental risks if the effects of new procedures exceed FAA threshold criteria for significance, which could delay implementation.

FOCUS AREA: PERFORMANCE BASED NAVIGATION

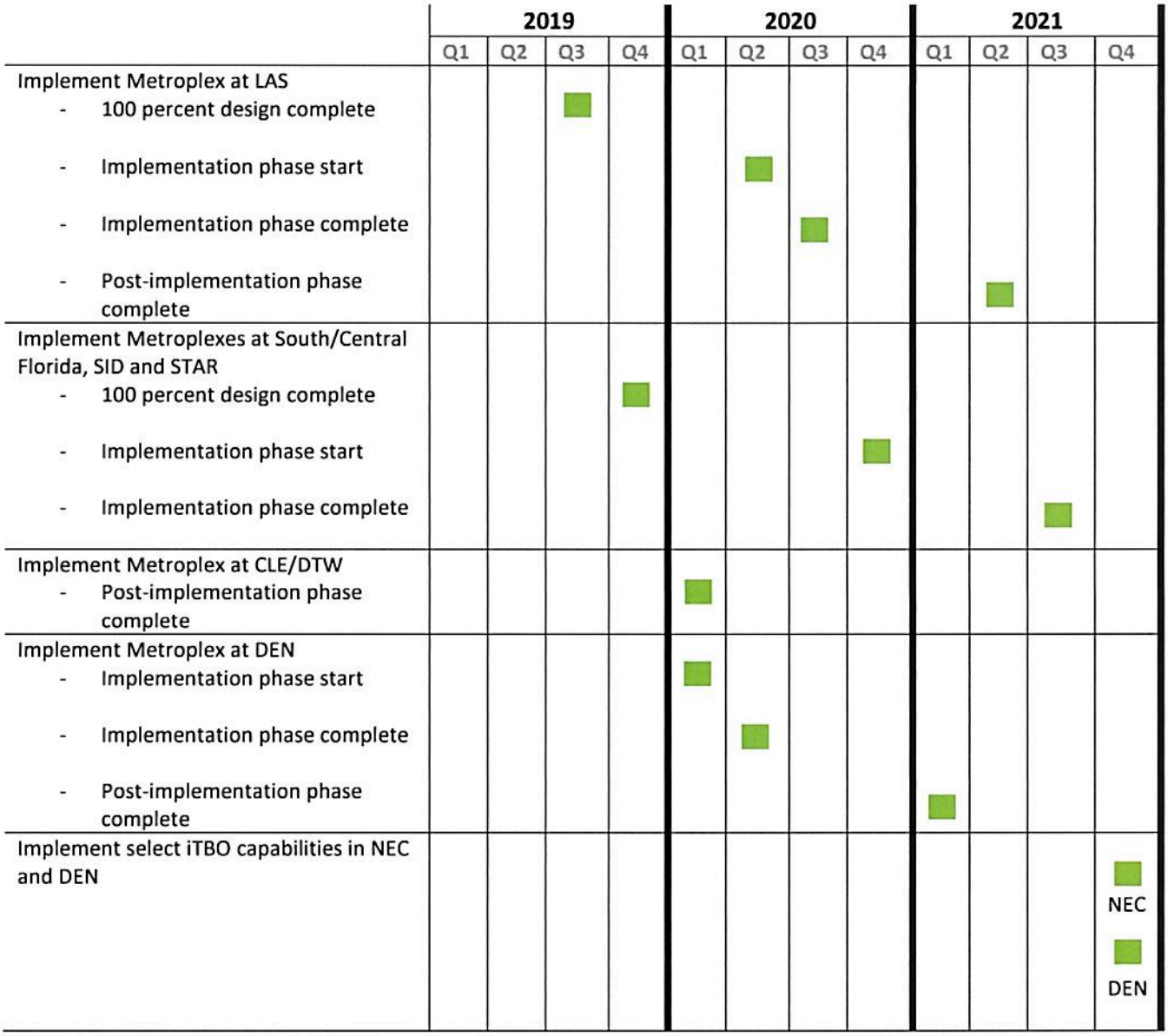
Performance Based Navigation (PBN) is an advanced, satellite-enabled form of air navigation. The FAA has established a network of thousands of precisely defined PBN routes and procedures to improve air traffic flow efficiency to and from airports throughout all phases of flight.

A PBN-centric National Airspace System (NAS) harmonized with Time Based Management (TBM) will enable Trajectory Based Operations (TBO) in the future. TBO is an air traffic management method for strategically planning, managing and optimizing flights throughout the operation by using TBM, information exchange between air and ground systems and an aircraft's ability to fly precise paths in time and space through PBN. TBO allows air traffic controllers to manage traffic on the basis of knowing when and where an aircraft will arrive at critical points along its flight from departure. Initial Trajectory Based Operations (iTBO) is the first step in implementing TBO and is enabled by a number of PBN, surveillance, communications and automation systems that together create a four-dimensional (4D) trajectory.

The FAA outlined its plans for a PBN-centric NAS in the 2016 *PBN NAS Navigation Strategy*[11] document, which details the agency's PBN objectives from 2016 to 2030 and beyond. Successful pre-implementation and implementation activities identified by the NextGen Advisory Committee (NAC) recommendation have advanced PBN and led to operational approvals that facilitate the use of emerging PBN capabilities. With the goal of bringing the strategy to an operational level of implementation, the NAC identified a new set of commitments for the CY2019–CY2021 timeframe.

[11] https://www.faa.gov/nextgen/media/PBN_NAS_NAV.pdf

PBN: Implementation Commitments



- **Implement metroplexes at LAS, South/Central FL, CLE/DTW, and DEN:** The FAA continues to improve overall NAS efficiency by bringing improvements to selected metropolitan areas, or metroplexes, which have multiple airports and complex air traffic flows. Each metroplex is a unique system of airports, aircraft, weather patterns and geography. Through the Metroplex program, the FAA collaborates with aviation stakeholders to improve regional traffic movement by optimizing airspace and procedures built on precise satellite-based navigation. The FAA commits to implementing improvements at the following metroplex sites:
  - **Las Vegas (LAS)**
    - **100 percent design complete, Q3 CY2019**: The FAA commits to completing final designs for the LAS Metroplex by Q3 CY2019.

    - **Implementation phase start, Q2 CY2020**: The FAA commits to begin the implementation phase of the LAS Metroplex by Q2 CY2020.
    - **Implementation phase complete, Q3 CY2020**: The FAA commits to completing the implementation phase of the LAS Metroplex by Q3 CY2020.
    - **Post-implementation phase complete, Q2 CY2021**: The FAA commits to completing the post-implementation phase of the LAS Metroplex by Q2 CY2021.
  - **South/Central Florida Standard Instrument Departures (SID) and Standard Terminal Arrival Route (STAR):**
    - **100 percent design complete, Q4 CY2019**: The FAA commits to completing final designs for the South/Central Florida Metroplex by Q4 CY2019.
    - **Implementation phase start, Q4 CY2020**: The FAA commits to begin the implementation phase of the South/Central Florida Metroplex by Q4 CY2020.
    - **Implementation phase complete, Q3 CY2021**: The FAA commits to completing the implementation phase of the South/Central Florida Metroplex by Q3 CY2021.
  - **Cleveland/Detroit (CLE/DTW)**
    - **Post-implementation phase complete, Q1 CY2020:** The FAA commits to completing the post-implementation phase of the CLE/DTW Metroplex by Q1 CY2020.
  - **Denver (DEN)**
    - **Implementation phase start, Q1 CY2020:** The FAA commits to begin the implementation phase of the DEN Metroplex by Q1 CY2020.
    - **Implementation phase complete, Q2 CY2020:** The FAA commits to completing the implementation phase of the DEN Metroplex by Q2 CY2020.
    - **Post-implementation phase complete, Q1 CY2021:** The FAA commits to completing the post-implementation phase of the DEN Metroplex by Q1 CY2021.

- **Implement select iTBO capabilities in NEC Q4 CY2021 and DEN Q4 CY2021:** The FAA commits to implementing select iTBO capabilities that will enable more precise trajectory management, collaborative scheduling and repeatable PBN procedures. Together they are designed to increase use of existing capacity, improve operational predictability and flexibility, and enhance flight efficiency:
  - Northeast Corridor (NEC) by Q4 CY2021
  - Northwest Mountain operating area, Denver (DEN) by Q4 CY2021

PBN: Pre-Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Joint analysis with industry on potential barriers that inhibit the consistent use of EoR procedures at six NSG 1–4 airports in the NAS						■ 6 Airports						

- **Joint analysis with industry on potential barriers that inhibit the consistent use of EoR procedures at six NSG 1–4 airports in the NAS, Q2 CY2020:** FAA will lead an effort partnering with industry on a high-level analysis on potential barriers that inhibit the consistent use of Established on Required Navigation Performance (EoR) procedures at six NSG 1–4 airports in the NAS by Q2 CY2020. This high-level analysis will also recommend next steps to address the identified barriers. Denver International (DEN), George Bush Intercontinental (IAH), Nashville International (BNA), Portland International (PDX), Austin-Bergstrom International (AUS), and Sacramento International (SMF) will be analyzed, representative of NSG 1–4 airports.

PBN: Industry Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Provide input, validate data, review findings, and confirm conclusions to post implementation analyses for implemented PBN procedures							■ CLE/ DTW				■ DEN	■ LAS

- **Provide input, validate data, review findings and confirm conclusions to post-implementation analyses for implemented PBN procedures: CLE/DTW Q3 CY2020; DEN Q3 CY2021; and LAS Q4 CY2021**: Industry plays a key role in assessing operational benefits after a milestone has been implemented. Using these locations and dates: CLE/DTW Q3 CY2020; DEN Q3 CY2021; and LAS Q4 CY2021, industry will validate the planning and execution of the intended goals that should be established and agreed upon by stakeholders prior to implementation.

Removal of CY2017–CY2019 PBN Commitments

At the June 2017 NAC meeting, industry recommended and the FAA agreed to remove the NextGen Priorities Multiple Runway Operations (MRO) milestone to publish the **Amend National Standards for VNAV for Simultaneous Independent Parallel Approaches, Q2 2017** — a national standard that would eliminate the Vertical Navigation (VNAV) requirement for parallel approaches. During the same meeting, the NAC Subcommittee was directed to examine the impact of removing the VNAV standard on existing plans and to work on a plan to make adjustments as needed.

During the October 2017 NAC meeting, the PBN NextGen Integration Working Group (NIWG) presented a plan to address subsequent PBN EoR milestones that were impacted by the cancellation of the VNAV standard and thus held in abeyance to further analyze contributing factors — aircraft equipage inventory, VNAV causal factors, equipage strategy and identification of subsequent actions that could be accomplished by industry.

Following the March 2018 NAC meeting, work on commitment 1 in the table below was completed using the expertise available. After determining that further analysis was needed, work within this commitment was transitioned from the PBN NIWG to the Performance Based Operations Aviation Rulemaking Committee. Commitments 2, 3, 4 and 5, as shown in the table below, were discontinued.

In August 2018, the PBN NIWG presented their quarterly report on the status of their CY2017 to CY2019 milestones to the NAC Subcommittee. It was determined that commitments 6, 7, 8 and 9, as shown in the table below, were not applicable and should be discontinued, and it was reiterated that commitments 2 through 5 were previously discontinued.

	PBN: Pre-Implementation Commitments	Date
1	EoR – Aircraft Equipage Inventory – Analyses of aircraft equipage inventory, VNAV causal factors, equipage strategy and identification of subsequent actions	Q2 CY2018
2	EoR – Site Selection Decision	Q2 CY2018
3	EoR RF/TF to xLS Safety Analysis	Q2 CY2018
4	EoR Feasibility Assessment: Concurrent Use of Track to Fix and Radius to Fix	Q2 CY2018
5	EoR Dependent Operations Safety Assessment	Q2 CY2018
6	EoR if Favorable Outcome of Independent Duals/Triples Safety Analysis; Develop and Approve Document Change Proposal (DCP) to 7110.65 paragraph 5.9.7	Q2 CY2018
7	EoR If 5.9.7 is Achieved and Applicable; begin EoR Operations with Modified RF Procedures at DEN and IAH	Q2 CY2018
	PBN: Industry Commitments	**Date**
8	Delta to Provide Data on their Utility and Usability for ATL EDO	Q2 CY2018
9	Delta to Provide Data on their Utility and Usability for DFW EDO	Q2 CY2018

Cost

The specific commitments in this section are part of the larger PBN program and multiple automation programs, which are funded in the President's Budget Request and the supporting Capital Investment Plan (CIP). These efforts are also supported each year by the FAA's annual operating budget.

PBN commitments leverage operational analyses and engineering studies funded and conducted in prior years. Through Fiscal Year (FY) 2016, the FAA spent $216 million in the Facilities and Equipment (F&E) account on PBN programs, which included study, design, evaluation and implementation teamwork for metroplex sites and research on EoR concepts. Funding for these commitments is included as part of the F&E plan, which totals $64 million for FY2017. Cost estimates are based on analysis of completed sites, as well as on the number of procedures to be implemented and the level of effort needed to complete the work.

Risks

The following risks have been identified as critical to implementing PBN and iTBO between CY2019 and the end of CY2021.

Balancing of Aircraft Equipage Capabilities

Aircraft equipage varies throughout the NAS, requiring the FAA to balance resource commitments while maintaining safety in the NAS. The agency will seek to address aircraft with limited existing capability at navigation service group (NSG) 1 airports, while ensuring more consistent use of PBN procedures at NSG 2–4 airports to provide benefits to highly capable aircraft.

Balancing Resources

As industry continues to invest in more capable aircraft fleets, the FAA continues to deploy PBN capabilities. This work is subject to adequate and stable funding.

Community Involvement

Community outreach is important to PBN implementation. Airports, aircraft operators and the FAA are partners in implementing PBN initiatives and benefits to stakeholders. Through joint collaboration with the aviation industry, engagement with local agencies and communities helps keep stakeholders informed.

Decision Support Tools/Aircraft Based Tools

Air traffic decision support systems, aircraft avionics and procedures all play a role in the successful implementation of PBN. It is essential to deploy air traffic control tools to leverage capabilities of aircraft avionics, ensure more efficient traffic flow and take full advantage of system capacity.

FOCUS AREA: SURFACE AND DATA SHARING

Noticeable efficiencies can be gained while an aircraft is on the ground and at the gate, and when connecting the surface to en route airspace. The FAA is committed to implementing near-term surface improvements, enabling data sharing with and among stakeholders, as well as completing feasibility assessments of additional capabilities including decision support tools, processes, procedures and policies.

The NextGen Advisory Committee (NAC) developed a follow-on set of commitments for surface and data sharing. Terminal Flight Data Manager (TFDM), identified as one of the new commitments, is a tower-based program that improves surface management and efficiency. TFDM supports new services that automate current manually-intensive operations and replace critical outdated systems in the National Airspace System (NAS). TFDM capabilities are being implemented incrementally in a phased (multiple build) approach throughout the life of the program. The introduction of TFDM into the NAS is a key building block for the FAA's Trajectory Based Operations (TBO) concept.

The remaining commitments involve the Airspace Technology Demonstration 2 (ATD-2) — the Integrated Arrival/Departure/Surface (IADS) field demonstration at Charlotte Douglas International Airport (CLT) — an initiative launched in collaboration with NASA in September of 2017. ATD-2 capabilities will help the FAA increase NAS benefits for TFDM, as well as initial TBO and full TBO. The FAA's goal of establishing TBO in the NAS is to maximize airspace capacity and efficiency with more sophisticated and seamlessly integrated information about the future position of aircraft at a given time, while maintaining safety and minimizing environmental impacts.

Surface and Data Sharing: Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
TFDM program will achieve key site IOC for Build 1 at PHX						■						
TFDM program will achieve ISD for Build 1 to allow additional TFDM system deployments into the NAS								■				
TFDM program will achieve IOC at 3 additional sites									■ 3 sites			
TFDM program will achieve key site IOC for Build 2 at CLT										■		
TFDM program will achieve ISD for Build 2 to allow additional deployments of the full TFDM capabilities into the NAS											■	
TFDM program will achieve IOC at 5 additional sites												■ 5 sites

- **TFDM program will achieve key site IOC for Build 1 at PHX, Q2 CY2020:** Initial Operating Capability (IOC) is the point at which a new system, including hardware and software, is declared ready for conditional operational use in the NAS. The FAA commits to achieving IOC for TFDM at the key site, Phoenix Sky Harbor International Airport (PHX), by Q2 CY2020.
- **TFDM program will achieve ISD for Build 1 to allow additional TFDM system deployments into the NAS, Q4 CY2020:** An in-service decision (ISD) validates that a program meets operational, functional, performance, safety and security requirements, and is supportable by the NAS. The FAA commits to achieving ISD for TFDM Build 1 by Q4 CY2020 to allow additional deployments of TFDM in the NAS.
- **TFDM program will achieve IOC at 3 additional sites, Q1 CY2021:** The FAA commits to achieving IOC for TFDM by Q1 CY2021 at three additional sites.
- **TFDM program will achieve key site IOC for Build 2 at CLT, Q2 CY2021:** The second deployment build for TFDM consists of surface metering which provides users the ability to meter departure flights, an additional airport resource management and surface scheduling capability. The FAA commits to achieving IOC for Build 2 of the program at CLT by Q2 CY2021.
- **TFDM program will achieve ISD for Build 2 to allow additional deployments of the full TFDM capabilities into the NAS, Q3 CY2021**: The FAA commits to achieving ISD for TFDM Build 2 by Q3 CY2021 to allow additional deployments of the full TFDM capabilities into the NAS.
- **TFDM program will achieve IOC at five (5) additional sites, Q4 CY2021:** The FAA commits to achieving IOC for TFDM by Q4 CY2021 at five additional sites.

Surface and Data Sharing: Pre-Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
NASA ATD-2 interim technology transfer from Phase 2: Fused IADS at CLT				■								
TFDM program will complete operational testing for Build 1						■						
NASA ATD-2 final technology transfer from Phase 3: Terminal departure IADS at DFW/DAL							■					

- **NASA ATD-2 interim technology transfer from Phase 2: Fused IADS at CLT, Q4 CY2019:** ATD-2 will provide coordinated schedules among the ramp, tower, terminal and center control facilities, giving air traffic managers tools to make better decisions about how to reduce congestion. NASA will transfer the interim technology from Phase 2 of the project at Charlotte Douglas International Airport (CLT) by Q4 CY2019.

- **TFDM program will complete operational testing for Build 1, Q2 CY2020:** Capabilities in the first deployment build for TFDM include: processing of electronic flight data and Electronic Flight Strips (EFS), processing of traffic flow data, partial airport resource management capabilities and a partial surface scheduling capability. The FAA commits to completing operational testing for Build 1 of the TFDM program by Q2 CY2020.
- **NASA ATD-2 final technology transfer from Phase 3: Terminal departure IADS at DFW/DAL Q3 CY2020:** NASA will conduct a final transfer of technology from Phase 3 of the ATD-2 project at Dallas/Fort Worth International Airport (DFW)/Dallas Love Field Airport (DAL) in Q3 CY2020. The third and final phase demonstrates a terminal departure scheduling capability that considers multiple airports and terminal boundary constraints.

Surface and Data Sharing: Industry Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Participate and provide input during recurring SWIFT meetings		■		■		■		■		■		■
Review TFDM waterfall and denote airports that have a significant non-CDM flight operator presence			■									
Collaborate with the FAA during all remaining CSIT visits (10 total)						■ 2 visits		■ 2 visits		■ 3 visits		■ 3 visits

- **Participate and provide input during recurring SWIFT meetings, CY2019 to CY2021:** The System Wide Information Management (SWIM) Industry–FAA Team (SWIFT) comprises FAA and aviation stakeholders including airlines, professional organizations and industry to foster a collaborative environment as SWIM capabilities continue to evolve.

  Industry commits to collaborating with the FAA through recurring SWIFT meetings from CY2019 to CY2021 to help ensure widespread community awareness of the available data and dependencies. This includes: SWIM TFDM terminal publication (TTP) feed-connectivity to achieve TFDM surface metering benefits; SWIM TFDM flight operations system collaboration services (TFCS) feed-connectivity to accomplish departure substitutions during surface departure metering; SWIM and non-SWIM data exchange platforms; and other decision support tools and NAS automation systems and the associated FAA data.

All meeting presentations, as well as meeting minutes will be made available to all industry participants following every SWIFT meeting, allowing awareness for all industry members, present or not.

  - SWIFT meeting commitments:
    - Participate in one FAA SWIFT meeting by Q2 CY2019
    - Participate in one FAA SWIFT meeting by Q4 CY2019
    - Participate in one FAA SWIFT meeting by Q2CY2020
    - Participate in one FAA SWIFT meeting by Q4 CY2020
    - Participate in one FAA SWIFT meeting by Q2 CY2021
    - Participate in one FAA SWIFT meeting by Q4 CY2021

- **Review TFDM waterfall and denote airports that have a significant non-CDM flight operator presence, Q3 CY2019:** Industry commits to reviewing the TFDM configuration waterfall and identifying locations by Q3 CY2019 with a significant number of operators that do not have a permanent operational presence at an airport such as foreign flag carriers, non-Collaborative Decision Making (CDM) domestic carriers, and general aviation operators.
- **Collaborate with the FAA during all remaining CSIT visits, CY2020 to CY2021:** Industry commits to collaborate with the FAA during Collaborative Site Implementation Team (CSIT) visits through CY2021. Industry-managed ramps will have the relevant industry member(s) participate and provide input as needed. This includes flight operators, airport operators and third-party ramp control providers, as appropriate.
  - Industry commitments:
    - Participate in two CSIT visits by Q2 CY2020
    - Participate in two CSIT visits by Q4 CY2020
    - Participate in three CSIT visits by Q2 CY2021
    - Participate in three CSIT visits by Q4 CY2021

Cost

The specific commitments in this section are part of the FAA's implementation of surface and data sharing improvements. The funding is included in the FY2019 President's Budget Request and the supporting Capital Investment Plan. Through FY2018, the FAA spent $237.1 million in the Facilities and Equipment (F&E) account for surface operation improvements and the TFDM program. The TFDM baseline includes an additional $310.6 million from FY2019–FY2021 to support the FAA commitments in the plan.

Risks

Collaborative Decision Making (CDM) is an operating philosophy whereby traffic flow management decisions are based on a foundation of real-time data sharing, a common view of constraints and a decision-making process that is focused on improving the predictability and efficiency of flight operations.

CDM participants include representatives from government, airlines, general aviation, business aviation, private industry and academia. They work together to develop new processes that often

rely less on technology and more on stakeholder agreements that are intended to achieve mutually beneficial outcomes, which support NAS efficiency and safety.

The success of these types of initiatives depends on all parties sharing data and making a clear commitment to exchange data. If the majority of the operators do not publish or subscribe to data via the SWIM system, then improved airport surface efficiency and operator fuel savings benefits will not be realized. The Terminal Flight Data Manager (TFDM) program is executing a robust risk, issue and opportunity (RIO) management process to mitigate programmatic risk. The program is currently tracking and working to mitigate the following risk associated with commitments in this plan:

TFDM: Flight Operator Subscription to TFDM terminal publication (TTP)

Risk Statement: If flight operators do not subscribe to the TTP prior to Initial Operating Capability at Charlotte Douglas International Airport in 2021, the TFDM program will not meet the requirements and achieve the planned benefits for surface metering.

Context: The TTP service is the interface for passing surface metering information back to the flight operators. If flight operators do not subscribe to the TTP, then TFDM metering will not be effective nor achieve the desired benefits. Flight operators will need to establish a subscription through SWIM to interface with the TTP.

FOCUS AREA: DATA COMMUNICATIONS

The Data Communications (Data Comm) program provides digital communications services between pilots and air traffic controllers, as well as enhanced air traffic control information to airline operations centers. Data Comm provides a data interface between ground automation and the flight deck for pilot and controller communications. With the push of a button, pilots and controllers can send, accept and insert (if allowed) safety-of-flight air traffic control clearances, instructions, traffic flow management notices, flight crew requests and reports.

Data Comm technology is critical to the success of NextGen, enabling efficiencies in both technology and human factors not possible with the current voice system. Data Comm services have already proven to enhance safety by reducing communication errors for pilots and controllers, increasing pilot and controller productivity by reducing their communication time, and increasing airspace capacity and efficiency while reducing delays, fuel burn and aircraft exhaust emissions.

Data Communications: Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Recommendation for target equipage rates for follow-on capabilities		■										
Deploy tower services to an additional seven towers			■ 7 Sites									
IOC for initial en route services at all CONUS ARTCCs												■ 20 Sites

- **Recommendation for target equipage rates for follow-on capabilities, Q2 CY2019:** The Data Comm benefits case demonstrates that increased equipage translates to additional operational benefits to operators and the NAS. Additional equipage will drive benefits in specific regions, including the Northeast Corridor (NEC). The original goal to equip at least 1,900 U.S. aircraft with Future Air Navigation System (FANS) 1/A and Very High Frequency (VHF) Data Link (VDL) Mode 2 equipment has been met as of Q3 CY2018. A joint FAA and industry team will provide recommendations for future target equipage rates by Q2 CY2019.
- **Deploy tower services to an additional seven towers, Q3 CY2019:** The FAA successfully delivered departure clearance services at 55 airports under the Data Comm program's Segment 1 Phase 1 in 2016, and did so 29 months ahead of schedule. Using underrun funds, the FAA added seven additional towers and delivered these towers 13 months ahead of schedule. The seven additional towers are Joint Base Andrews (ADW), Buffalo Niagara International Airport (BUF), Charleston (SC) International Airport (CHS), John Glenn Columbus International Airport (CMH), Southwest Florida International Airport (Fort Myers) (RSW), Reno-Tahoe Airport (RNO) and Van Nuys Airport (VNY).

- **IOC for initial en route services at all CONUS ARTCCs, Q4 CY2021:** Data Comm Controller Pilot Data Link Communications (CPDLC) services will be implemented by the FAA in the en route airspace at all 20 Air Route Traffic Control Centers (ARTCC) in the continental United States (CONUS) by Q4 CY2021, including transfer of communications, check-in (Initial), altimeter settings, altitudes, airborne reroutes/go button, controller initiated routes (Initial), direct-to-fix (Initial), crossing restrictions (Initial) and speeds (Initial).

Data Communications: Pre-Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Loadability solution for runway SID/STARs			■									
Solution for full automation for the confirm assigned route capability			■									
Baseline enhanced Data Comm services for en route utilizing the existing FANS 1/A message set											■	

- **Loadability solution for runway SID/STARs, Q3 CY2019:** Modern Area Navigation (RNAV) Standard Instrument Departure (SID), Standard Terminal Arrival Route (STAR) and RNAV Required Navigation Performance (RNP) approach procedures often include the runway as a dependent element of the procedure. This dependency means without the runway, the clearance would be incomplete. The tower data link system does not have the complete information needed to provide the runway element as part of the uplinked, loadable departure clearance (DCL). The FAA will develop a solution by Q3 CY2019.
- **Solution for full automation for the Confirm Assigned Route capability, Q3 CY2019:** When a reroute message is issued, the flight crew currently responds by sending the entire active route loaded in the Flight Management Computer (FMC) back to the controller; the controller is expected to manually review the Confirm Assigned Route message and identify possible errors. The FAA commits to develop a solution by Q3 CY2019.
- **Baseline enhanced Data Comm services for en route utilizing the existing FANS 1/A message set, Q3 CY2021:** Services will provide initial, dynamic four-dimensional (4D) trajectory management through complex reroutes with time, speed and altitude elements; adapted and tailored arrivals; enhanced traffic management coordinator-initiated reroutes; and Automatic Dependent Surveillance–Contract (ADS–C) initial aircraft intent. The FAA and industry will baseline capabilities in these areas by Q3 CY2021, subject to budget availability.

Data Communications: Industry Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Recommendation for regional jet equipage strategy		■										
Recommendation for target equipage rates for follow-on capabilities		■										
Airlines to equip 1,900 aircraft				■								
Baseline enhanced Data Comm services for en route utilizing the existing FANS 1/A message set											■	
Resolution of avionics/Pegasus 1 interoperability issue												■

- **Recommendation for regional jet equipage strategy, Q2 CY2019:** More than 1,600 regional jets operate in domestic U.S. airspace. Many of the congested airspaces where Data Comm can provide the most operational benefits, both en route airspace and at airport towers, have a significant amount of regional jet operations. Industry will provide a recommendation for a regional jet equipage plan by Q2 CY2019.
- **Recommendation for target equipage rates for follow-on capabilities, Q2 CY2019:** The Data Comm benefits case demonstrates that increased equipage translates to additional operational benefits to operators and the NAS. Additional equipage will drive benefits in specific regions, including the NEC. The original goal to equip 1,900 U.S. aircraft with FANS 1/A and VDL Mode 2 equipment was met as of Q3 CY2018, and industry along with the FAA will provide recommendations for future target equipage rates by Q2 CY2019.
- **Airlines to equip 1,900 aircraft, Q4 CY2019:** The Data Comm program has achieved its goal of equipping a minimum of 1,900 U.S. aircraft with FANS 1/A and VDL Mode 2 by the end of CY2019. The FAA established a financial incentive program that successfully encouraged early adopters and resulted in the levels of participation required to achieve operational benefits.
- **Baseline enhanced Data Comm services for en route utilizing the existing FANS 1/A message set, Q3 CY2021:** Services will provide initial, dynamic four-dimensional (4D) trajectory management through complex reroutes with time, speed and altitude elements; adapted and tailored arrivals; enhanced traffic management coordinator-initiated reroutes; and Automatic Dependent Surveillance–Contract (ADS–C) initial aircraft intent. Industry, jointly with the FAA, will baseline capabilities in these areas by Q3 CY2021.
- **Resolution of avionics/Pegasus 1 interoperability issue, Q4 CY2021:** Software issues in the B757 and B767 Pegasus 1 flight management system prevent pilots from using Data Comm services. A temporary ground system mitigation was developed to allow affected aircraft to participate in En Route Initial Services but without a fix implemented in the field, approximately 550 domestic B757 and B767 aircraft will not be able to

participate in domestic En Route Controller Pilot Data Link Communications starting in January 2022. In certain regions and at certain airports (e.g., Atlanta, Memphis, Louisville, San Francisco and Seattle), this may disproportionally affect operations due to the population of B757 and B767 aircraft. Industry has agreed to address these issues by the end of CY2021.

Cost

The majority of the FAA commitments in this report for Tower and En Route Services are funded as part of Data Comm Segment 1 Phase 1 (S1P1) and Segment 1 Phase 2 (S1P2) Initial En Route and Full En Route Services baselines, as reflected in the current Capital Investment Plan. Once solutions are identified, estimates will be developed for the "Loadability Solution for Runway SID/STARs" commitment and the "Solution for Full Automation for the Confirm Assigned Route Capability." Through FY2018, the FAA spent $1.4 billion for S1P1 and S1P2. In FY2019, the FAA plans to spend $113.5 million in the Facilities and Equipment account for S1P2.

Risks

As with any program, these commitments are subject to cost, schedule and performance risks. The FAA is committed to providing executive oversight to mitigate risks and adhere to these commitment timelines. Data Comm has significant interdependencies with other FAA projects that senior leadership closely monitors. For the program to succeed, all subsystems of the program, to include aircraft avionics and the air-to-ground network, must work together to deliver the service into the NAS.

Delay to the delivery and integration of any of the component subsystems could impact commitment dates. Additionally, close coordination with FAA field personnel and airline operators is required to operationally test and evaluate the system. Delay in providing these resources could impact the activation of services in the NAS. The development, acceptance, and delivery of training materials to support initial operations at a site, as well as training for operator flight crews, are also critical to success.

FOCUS AREA: NORTHEAST CORRIDOR

The Northeast Corridor (NEC) is defined as the airspace that spans from Washington, D.C. to Boston and includes Philadelphia and the New York area. The NEC contains the most congested airports and airspace in the United States and has a significant impact on daily operations in the National Airspace System (NAS). The FAA, in collaboration with the NextGen Advisory Committee (NAC), agreed in 2017 to make the NEC a NextGen priority focus area.

Applying Trajectory Based Operations (TBO) capabilities in the NEC is a key part of the FAA's implementation strategy for TBO. The agency is reviewing current deployment waterfalls for TBO capabilities and identifying gaps between the desired end state and what is currently planned.

TBO is expected to result in more efficient use of system capacity by maximizing airspace and airport throughput, improving operational predictability through more accurate gate-to-gate strategic planning, enhancing flight efficiency through integrated operations, and increasing operational flexibility through increased user collaboration regarding trajectories and priorities.

The initiatives below are intended to address the highest priority operational needs for the NEC from October 2017 through December 2021. The FAA and industry commitments and milestones are based on the report *Phase 2 Addendum to Priorities for Improving Operational Performance in the Northeast Corridor (NEC) through CY2021*. The industry recommendations were based on ten operational need priority areas for the NEC through 2021 as defined by the NEC NextGen Integration Work Group.

Northeast Corridor: Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Expand consistent usage of defined and existing capping and tunneling for departures/arrivals to/from the NEC	■											
Improve airborne metering to PHL	■											
Implement TBFM pre-departure scheduling at a selected airport			■									
Implement CRDA application for PHL 27R/35 for RNAV approaches				■								
Implement ZNY offshore PBN routes					■							
Improved departure management for flights destined to LGA						■						
Implement DSP enhancements								■				
Implement Eastern Seaboard high altitude PBN routes (including SID/STAR connectivity) through ZBW, ZNY and ZDC airspace								■				
Implement PDRR/ABRR enhancements								■				
Improve arrival TBM to PHL												■

- **Expand consistent usage of defined and existing capping and tunneling for departures/arrivals to/from the NEC, Q1 CY2019:** The FAA will increase the use of capping (clearing an aircraft to an altitude lower than the requested altitude until the aircraft is clear of a particular airspace) and tunneling (descending air traffic prior to the normal descent point at the arrival airport to keep aircraft clear of particular airspace) for departures and arrivals to and from the NEC from Q2 CY2018 to Q1 CY2019.
- **Improve airborne metering to PHL, Q1 CY2019:** Airborne metering is used to schedule runway assignments and landing times, and allocate airborne delays. The FAA will improve airborne metering to Philadelphia International Airport (PHL) by Q1 CY2019 by refining metering parameters to improve operational efficiency for facilities currently metering to PHL.
- **Implement TBFM pre-departure scheduling at a selected airport, Q3 CY2019:** Time Based Flow Management (TBFM) uses time instead of distance to help controllers space air traffic, which results in more efficient metering — saving time and reducing fuel burn and aircraft exhaust emissions. The FAA commits to implementing TBFM pre-departure scheduling by Q3 CY2019 at a selected airport.

- **Implement CRDA application for PHL 27R/35 for RNAV approaches, Q4 CY2019:** The Converging Runway Display Aid (CRDA) is a tool controllers use to better visualize the location and spacing of aircraft on approach paths to intersecting runways, allowing controllers to more efficiently sequence arrivals into an airport. The FAA will implement CRDA for aircraft flying Area Navigation (RNAV) approaches to PHL Runways 27R and 35 by Q4 CY2019.
- **Implement ZNY offshore PBN routes, Q1 CY2020:** The FAA commits to implementing offshore PBN routes for the New York Air Route Traffic Control Center (ZNY) by Q1 CY2020 to help reduce airborne arrival and departure delays at New York area airports.
- **Improved departure management for flights destined to LGA, Q2 CY2020:** The FAA will improve the management of departures for flights headed to LaGuardia Airport (LGA) by Q2 CY2020.
- **Implement DSP enhancements, Q4 CY2020:** The FAA will implement enhancements by Q4 CY2020 to the Departure Spacing Program (DSP), a tool used by tower controllers to optimize taxi and takeoff clearances to more efficiently use available runway and airspace capacity.
- **Implement Eastern Seaboard high altitude PBN routes (including SID/STAR connectivity) through ZBW, ZNY and ZDC airspace, Q4 CY2020:** The FAA will implement high altitude PBN routes along the Eastern Seaboard by Q4 CY2020, including Standard Instrument Departure (SID) and Standard Terminal Arrival (STAR) connectivity, to address bottlenecks primarily in the Mid-Atlantic airspace and improve traffic flow to key NEC airports.
- **Implement PDRR/ABRR enhancements, Q4 CY2020:** The FAA will implement enhancements for Pre-Departure Reroutes (PDRR)/Airborne Reroutes (ABRR) by Q4 CY2020. PDRR/ABRR is a capability that provides air traffic managers the ability to electronically send aircraft-specific reroutes to controllers.
- **Improve Arrival Time Based Management (TBM) to PHL, Q4 CY2021:** This initiative, to be completed by Q4 CY2021, will expand the number of facilities metering to PHL and is intended to increase the use of metering.

Northeast Corridor: Pre-Implementation Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Conduct a feasibility study to create a process to reduce and/or eliminate passback MIT for departures from NY	■											
Complete concept assessment to deconflict LGA/EWR/TEB when on LGA 13ILS	■											
Complete review/update of adaptation for improving airborne metering to PHL	■											
Complete TBFM refresher training for metering to PHL	■											
Evaluate design alternatives to the GLDMN/NTHNS RNAV SIDs to address noise concerns		■										
Conduct feasibility assessment of EoR simultaneous operations to JFK 13R RNP and 13L ILS		■										
Complete concept analysis for TEB RW19 RNAV SID for overnight operations		■										
Conduct concept exploration of simultaneous operations on widely-spaced approaches to different airports		■										
Determine viability and model ZDC airspace redesign alternatives			■									
Conduct an analysis to determine the sequence of remaining airports to receive en route metering			■									
Evaluate LGA31 RNAV approach design alternatives that approximate the LGA 31 EXPWY VIS approach and are usable for most operators			■									
Complete concept assessment for EWR 22L/29 arrival operations			■									
Benefits assessment for gate docking technologies to improve surface management				■								
Joint Industry/FAA milestone to assess opportunities to expand the use of CDTI-assisted operations beyond CAVS				■								

Joint Industry/FAA milestone to complete EFVS benefits studies to determine requirements for reaching Cat II/III equivalent operations in the NEC				■								
Joint Industry/FAA milestone to complete studies to analyze the effects of mixed EFVS equipage aircraft operations in the NEC				■								
Conduct IDRP prototype re-familiarization session					■							
Conduct CRDA feasibility analysis for EWR 22L/11 to lower minima					■							
Conduct CRDA feasibility analysis for EWR 4R/29 to lower minima					■							
Conduct analysis to evaluate the impact and benefit of applying 7110.308 at EWR					■							
Conduct operational analysis to identify enhancements to improve data driven TFM decision making					■							
Joint Industry/FAA milestone to review the relevant information and recommend next steps of FIM							■					
Conduct FIM NEC-specific benefits study							■					

- **Conduct a feasibility study to create a process to reduce and/or eliminate passback MIT for departures from New York, Q1 CY2019:** Air traffic managers use miles-in-trail (MIT) as a traffic management initiative when traffic congestion is anticipated at airports or in sectors downstream. Often these delays are passed back to the upstream facilities including airports in the New York area, a key region in the NEC. The FAA commits to conducting a feasibility study to create a process to reduce and/or eliminate passback of these delays to departures from New York by Q1 CY2019.
- **Complete concept assessment to deconflict LGA/EWR/TEB when on LGA 13ILS, Q1 CY2019:** The FAA will complete a concept assessment by Q1 CY2019 on developing an Instrument Landing System (ILS) approach to LaGuardia Airport (LGA) Runway 13 that can turn final within the confines of LGA airspace while deconflicting the LGA/Newark Liberty International Airport (EWR)/Teterboro Airport (TEB) airspace. Aircraft from the south would save approximately 15 miles compared to the current ILS approach to Runway 13. Sequencing tools would be needed to manage mixed equipage scenarios.
- **Complete review/update of adaptation for improving airborne metering to PHL, Q1 CY2019:** Airborne metering is used to schedule runway assignments and landing times, and allocate airborne delays. The FAA will complete a review and make updates, if necessary, to an adaptation for improving airborne metering to PHL by Q1 CY2019.

- **Complete TBFM refresher training for metering to PHL, Q1 CY2019:** FAA operational personnel will complete refresher training by Q1 CY2019 for metering flights to PHL using TBFM.
- **Evaluate design alternatives to the GLDMN/NTHNS RNAV SIDs to address noise concerns, Q2 CY2019:** The FAA will evaluate design alternatives by Q2 CY2019 to the GLDMN/NTHNS RNAV SID procedures to address noise concerns.
- **Conduct feasibility assessment of EoR simultaneous operations using JFK 13R RNAV RNP and 13L ILS approaches, Q2 CY2019:** The FAA will conduct a feasibility assessment by Q2 CY2019 regarding the use of EoR simultaneous operations at JFK using a 13R RNAV RNP approach with radius-to-fix (RF) legs, and a Runway 13L ILS approach.
- **Complete concept analysis for TEB RW19 RNAV SID for overnight operations, Q2 CY2019:** The FAA will complete a concept analysis by Q2 CY2019 for an RNAV SID procedure for TEB Runway 19 for use during overnight operations.
- **Conduct concept exploration of simultaneous operations on widely-spaced approaches to different airports, Q2 CY2019:** To expedite addressing deconfliction issues, the FAA will conduct concept exploration of simultaneous operations on widely-spaced approaches to different airports by Q2 CY2019.
- **Determine viability and model ZDC airspace redesign alternatives, Q3 CY2019:** The FAA will determine by Q3 CY2019 the viability of, and provide modeling for, redesign alternatives for the Washington Air Route Traffic Control Center (ZDC) airspace to reduce air traffic management restrictions.
- **Conduct an analysis to determine the sequence of remaining airports to receive en route metering, Q3 CY2019:** The FAA will conduct an analysis by Q3 CY2019 to determine the sequence of remaining airports to receive en route metering.
- **Evaluate LGA31 RNAV approach design alternatives that approximate the LGA 31 EXPWY VIS approach and are usable for most operators, Q3 CY2019:** The FAA will evaluate design alternatives by Q3 CY2019 for an Area Navigation (RNAV) approach that approximates the Expressway Visual (EXPWY VIS) approach to LGA Runway 31.
- **Complete concept assessment for EWR 22L/29 arrival operations, Q3 CY2019:** The FAA will complete a concept assessment by Q3 CY2019 for arrival operations at EWR Runways 22L and 29.
- **Benefits assessment for gate docking technologies to improve surface management, Q4 CY2019:** The FAA will conduct a study by Q4 CY2019 to assess if more widespread use of gate docking technologies, particularly during convective weather, would significantly improve NEC operations.
- **Joint Industry/FAA milestone to assess opportunities to expand the use of CDTI-assisted operations beyond CAVS, Q4 CY2019:** CAVS requires users to have traffic in sight. CDTI-assisted operations beyond CAVS could permit pilots to use Automatic Dependent Surveillance–Broadcast In/CDTI to identify and follow traffic in conditions of reduced visibility, with some changes to current procedures. The FAA and industry

commit to exploring possible new applications of CDTI-assisted operations beyond CAVS by Q4 CY2019.

- **Joint Industry/FAA milestone to complete EFVS benefits studies to determine requirements for reaching Cat II/III equivalent operations in the NEC, Q4 CY2019:** The FAA and industry will complete benefits studies by Q4 CY2019 to determine requirements for reaching Cat II/III equivalent operations at selected NEC airports. These studies should include the relative advantages to primary and secondary airports and how often arrival rates would improve if these benefits did exist.
- **Joint Industry/FAA milestone to complete studies to analyze the effects of mixed EFVS equipage aircraft operations in the NEC, Q4 CY2019:** EFVS is an electronic system that provides a display of the forward scene topography through imaging sensors and includes a display element, sensors, computers and power supplies. EFVS provides an operational credit to lower required visibility/runway visual range (RVR) minima on instrument approaches and significantly increases situational awareness during low visibility operations. The FAA and industry will complete studies to analyze the effects of mixed EFVS equipage aircraft operations at selected NEC airports by Q4 CY2019. The studies will include determining what level of equipage is required to begin realizing significant benefits. EFVS installation is completely dependent on the operator, therefore these studies will help define benefits for each specific carrier's operations, as well as the potential timeframe to achieve immediate return on the investment.
- **Conduct Integrated Departure Route program (IDRP) prototype re-familiarization sessions, Q1 CY2020:** The FAA will conduct operational re-familiarization sessions by Q1 CY2020 with operational staff about the prototype for the IDRP, a tool used by air traffic managers and industry to help mitigate congestion.
- **Conduct CRDA feasibility analysis for EWR 22L/11 to lower minima, Q1 CY2020:** The FAA will conduct a feasibility analysis by Q1 CY2020 of using lower weather minima for visual operations when EWR is on Runways 22L and 11.
- **Conduct CRDA feasibility analysis for EWR 4R/29 to lower minima, Q1 CY2020:** The FAA will conduct a feasibility analysis by Q1 CY2020 of using lower weather minima for visual operations when EWR is on Runways 4R and 29.
- **Conduct analysis to evaluate the impact and benefit of applying 7110.308 at EWR, Q1 CY2020:** The FAA will analyze and evaluate the impact and benefits of applying Order 7110.308, the standards for Simultaneous Dependent Approaches to Closely Spaced Parallel Runways, at EWR by Q1 CY2020.
- **Conduct operational analysis to identify enhancements to improve data driven TFM decision making, Q1 CY2020:** The FAA will conduct an operational analysis by Q1 CY2020 to identify new ways to improve data driven traffic flow management (TFM) decision making.
- **Joint Industry/FAA milestone to review the relevant information and recommend next steps of FIM, Q3 CY2020:** The FAA and industry will conduct a review of relevant implementation business case information (e.g., demonstration results, projected cost, and benefits, etc.) and recommend next steps of Flight Interval Management (FIM) by Q3 CY2020.

- **Conduct FIM and NEC-specific benefits study, Q3 CY2020:** The FAA will conduct a FIM and NEC-specific benefit study, including safety cases, demonstration data, etc., by Q3 CY2020.

Northeast Corridor: Industry Commitments

	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Provide input and review the concept assessment to deconflict LGA/EWR/TEB when on LGA 13 ILS	■											
PANYNJ will exchange flight data with FAA/airlines at EWR, JFK, LGA through CDM partnership		■										
Provide input to the evaluation of the alternatives to the GLDMN/NTHNS RNAV SIDs to address noise concerns		■										
Provide input and review feasibility assessment of EoR simultaneous operations using JFK 13R RNAV (RNP) and 13L ILS approaches		■										
Provide input and review concept analysis for TEB RW19 RNAV SID for overnight operations		■										
Identify and prioritize applications in the New York area for simultaneous operations on widely-spaced approaches to different airports to expedite addressing deconfliction issues		■										
Participate in concept exploration of simultaneous operations on widely-spaced approaches to different airports		■										
Complete training of airspace user personnel to support TBFM pre-departure scheduling			■									
Provide input on ZDC airspace redesign alternatives to reduce traffic management restrictions			■									
Provide input to evaluation of designs for LGA31 RNAV approach that approximates the LGA31 EXPWY VIS approach and is usable for most operators			■									

Work with FAA to mitigate climb gradient concerns to the GLDMN/NTHNS RNAV SIDs			■									
Provide input and review concept assessment for EWR 22L/29 arrival operations			■									
NBAA will support design of northbound and southbound escape routes			■									
PANYNJ will create new high-speed exit on JFK Runway 31R to reduce runway occupancy time				■								
PANYNJ with industry will conduct a review of existing PBN procedures, determine operator issues, identify needed modifications and prioritize needed changes				■								
Southwest Airlines commits to providing improved aircraft intent data via surface data elements				■								
Joint Industry/FAA milestone to assess opportunities to expand the use of CDTI-assisted operations beyond CAVS				■								
Joint Industry/FAA milestone to complete studies to analyze the effects of mixed EFVS equipage aircraft operations in the NEC				■								
Joint Industry/FAA milestone to complete EFVS benefits studies to determine requirements for reaching Cat II/III equivalent operations in the NEC				■								
Support design and implementation of ZNY offshore PBN routes					■							
Provide input and review CRDA feasibility analysis for EWR 22L/11 to lower minima					■							
Provide input and review of CRDA feasibility analysis for EWR 4R/29 to lower minima					■							
Provide input and review of FAA evaluation of the impact and benefit of applying 7110.308 at EWR					■							
Provide input and review operational analysis to identify enhancements to improve data driven TFM decision making					■							

FedEx will provide improved aircraft intent data via surface data elements					■							
Conduct GBAS evaluation/assessment at BOS						■						
Conduct assessment of DCA north end hold pads							■					
Conduct assessment of additional PHL 27L high-speed exits							■					
Conduct assessment of PHL 27R departure queue taxiway							■					
Joint Industry/FAA milestone to review the relevant information and recommend next steps of FIM							■					
Continue to support ongoing design work and implementation of Eastern Seaboard high altitude PBN routes (including SID/STAR connectivity) through ZBW, ZNY and ZDC airspace								■				
PANYNJ will install non-federal GBAS at LGA and JFK								■ LGA			■ JFK	
Evaluate the use of multi-route TOSs to communicate departure and arrival trajectory preferences from/to PHL and NY area airports												■
Create additional BOS tower space for TFDM equipment to enable surface metering												■
Conduct assessment of PHL taxiway extension for end around operations												■

- **Provide input and review the concept assessment to deconflict LGA/EWR/TEB when on LGA 13 ILS, Q1 CY2019:** Industry will provide input and review the concept assessment by Q1 CY2019 on developing an ILS approach to Runway 13 that can turn final within the confines of LGA airspace while deconflicting the LGA/EWR/TEB airspace. Aircraft from the south would save approximately 15 miles compared to the current ILS approach to Runway 13. Sequencing tools would be needed to manage mixed equipage scenarios.
- **PANYNJ will exchange flight data with FAA/airlines at EWR, JFK and LGA through CDM partnership, Q2 CY2019:** The Port Authority of New York and New Jersey (PANYNJ) will begin exchanging flight data with the FAA and airlines that fly at EWR, JFK and LGA by Q2 CY2019 through a collaborative decision making (CDM) partnership that aims to improve air traffic flow management through increased information exchange among aviation community stakeholders.

- **Provide input to the evaluation of the alternatives to the GLDMN/NTHNS RNAV SIDs to address noise concerns, Q2 CY2019:** Industry commits to review and provide input by Q2 CY2019 on possible alternatives to using TNNIS, GLDMN and NTHNS SID procedures to address noise concerns.
- **Provide input and review feasibility assessment of EoR simultaneous operations using JFK 13R RNAV (RNP) and 13L ILS approaches, Q2 CY2019:** Industry commits to review and provide input by Q2 CY2019 on a feasibility assessment regarding the use of Established on RNP (EoR) simultaneous operations at JFK using a 13R RNAV RNP approach with radius-to-fix (RF) legs, and a Runway 13L ILS approach.
- **Provide input and review concept analysis for TEB RW19 RNAV SID for overnight operations, Q2 CY2019:** Industry commits to reviewing and providing input by Q2 CY2019 on concept analysis for using RNAV SID procedures from TEB Runway 19 for overnight operations.
- **Identify and prioritize applications in the New York area for simultaneous operations on widely-spaced approaches to different airports to expedite addressing deconfliction issues, Q2 CY2019:** Industry will identify and prioritize applications for simultaneous approaches to widely-spaced parallel runways at airports in the New York area by Q2 CY2019 to accelerate the deconflicting of the airspace.
- **Participate in concept exploration of simultaneous operations on widely-spaced approaches to different airports, Q2 CY2019:** To help expedite addressing separation/access issues, PANYNJ will conduct a concept exploration of simultaneous operations on widely-spaced approach courses to different airports in the New York area by Q2 CY2019.
- **Complete training of airspace user personnel to support TBFM pre-departure scheduling, Q3 CY2019:** Industry commits to educate appropriate stakeholders by Q3 CY2019 to support Time Based Flow Management (TBFM) pre-departure scheduling.
- **Provide input on ZDC airspace redesign alternatives to reduce traffic management restrictions, Q3 CY2019:** Industry commits to providing input by Q3 CY2019 on airspace redesign alternatives for ZDC that would reduce traffic management restrictions.
- **Provide input to evaluation of designs for LGA31 RNAV approach that approximates the LGA31 EXPWY VIS approach and is usable for most operators, Q3 CY2019:** Industry commits to providing input by Q3 CY2019 on the evaluation of new designs for an RNAV approach that approximates the Expressway Visual (EXPWY VIS) approach to LGA Runway 31.
- **Work with the FAA to mitigate climb gradient concerns to the GLDMN/NTHNS RNAV SIDs, Q3 CY2019:** Industry commits to working with the FAA to address concerns about climb gradient for TNNIS, GLDMN and NTHNS SID procedures by Q3 CY2019.
- **Provide input and review concept assessment for EWR 22L/29 arrival operations, Q3 CY2019:** Industry commits to reviewing and providing input by Q3 CY2019 on a concept assessment for arrival operations to EWR Runways 22L and 29.

- **NBAA will support design of northbound and southbound escape routes, Q3 CY2019:** The National Business Aviation Association (NBAA) will provide design support for northbound and southbound escape routes, which are alternate routings after takeoff by Q3 CY2019.
- **PANYNJ will create new high-speed exit on JFK Runway 31R to reduce runway occupancy time, Q4 CY2019:** PANYNJ will create a new high-speed runway by Q4 CY2019 to reduce Runway Occupancy Time (ROT) on JFK Runway 31R.
- **PANYNJ with industry will conduct a review of existing PBN procedures, determine operator issues, identify needed modifications and prioritize needed changes, Q4 CY2019:** PANYNJ will conduct a joint review with industry by Q4 CY2019 to determine if existing PBN procedures need to be modified and to prioritize updating those procedures, if needed.
- **Southwest Airlines commits to provide improved aircraft intent data via surface data elements, Q4 CY2019:** Southwest will begin providing enhanced information to SWIM by Q4 CY2019 to help improve traffic flow management.
- **Joint Industry/FAA milestone to assess opportunities to expand the use of CDTI-assisted operations beyond CAVS, Q4 CY2019:** Unlike CAVS which requires users to have traffic in sight, an expanded use of CAVS could permit pilots to use Automatic Dependent Surveillance–Broadcast (ADS-B) In/CDTI to identify and follow traffic, with some changes to current procedures. The FAA and industry commit to developing operational criteria for expanded CAVS use, including conducting studies to determine lead/follow requirements, controller requirements, defining the conditions under which the procedure is allowable and exploring opportunities to use this new capability by Q4 CY2019.
- **Joint Industry/FAA milestone to complete studies to analyze the effects of mixed EFVS equipage aircraft operations in the NEC, Q4 CY2019:** EFVS is an electronic system that provides a display of the forward scene topography through imaging sensors and includes a display element, sensors, computers and power supplies. EFVS provides an operational credit to lower required visibility/runway visual range (RVR) minima on instrument approaches and significantly increases situational awareness during low visibility operations. The FAA and industry will complete studies to analyze the effects of mixed EFVS equipage aircraft operations at selected NEC airports by Q4 CY2019. The studies will include determining what level of equipage is required to begin realizing significant benefits. As EFVS installation is completely dependent on the operator, these studies will help define benefits for each specific carrier's operations, as well as the potential timeframe to achieve immediate return on the investment.
- **Joint Industry/FAA milestone to complete EFVS benefits studies to determine requirements for reaching Cat II/III equivalent operations in the NEC, Q4 CY2019:** The FAA and industry will complete benefits studies by Q4 CY2019 to determine requirements for reaching Cat II/III equivalent operations at selected NEC airports. These studies should include the relative advantages to primary and secondary airports and how often arrival rates would improve if these benefits did exist.
- **Support design and implementation of ZNY offshore PBN routes, Q1 CY2020:** Industry commits to support design and implementation of offshore PBN routes for the

New York Air Route Traffic Control Center (ZNY) through Q1 CY2020 to help reduce airborne arrival and departure delays at New York area airports.

- **Provide input and review CRDA feasibility analysis for EWR 22L/11 to lower minima, Q1 CY2020:** Industry commits to reviewing and providing input by Q1 CY2020 on a Converging Runway Display Aid (CRDA) feasibility analysis of lowering minima for EWR Runways 22L and 11.
- **Provide input and review of CRDA feasibility analysis for EWR 4R/29 to lower minima, Q1 CY2020:** Industry commits to reviewing and providing input by Q1 CY2020 on a CRDA feasibility analysis of lowering minima for EWR Runways 4R and 29.
- **Provide input and review of FAA evaluation of the impact and benefit of applying 7110.308 at EWR, Q1 CY2020:** Industry commits to reviewing and providing input by Q1 CY2020 on the FAA's evaluation of the impact and benefits of applying Order 7110.308, the standards for Simultaneous Dependent Approaches to Closely Spaced Parallel Runways, at EWR.
- **Provide input and review operational analysis to identify enhancements to improve data driven TFM decision making, Q1 CY2020:** Industry commits to reviewing analysis and providing input by Q1 CY2020, to identify potential ways for improving TFM data driven decision making.
- **FedEx will provide improved aircraft intent data via surface data elements, Q1 CY2020:** FedEx will begin providing enhanced information to the FAA's System Wide Information Management System (SWIM) by Q1 CY2020 to help improve TFM.
- **Conduct GBAS evaluation/assessment at BOS, Q2 CY2020:** The Ground Based Augmentation System (GBAS) allows redundant precision approaches to all runway ends at an airport, in addition to existing Area Navigation or ILS approaches. The Massachusetts Port Authority (Massport) will evaluate the use of GBAS at BOS by Q2 CY2020, assessing possible benefits related to access and resiliency. Results will inform an airport investment decision for a non-Federal GBAS installation.
- **Conduct assessment of DCA north end hold pads, Q3 CY2020:** With development of the new north concourse, reconfigured and expanded hold pads, and stub taxiways on the north end, it could improve efficiency and ease surface congestion. By Q3 CY2020, the Metropolitan Washington Airports Authority will conduct an assessment on creating north end hold pads at Ronald Reagan Washington National Airport (DCA).
- **Conduct assessment of additional PHL 27L high-speed exits, Q3 CY2020:** With input from the FAA and operators, PHL will conduct an assessment by Q3 CY2020 of the possibility of adding additional high-speed taxiway exits at Runway 27L to improve arrival throughput.
- **Conduct assessment of PHL 27R departure queue taxiway, Q3 CY2020:** With input from the FAA and operators, PHL will conduct an assessment by Q3 CY2020 of departure queue taxiways to feed Runway 27R.

- **Joint Industry/FAA milestone to review the relevant information and recommend next steps of FIM, Q3 CY2020:** The FAA and industry should conduct a review of the results of CY2018–CY2019 FIM demonstrations, including cost and benefits, prior to the FAA's final investment decision, and offer recommended next steps by Q3 CY2020 for development and implementation of FIM.
- **Continue to support ongoing design work and implementation of Eastern Seaboard high altitude PBN routes (including SID/STAR connectivity) through ZBW, ZNY and ZDC airspace, Q4 CY2020:** Industry will continue to support ongoing design work and the implementation of high altitude PBN routes along the Eastern Seaboard through Q4 CY2020. This includes SID and STAR connectivity to address bottlenecks primarily in the Mid-Atlantic airspace and to improve traffic flow to all key NEC airports.
- **PANYNJ will install non-Federal GBAS at LGA Q4 CY2020, and JFK Q3 CY2021:** GBAS allows precision approaches where none are currently available, with potential for all weather CAT III capability. PANYNJ will install non-Federal GBAS equipment at LGA by Q4 CY2020 and JFK by Q3 CY2021 with the initial goals of providing additional resiliency and approach overlays to all runway ends.
- **Evaluate the use of multi-route TOSs to communicate departure and arrival trajectory preferences from/to PHL and New York area airports, Q4 CY2021:** Industry is committed to evaluating by Q4 CY2021 the viability of developing technology to support multi-route Trajectory Options Sets (TOS) to request desired departure and arrival trajectories to and from PHL and New York area airports to determine the feasibility of use.
- **Create additional BOS tower space for TFDM equipment to enable surface metering, Q4 CY2021:** The FAA will work with Massport to create additional space at the BOS tower by Q4 CY2021. This additional space will accommodate TFDM equipment that will enable surface metering.
- **Conduct assessment of PHL taxiway extension for end around operations, Q4 CY2021:** With input from the FAA and operators, PHL will conduct an assessment by Q4 CY2021 of taxiway extensions for end-around operations to improve surface flow.

Cost

The specific FAA commitments in this section are part of other programs within the FAA, such as Time Based Flow Management, Collaborative Air Traffic Management, Airspace and Procedures and NextGen Portfolios. They are funded in the President's Budget Request and the supporting Capital Investment Plan. These efforts are also supported each year by the FAA's annual operating budget.

Risks

Given that the NEC is a collection of multiple initiatives of different types (airspace and procedures, airports, tools, and tactical) across differing timeframes, the integration of all components in a timely and cohesive way is a challenge, but critical to a successful outcome. Risks posed across the wide array of NEC initiatives include environmental, operator equipage, technical and resource limitations, both personnel and financial.

Environmental Risks

Proposed procedures that overfly new communities or increase concentration of flight activity over sensitive communities presents the greatest risk to planned schedules and meeting operational goals. Low altitude changes with connectivity to other actions (cumulative impact) may need to be considered together, extending timeframes well beyond expected timelines for individual initiative implementations. Environmental concerns from a variety of non-aviation stakeholders are requiring increasing levels of community outreach and in some cases can delay or derail implementations.

All NEC initiatives requiring National Environmental Policy Act (NEPA)[12] compliance are proposed actions only. Per the White House Council on Environmental Quality, "all Federal agencies in the executive branch have to comply with NEPA before they make final decisions about federal actions that could have environmental effects."

Operator Equipage

While utilizing existing RNAV capabilities provides an essential foundation to address needs in the NEC, particularly in the near term, there is a recognition that utilizing advanced navigation capabilities may be necessary to deconflict air traffic procedures in the vicinity of major airports in close proximity, particularly in New York area. The tighter containment of advanced RNP (A-RNP) solutions could provide for airport deconfliction that cannot be afforded by RNAV procedures.

Implementation and effective use of more advanced RNP solutions such as RNP Authorization Required (RNP-AR) is dependent upon at least three key actions to mitigate risks:

- Developing published procedures with community involvement
- Availability of controller and Air Traffic Control System Command Center decision support tools to manage aircraft flows
- Having a critical mass of appropriately equipped aircraft

Implementation of fully leveraged Performance Based Navigation (PBN) capabilities, such as Advanced RNP in the NEC is limited by the inability to segregate aircraft equipped for advanced RNP operations from non-equipped aircraft in the congested airspace surrounding NEC airports.

Operational improvements at NEC airports may not be fully realized unless the navigation equipage requirements for the expected NEC operational state are met, controller decision tools are in place, and air traffic control and operators commit to using these procedures.

Facility Resources

The large air traffic control facilities across the NEC are in high demand for several NAS initiatives. Competing schedules must be continually monitored and adjusted to accommodate and integrate with other major initiatives unrelated to NEC. Access to air traffic control experts is vital to the successful implementation of NEC initiatives.

Availability of facility subject matter experts in design work and training for new procedures must always be balanced against the operational needs of the facility for every day operations.

[12] https://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/

Staffing issues during high leave periods (e.g., summer months in many places) and even normal facility operational staffing needs can affect the ability to devote resources to the design and implementation of new procedures.

Previously Completed Commitments from NAC Recommendations Outside of the Scope of CY2019-2021 Joint Implementation Plan

The commitments listed below were recommended by the NAC; however the timing of the recommendations took place before the development of the NAC NextGen Priorities Joint Implementation Plan for CY2019-2021. To maintain open communication and continuity of documenting and monitoring NAC milestones, the completed commitments are listed below, along with the quarter and year. The commitments are sorted in the same sequence as the plan.

Implementation Commitments	Date
Implement EDC at ZNY	Q4 CY2017
Implement TBFM IDAC at 4 New York towers	Q4 CY2017
Relocate high-speed exits on JFK runway 4R/22L to better location on runway to reduce ROT	Q4 CY2017
Implement BOS surface viewer tool at ZBW	Q2 CY2018
Implement SCIA to PHL 9R/17	Q3 CY2018

Pre-Implementation Commitments	Date
Complete training and establish operating agreements to support EDC at ZNY	Q4 CY2017
Deploy/Relocate Equipment/Software to support IDAC deployment at 4 New York area towers	Q4 CY2017
Complete design of new PBN arrival and departure procedures for two airports from the ZNY oceanic transition sectors	Q1 CY2018
Complete design and testing for vertical climb escape route for TEB/HPN	Q1 CY2018
Commence 90-day trial of the use of the NOD prototype for common planning coordination and awareness between FAA and airspace user	Q1 CY2018
Complete assessment for early TBFM pre-departure scheduling	Q2 CY2018
Complete design validation of Eastern Seaboard high altitude PBN routes (including SID/STAR connectivity)	Q2 CY2018
RAPT refresher training for FAA personnel	Q2 CY2018
Complete feasibility study for the modified missed approach for LGA22	Q3 CY2018
Update the minima for existing SCIA procedure to PHL 9R/17	Q3 CY2018
Complete study report of the NOD prototype on trial	Q3 CY2018
Insert DRS info into the NOD prototype and make available to Industry	Q3 CY2018

Conduct an environmental review for the use of dispersal headings for LGA13 departures using the current GLDMN, TNNIS and NTHNS SIDs within the current limitations specified in each procedure's existing CATEX	Q2–Q4 CY2018
Conduct safety assessment of SCIA operations with RNAV for PHL 9R/35	Q4 CY2018
Extend PHL runway 9R/27L by 1,500 feet and supporting taxiway improvements	Q4 CY2018

Industry Commitments	Date
JetBlue provides improved aircraft intent data via surface data elements	Q4 CY2017
United Airlines provides improved aircraft intent data via surface data elements	Q4 CY2017
Industry will participate in design activities associated with the new PBN arrival and departure procedures for the ZNY oceanic transition sectors	Q1 CY2018
NBAA resources or members to participate in design and testing	Q1 CY2018
Industry will participate in design activities associated with Atlantic Coast including SID/STAR connectivity	Q2 CY2018
Industry provides input/feedback on use of NOD prototype	Q2 CY2018
Conduct safety assessment of SCIA operations with RNAV for PHL 9R/35	Q4 CY2018
Airspace users to complete training to support capping and tunneling for departures/arrivals to/from the NEC	Q4 CY2018
Provide input and review an analysis to determine the sequence of remaining airports to receive en route metering	Q4 CY2018
Participate in feasibility study to create a process to reduce and/or eliminate passback MIT for departures from NY	Q4 CY2018
Extension of BWI Concourse E	Q4 CY2018
Participate in community engagement activities for LGA13 departure dispersion using TNNIS, GLDMN & NTHNS	Q4 CY2018
Participate in feasibility study for the modified missed approach for LGA22	Q4 CY2018
Provide input and review safety assessment of SCIA operations with RNAV for PHL 9R/35	Q4 CY2018

APPENDIX A

NextGen Integration Working Group Final Report

The *NextGen Integration Working Group Rolling Plan 2019–2021 Final Report* contains the NextGen Advisory Committee's (NAC) final recommendations on commitments the FAA and Industry should take to deliver tangible benefits in the National Airspace System (NAS) across all focus areas and align priorities with the aviation community for the next three years. The recommendations were approved by the NAC on October 31, 2018.

APPENDIX B

NextGen Advisory Committee Northeast Corridor Addendum

The *Phase 2 Addendum to Priorities for Improving Operational Performance in the Northeast Corridor (NEC) through CY2021* report contains the FAA and Industry commitments through December 2021, describing the activities and initial milestones to implement initiatives in the NEC. The recommendations were approved by the NAC in June 2018.

APPENDIX C

Acronym List and Airport Codes

Acronym	Definition
4D	Four Dimensional
ABRR	Airborne Reroute
ADS-B	Automatic Dependent Surveillance–Broadcast
ADS-C	Automatic Dependent Surveillance–Contract
A-RNP	Advanced-Required Navigation Performance
ARTCC	Air Route Traffic Control Centers
ATD-2	Air Space Technology Demonstration
CATEX	Categorical Exclusion
CAVS	Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation
CDTI	Cockpit Display of Traffic Information
CDM	Collaborative Decision Making
CIP	Capital Investment Plan
CONUS	Continental United States
CPDLC	Controller Pilot Data Link Communications
CRDA	Converging Runway Display Aid
CSG	Collaborative Decision-Making Stakeholders Group
CSIT	Collaborative Site Implementation Team
CSPO	Closely Spaced Parallel Runway Operations
CWT	Consolidated Wake Turbulence
CY20xx	Calendar Year 20xx
DCIT	Data Comm Implementation Team
DCL	Departure Clearance
DCP	Document Change Proposal
DSP	Departure Spacing Program
EDC	En Route Departure Capability
EDO	Established on Departure Operations
EFVS	Enhanced Flight Vision System
EFS	Electronic Flight Strips
EoR	Established on Required Navigation Performance
EXPWY VIS	Expressway Visual
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FANS	Future Air Navigation System
FIM	Flight Interval Management
FMC	Flight Management Computer
FY20xx	Fiscal Year 20xx

Acronym	Definition
GBAS	Ground Based Augmentation System
GPS	Global Positioning System
HUR	High Update Rate
IADS	Integrated Arrival/Departure/Surface
IDAC	Integrated Departure Arrival Capability
IDRP	Integrated Departure Route Program
ILS	Instrument Landing System
IOC	Initial Operating Capability
ISD	In-Service Division
iTBO	Initial Trajectory Based Operations
JAT	Joint Analysis Team
kg	Kilograms
MIT	Miles-in-Trail
MRO	Multiple Runway Operations
MRS	Minimum Radar Separation
NAC	NextGen Advisory Committee
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NBAA	National Business Aviation Association
NEC	Northeast Corridor
NEPA	National Environmental Policy Act
NIWG	NextGen Integration Working Group
nm	Nautical miles
NOD	NAS Operations Dashboard
NSG	Navigation Service Group
OPD	Optimized Profile Descent
PANYNJ	Port Authority of New York and New Jersey
PARC	Performance Based Operations Aviation Rulemaking Committee
PBN	Performance Based Navigation
PDRR	Pre-Departure Reroute
RAA	Regional Airline Association
RAPT	Route Availability Planning Tool
RE&D	Research, Engineering and Development
RECAT	Recategorization
RF	Radius-to-Fix
RIO	Risk, Issue and Opportunity
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance Authorization Required
ROT	Runway Occupancy Time
RVR	Runway Visual Range

Acronym	Definition
S1P1	Segment 1 Phase 1
S1P2	Segment 1 Phase 2
SCIA	Simultaneous Converging Instrument Approaches
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
SWAP	Severe Weather Avoidance Plan
SWIFT	SWIM Industry-FAA Team
SWIM	System Wide Information Management
TBFM	Time Based Flow Management
TBM	Time Based Management
TBO	Trajectory Based Operations
TFCS	TFDM Flight Operations System Collaboration Services
TFDM	Terminal Flight Data Manager
TFM	Traffic Flow Management
TOS	Trajectory Options Sets
TRACON	Terminal Radar Approach Control Facilities
TTP	TFDM Terminal Publication
VDL	VHF Data Link
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omni-Directional Range
xLS	x Landing System

Airport Code	Definition
ADW	Joint Base Andrews (AFB)
ATL	Southeast Region, Atlanta Metroplex
AUS	Austin-Bergstrom International Airport
BNA	Nashville International Airport
BOS	Boston Logan International Airport
BUF	Buffalo Niagara International Airport
BWI	Baltimore Washington International-Thurgood Marshall Airport
CHS	Charleston (SC) International Airport
CLE	Cleveland Hopkins International Airport
CLT	Charlotte Douglas International Airport
CMH	John Glenn Columbus International Airport
DAL	Dallas Love Field Airport
DCA	Ronald Reagan Washington National Airport
DEN	Denver International Airport
DFW	Dallas/Fort Worth International Airport
DTW	Detroit Metro Airport
EWR	Newark Liberty International Airport
GYY	Gary / Chicago Airport
HPN	Westchester County Airport
IAH	George Bush Intercontinental Airport (Houston)
JFK	John F. Kennedy International Airport
LAS	Las Vegas Metroplex
LGA	LaGuardia Airport
ORD	Chicago O'Hare International Airport
PDX	Portland International Airport
PHL	Philadelphia International Airport
PHX	Phoenix Sky Harbor International Airport
RNO	Reno-Tahoe International Airport
RSW	Southwest Florida International Airport (Ft. Myers)
SFO	San Francisco International Airport
SMF	Sacramento International Airport
TEB	Teterboro Airport
VNY	Van Nuys Airport
ZBW	Boston Air Route Traffic Control Center
ZDC	Washington Air Route Traffic Control Center
ZNY	New York Air Route Traffic Control Center