U.S. Department of Transportation
Federal Aviation Administration

National Airspace and Procedures Plan

2011

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Introduction

The March 2011 edition of the Next Generation Air Transportation System (NextGen) Implementation Plan (NGIP) describes NextGen as "a comprehensive overhaul of our National Aviation System to make air travel more convenient and dependable." NextGen is built on the principles of delivering the highest levels of safety, security, and efficiency. Modern airspace design and Performance-based Navigation (PBN) procedures are key building blocks in the plan to meet NextGen's goals. In this second edition of the National Airspace and Procedures Plan (NAPP), we build on the objectives of the inaugural NAPP, not only providing a comprehensive compilation of current and planned airspace and procedures efforts, but also closely coupling these important foundational activities with the NGIP and other NextGen planning materials.

Modernizing the Nation's airspace and developing PBN optimized procedures requires a cohesive, high-level evolutionary strategy paired with specific tactics to deliver the desired products. The purpose of the NAPP is to articulate the Federal Aviation Administration's (FAA) system-level strategy concerning airspace and procedures to deliver NextGen's safety, security, and efficiency goals. The airspace and procedures enhancements described in the NAPP provide their own benefits but also establish an effective foundation for other improvements in NextGen. The NAPP offers a narrative description, including scope, schedule and impacts, of airspace activities and PBN en route, arrival, approach, and departure procedure implementations, which will evolve the National Airspace System (NAS) toward NextGen.

This update to the NAPP includes a new structure, moving from the "problem area" approach originally used in the RTCA Task Force 5 Final Report, to the "solution portfolio" approach now used in the NGIP.

Airspace and Procedures Activities and their Relationship to NextGen

NextGen is a complex endeavor that is a combination of many initiatives spanning the FAA and other parts of the aviation community. NextGen is comprised of an enterprise architecture that translates operational goals into operational improvements (OIs). Functionally, these OIs are grouped into implementation portfolios as described in appendix B of the NGIP. Chronologically, NextGen capability enhancements are laid out across two timeframes: mid-term (through 2018) and long-term (beyond 2018). The mid-term has further been broken into two segments: Alpha, which covers the present through 2015, and Bravo, which includes the completion of the mid-term.

This version of the NAPP will cover the airspace and procedures activities directly correlated to the first half of NextGen's mid-term. Airspace and procedures enhancements play a key role in this time period, significantly contributing to expected operational improvements. The airspace and procedures activities described in the NAPP include scope, design, evaluation, implementation, and in-service activities that are part of the life cycle used to create an optimized, modern NAS. The NAPP also includes reference to other supporting and enabling functions directly related to the NextGen portfolios, such as navigational infrastructure changes.

The NAPP is interconnected with other national aviation and aerospace planning efforts. The NAPP provides descriptions of airspace and procedures efforts that form a narrative companion to the National Airspace System Enterprise Architecture (NAS EA) Airspace and Procedures Roadmap and is consistent with the FAA's Mid-Term Operations Concept. The NAPP reflects and informs the NGIP. At its core, the NAPP embodies the principles of the FAA's Flight Plan and the FAA's Destination 2025 Strategic Plan.

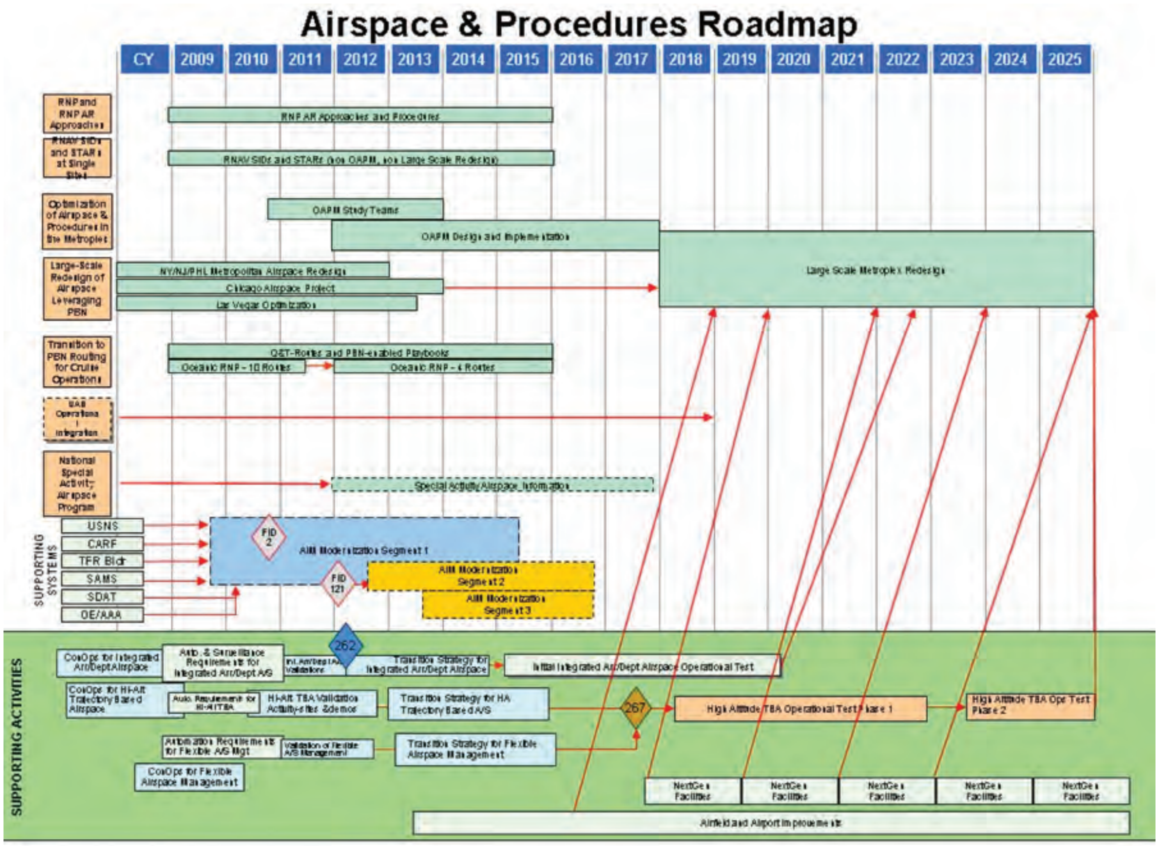


Figure 1. Excerpt from NAS EA Airspace and Procedures Roadmap.

An overarching consideration for the FAA is the commitment to conduct the appropriate level of environmental review and to prepare the associated documentation in transition to NextGen Airspace and Procedures as required by the National Environmental Policy Act (NEPA). The potential environmental impact will be evaluated and tracked, along with operational changes associated with airspace and procedures enhancements. This continued commitment is a key tactic to address environmental constraints and challenges.

NAPP ORGANIZATION

The next section of the NAPP provides an overarching summary of the progress of the NAS to NextGen through the mid-term. This overview sets the framework for the remainder of the plan, describing the integrated transition of operations currently supported by conventional navigation and static airspace to performance-based operations supported by dynamic airspace design and management. The primary content of the plan is organized around the relevant NextGen implementation portfolios as described in the NGIP. Within each of the relevant portfolios are NextGen capabilities, made up of specific airspace and PBN procedures activities. These solutions represent the FAA's agreements to modernize airspace and enhance procedures. The majority of airspace and procedures solutions fit within the PBN portfolio.

The NAPP also includes a summary of the milestones and products that will support achieving the NextGen success criteria outlined in the NGIP. These milestones reflect three types of FAA agreements:

- Commitments: Milestones that are fully sanctioned and resourced. Specifically, commitments will be those milestones that have current fiscal year (FY) resources.

- Targets: Milestones that are part of a sanctioned or chartered project, but that may not have all the necessary resources, or that have potential risks (operational, technical, environmental, or other) that have not yet been mitigated.

- Proposals: Milestones that are associated with planned activities. These milestones have not been approved, sanctioned, or resourced, but represent the potential schedule for an effort.

The final section of the plan includes future planning, research, and transition efforts such as applied research activities, concepts, and demonstrations related to airspace and procedures to solve problems in key areas. The appendices of the NAPP include additional project details for each effort highlighted in the plan, and additional information on the various guidelines and orders that are used to develop and maintain the life cycle of these efforts.

NextGen Integrated Airspace and Procedures in the Mid-Term

This section describes the evolution of airspace and procedures enhancements from the present through the mid-term (through 2018). The focus for these enhancements will be an integrated approach, to set a foundation and direction for large-scale airspace and procedures efforts. The Integrated Airspace and Procedures approach provides a geographic focus to problem-solving with a systems view of PBN initiatives and the design of airspace. This approach continues development of Area Navigation (RNAV) and Required Navigation Performance (RNP) procedure designs as multi-airport, arrival/departure, and city pair networks. These efforts will leverage the success achieved with streamlined processes and adapt those processes to support large-scale metroplex projects. It moves airspace design toward NextGen with an emphasis on optimized PBN procedures as a key benefit mechanism.

The Optimization of Airspace and Procedures in the Metroplex (OAPM) is an important method by which Integrated Airspace and Procedures efforts will be incorporated into the NAS. OAPM is a systematic and expedited approach to implementing PBN procedures and airspace changes. OAPM was developed in direct response to the RTCA's Task Force 5 Final Report on Mid-term NextGen Implementation, specifically, the recommendations on the quality, timeliness, and scope of metroplex activities.

Along with OAPM, completing near-term milestones for the legacy Airspace Management Program (AMP) airspace projects and meeting the PBN commitments will continue to be a focal area in the mid-term timeframe. The AMP legacy projects include the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign, the Chicago Airspace Project (CAP), and the Las Vegas Optimization project. Optimized profiles for arrivals and departures are pursued as a priority in PBN procedure development efforts.

There will be increased use of PBN routes in the cruise phase of flight. Q routes are high altitude RNAV routes that can be defined with a combination of navigational aids (NAVAIDs), fixes, or waypoints. This will continue the transition from an en route structure wholly dependent on ground-based navigation to a performance-based en route structure, replacing the existing jet routes. In lower altitude airspace, the use of Global Positioning System (GPS)-based RNAV T routes will expand to begin replacement of Very High Frequency (VHF) Omni-directional Radio Range (VOR) Federal airways defined by VOR NAVAIDs and fixes.

Results of NextGen demonstration efforts and Mid-Term Concept exploration experiments should be available between 2012 and 2015, and they will inform decisions about inclusion of future concepts in design and development work planned for the second half of the mid-term. New large-scale airspace projects will incorporate the validated concepts tested in the early mid-term, possibly including High Density Integrated Arrival and Departure Operations and High Altitude Trajectory Based Airspace.

Throughout the mid-term, ground-based navigation services will be transitioning to satellite-based services. In support of this transition, an Alternate Positioning, Navigation, and Timing (APNT) service is being researched to mitigate a Global Navigation Satellite Systems (GNSS) interference event that impacts multiple en route sectors and/or a major metropolitan area or metroplex, including operations at satellite and reliever airports, for a period of time ranging from a few minutes to several days. The goals of APNT include ensuring continuity of operations in the NextGen time period, providing PBN, and supporting Automatic Dependent Surveillance-Broadcast (ADS-B) and Trajectory-based Operations (TBO), in a manner appropriate to all users. At the same time impact on user avionics requirements will be minimized and a long lead transition time will be planned.

Airspace and procedures enhancements will integrate efforts to rationalize/reduce the number of conventional NAVAIDs, primarily VORs but also nondirectional radio beacons (NDBs), throughout the mid-term. These efforts will work together to make reduction in number of conventional NAVAIDs a part of en route airspace design considerations. They will also work together in development of approach and terminal procedures to improve service and rationalize NAVAIDs required.

By 2018, several additional airfield enhancements will be commissioned, and NextGen will have implemented several enabling capabilities. These capabilities will provide improvements in collaborative decision making, routing options, surveillance accuracy, data communications, flight path accuracy, sector design, and the distribution of aeronautical information. Airspace and procedures changes in this period will leverage these operational enhancements. Features inherent to these new systems, in particular automation and communications systems, will enable more dynamic design and management of airspace.

Integrated Airspace and Procedures and NextGen Portfolios

The NGIP uses a systems approach for modernization, cutting across lines of business to create functional portfolios. The functional portfolios encompass capabilities with a common benefits pool. The NAPP has connectivity to many of the portfolios. The primary relationships are highlighted in this section.

Airspace and Procedures Capabilities in the NextGen PBN Portfolio

The PBN portfolio, as described in the NGIP, addresses ways to leverage the transformation technologies of RNAV and RNP in conjunction with innovative airspace design techniques to improve efficiency, access, flexibility, and throughput. The majority of activities included in the NAPP support the NextGen PBN portfolio. Furthermore, Integrated Airspace and Procedures efforts are a foundation for providing many of the benefits expected from the OIs planned for the NextGen Alpha timeframe. This section provides a high-level description of the airspace and procedures work included in the PBN portfolio.

Optimization of Airspace and Procedures in the Metroplex: This project is focused on operational optimization, delivering key efficiencies for the Nation's busiest metropolitan areas within 2-3 years once work begins at each site. There are 21 candidate metroplex sites, consistent with the FAA Flight Plan Metro Areas, Task Force 5 recommended sites, and the FAA's Core Airports. OAPM solutions are focused on optimizing procedures and traffic flows, and may include airspace structure changes to support those optimal routings. Specific operational changes include providing PBN alternatives to existing conventional procedures, reducing or eliminating level-offs on arrivals, segregating routes to deconflict flows, adding departure and arrival transitions, expediting departures, adding or modifying existing routes, and realigning airspace to support the proposed changes.

The first OAPM study teams were initiated as prototypes in September 2010, and addressed the Washington, D.C., and North Texas metroplexes. In FY 2011, five study teams are planned for execution, covering the Charlotte, Northern California, Houston, Atlanta and Southern California metroplexes. Current project plans state that study teams for all 21 metroplexes will be complete or underway by the end of 2013. For those metroplexes that obtain approved charters to move onto design and implementation (D&I), it is expected that those efforts will be implemented by 2017. The earliest D&I efforts are associated with the Washington, D.C., and North Texas metroplexes. These D&I efforts started in the summer of 2011 and could be completed as early as mid-2014.

Additional information on OAPM efforts is included in appendix A.

Legacy Large-Scale Airspace Projects: These legacy efforts encompass AMP projects started before the formation of the National Operational Airspace Council (NOAC) in August 2009: the NY/NJ/PHL Metropolitan Area Airspace Redesign, CAP, the Las Vegas Optimization project, and the recently completed Houston Area Air Traffic System (HAATS) project. Although these are considered legacy projects, many of the expected efficiencies and benefit gains are enabled by optimized PBN procedures. The majority of milestones in these projects are scheduled to be completed by 2015.

All the legacy AMP projects were initiated in response to significant delay and efficiency issues identified by the aviation community and the FAA. The New York and Chicago projects are large-scale airspace redesign projects that were started in the late 1990s as part of the National Airspace Redesign program. Both projects have completed significant design and evaluation efforts and are partly through their multi-stage implementation plans. The Las Vegas effort was started in 2008 in response to airport planning efforts initiated by the Clark County Department of Aviation.

In late 2010, the HAATS project completed implementation of its final stage. The HAATS project was described in the first version of the NAPP.

Additional information on the legacy AMP projects is included in appendix B.

Integration of PBN Procedures and Routes: The FAA PBN Integration Group manages the development of PBN procedures and routes to include RNAV Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARs), Required Navigation Performance – Authorization Required (RNP AR), and Q and T routes. There are over 820 RNAV SIDs/STARs and RNP procedures, and 150 Q and T routes.

NAS-wide demand and production is coordinated by Regional Airspace Procedures Teams (RAPT) and managed by the National Airspace and Procedures Team (NAPT). Current procedure demands are scheduled through 2013/2014, and include single and integrated sites, OAPM, and AMP projects. Demand will continue to be accommodated, with priority assigned to OAPM and AMP project sites.

PBN procedures address location-specific needs stemming from safety concerns (e.g., conflict alerts), infrastructure constraints (e.g., terrain, runway closure, construction and crane operations, runway ends not serviced by precision approach systems, etc.) and other needs that must be addressed in the immediate term. PBN may also add efficiency to existing structure with new procedures or by optimizing existing procedures. These procedures are developed with optimized vertical profiles and procedural deconfliction and merged with newly developed RNP AR and existing Standard Instrument Approach Procedures (SIAPs), all of which provide benefit for the user and air traffic control (ATC). Procedures have improved throughput, reduced pilot/controller communications and read back errors, and reduced fuel burn and carbon emissions.

Additional information on PBN procedures and routes is included in appendix C.

Transition of the Conventional Air Traffic Service (ATS) Route Network to PBN: The PBN Integration Group is leading the effort to implement a PBN route network in the NAS. This PBN route network includes Q and T routes that use RNAV waypoints and are independent of ground-based NAVAIDs. Q routes are RNAV routes above flight level (FL) 180 and T routes are RNAV routes below FL 180. Currently, there are 77 Q routes and 73 T routes in the NAS. Expansion of Q and T routes will form a PBN route network that will efficiently connect metroplex areas and provide benefits to the users. Additional end-to-end benefits will be derived as this network is integrated with the existing, planned, and future PBN procedures at the busy airports. The PBN route network will take into account the outcomes of OAPM designs and airspace redesign projects.

Additional information on the transition of the conventional ATS route network to PBN is included in Appendix D.

Distance Measuring Equipment (DME) Infrastructure: FAA's Navigation Services is working to ensure that PBN operations can continue when the GPS becomes unavailable. To provide continuous RNAV and RNP access, a robust DME infrastructure is needed. Limitations in existing DME coverage may restrict the routing options for PBN procedures at some locations.

Most continental United States (CONUS) Q routes are authorized for GPS or DME/DME/Inertial Reference Unit (IRU). DME/DME RNAV coverage is limited at all altitudes over a significant part of the western mountainous and Alaska areas. Improvements to the DME network supporting en route operations are planned to reduce coverage gaps and improve geometry. Work is being done to determine the full coverage or true Service Volume (SV) for stand-alone DMEs, which will result in the elimination of the need for Expanded Service Volumes (ESVs). DMEs will be configured in the NAS as appropriate to support Q routes using DME/DME or DME/DME/IRU as a navigation means or to provide backup if GPS is not available.

Terminal RNAV DME/DME supports work necessary to use DME/DME RNAV in the terminal domain, including conducting testing to lead toward stand-alone DMEs, increased SVs, making possible actions to support SIDs/STARs/terminal RNAV/RNP. Action to support terminal RNAV and RNP include increases in the SVs of DMEs, increasing the number and possibly relocating DME facilities to improve service in terminal and extended terminal areas such as metroplexes.

Airspace and Procedures Capabilities in other NextGen Portfolios

Airspace and procedures efforts provide indirect support to several other NextGen portfolios. This section highlights two specific efforts that directly contribute to the Low Visibility Portfolio and the On-Demand Information Portfolio.

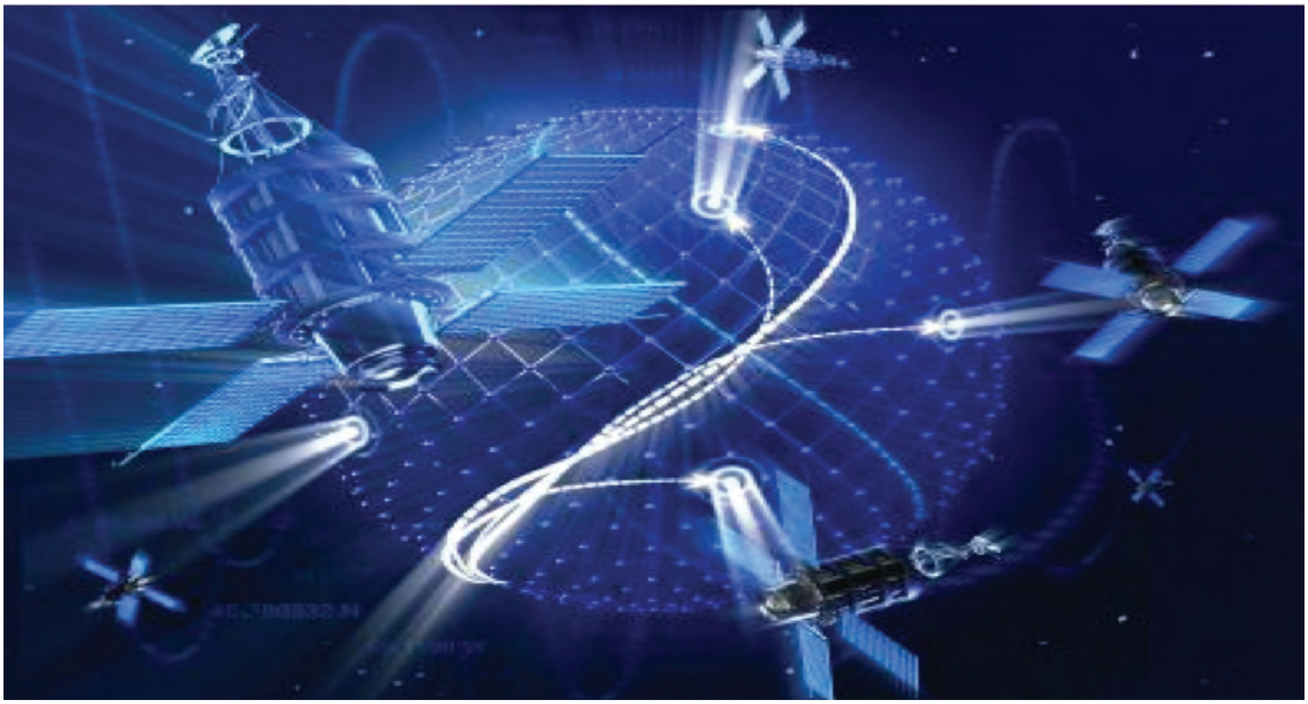
Low Visibility Approaches: Satellite-based approach procedures that have been developed to date include Lateral Navigation (LNAV), Lateral Navigation/Vertical Navigation (LNAV/VNAV), Localizer Performance with Vertical guidance (LPV), and Localizer Performance (LP). LNAV procedures provide lateral guidance only. LNAV/VNAV approaches use lateral guidance (556-meters lateral limit) from GPS and/or Wide Area Augmentation System (WAAS) and vertical guidance provided by either the barometric altimeter or WAAS. LPV is similar to LNAV/VNAV except it is much more precise (40-meters lateral limit), enables descent to 200 250 feet above the runway, and can only be flown with a WAAS receiver. LPV approaches are operationally equivalent to Category (CAT) I Instrument Landing System (ILS) approaches. LP is a nonprecision approach procedure that uses the high precision of LPV for lateral guidance and barometric altimeter for altitude. There are over 2,440 published LPV procedures.

Satellite-based procedures improve NAS operations capacity, efficiency, and safety because they are available at many more runway ends than conventional procedures and make it possible to economically provide vertical reference, if not guidance, to many of these runway ends. Current inventory and plans for publication of approach procedures are available at the FAA AeroNav Products Web site:

http://www.faa.gov/air_traffic/flight_info/aeronav/ifpinventorysummary.

National Special Activity Airspace Project (NSAAP): Special Activity Airspace (SAA) is defined as airspace with defined dimensions that meets all of the following conditions: 1) activities within the airspace may pose a hazard, increased flight risk, or restriction to nonparticipants, 2) rules and/or restrictions may be placed upon both participants and/or nonparticipants with regard to that specific airspace, 3) airspace status is published or broadcast to increase situational awareness for nonparticipants, and 4) establishment of the airspace is coordinated between user and controlling agency. SAA includes the following airspace types: restricted areas, prohibited areas, military operations areas, Air Traffic Control Assigned Airspace (ATCAAs), warning areas, Temporary Flight Restrictions (TFRs), Aerial Refueling Tracks (ARs), stationary Altitude Reservations (ALTRVs), orbit areas, temporary Special Use Airspace (SUA), Instrument and Visual Routes (IRs and VRs), and the Special Flight Rules Area (SFRA) in the Washington, D.C., metropolitan area.

One of the key national airspace efforts is NSAAP, the development of a cohesive effort to work through the numerous issues with SAA. NSAAP is a collaborative effort committed to developing increased cooperation and operational partnerships among the identified SAA Community of Interest (COI), which includes the FAA and NAS customers, both civilian and Department of Defense (DOD). NSAAP is focused on improving information pertaining to SAA and overall access to the NAS through enhanced scheduling, tracking, analysis, and sharing of data for more efficient flight planning and daily operations. NSAAP has a diverse set of stakeholders and intersects with many NextGen efforts, including those sponsored by the Joint Planning and Development Office (JPDO).



SUMMARY OF MILESTONES SUPPORTING NEXTGEN SUCCESS CRITERIA

The tables below include a summary of the NAPP milestones associated with efforts described in the previous section and their relationship to NextGen OIs and capabilities. Capability names are taken from the NGIP.

Operational Improvement: RNAV SIDs, STARs, and Approaches (OI 107103)	
NextGen Capability: RNP AR Approaches 2010-2015	*Success Criteria:* Complete annual NAPT production plans
NAPP Milestones Supporting Success Criteria: • Implement RNP ARs planned for 2011 (commitment) • Implement RNP ARs planned for 2012 (target)	
NextGen Capability: RNAV SIDs and STARs at Single Sites 2010-2015	*Success Criteria:* Complete annual NAPT production plans for core airports, not associated with OAPM or legacy AMP projects
NAPP Milestones Supporting Success Criteria: • Implement RNAV SIDs and STARs planned for 2011 (commitment) • Implement RNAV SIDs and STARs planned for 2012 (target)	

<table>
<tr><td colspan="2">Operational Improvement: Increase Capacity and Efficiency Using RNAV and RNP (OI 108209)</td></tr>
<tr><td>NextGen Capability: Optimization of Airspace and Procedures in the Metroplex 2013- 2015</td><td>Success Criteria: Complete D&I Team work and implementation of OAPM changes for a minimum of 3 metroplexes</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• Begin D&I for Washington, D.C., Metro and North Texas in June/July 2011 (commitment)
• Begin Atlanta and Southern California study teams in late August 2011 (commitment)
• Identify FY 2012 study team sites in summer 2011 (commitment)
• Begin Northern California D&I in winter 2012 (target)
• Begin Charlotte and Atlanta D&I concurrently in winter 2011/2012 (target)</td></tr>
<tr><td>NextGen Capability: Large-scale Redesign of Airspace Leveraging PBN 2010-2015</td><td>Success Criteria:
Implement stage 2A of NY/NJ/PHL Airspace Redesign in 2011; Implement CAP stage 3, coincident with OMP runway 10C/28C completion in 2013; Implement Las Vegas Optimization in 2014</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• NY/NJ/PHL Airspace Redesign stage 2A implementation – October 2011 (commitment)
• NY/NJ/PHL Airspace Redesign stage 2B implementation – June 2012 (target)
• CAP stage 3 implementation – December 2013 (coincident with OMP runway 10C/28C completion) (target)
• Las Vegas Optimization Design environmental assessment (EA) completion – April 2012 (target)
• Las Vegas Optimization implementation – summer 2013 (target)</td></tr>
<tr><td>NextGen Capability: Transition to PBN Routing for Cruise Operations 2010-2015</td><td>Success Criteria: Q-routes available between metroplexes (locations TBD); NY Wind Route Option Playbook transitions; T-routes available at low altitude (locations TBD)</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• NY/NJ/PHL Airspace Redesign Q-routes – 2011 (commitment)
• Additional Playbook transition design and modeling complete – 2012 (proposal)
• Navigation Reference System (NRS) usage and human factors studies (phase 2) complete – 2012 (proposal)</td></tr>
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<tr><td colspan="2">Improved Management of Airspace for Special Use (OI 108212)</td></tr>
<tr><td>NextGen Capability: ANSP Real-Time Status for SUAs</td><td>Success Criteria: Operationally available to internal and external users</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• NSAAP requirements document; NAS-wide benefits analysis – 2011 (commitment)
• Initial dissemination of SAA data using System Wide Information Management (SWIM) – 2012 (proposal)
• Initial interfaces established with other FAA systems – 2013 (proposal)
• Full operating capability – 2014 (proposal)</td></tr>
<tr><td>NextGen Capability: SAA Forecast of Capacity Constraints</td><td>Success Criteria: Operationally available to internal and external users.</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• NSAAP requirements document; NAS-wide benefits analysis – 2011 (commitment)
• Initial dissemination of SAA data using SWIM – 2012 (proposal)
• Initial interfaces established with other FAA systems – 2013 (proposal)
• Full operating capability – 2014 (proposal)</td></tr>
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<table>
<tr><td colspan="2">Low-Visibility/Ceiling Approach Operations (OI 107117)</td></tr>
<tr><td>NextGen Capability: LPV Approaches</td><td>Success Criteria: Continue production of LPV approach procedures at runways without ILSs that qualify for LPV. Operationally available LP approach at one airport. Operationally available public RNAV (GPS) approach with an RF turn at one airport</td></tr>
<tr><td colspan="2">NAPP Milestones Supporting Success Criteria:
• Implement LPV approaches as planned for 2011 (commitment)</td></tr>
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Future Planning, Research and Transition Efforts

The activities described in this section include concept evaluation efforts, demonstrations, or research studies. These efforts will evolve into specific airspace and procedures efforts that will support the Bravo segment of NextGen.

Concept Exploration Efforts: Air Traffic Organization (ATO) Planning has two major concepts concerning airspace and procedure evolution: Integrated Arrival and Departure Control Services and High Altitude Trajectory-based Airspace.

Integrated Arrival and Departure Control Services is a mid-term operational concept for super density integrated arrival/departure operations in major metropolitan areas. The concept calls for improving operational efficiencies in major metropolitan areas by expanding the lateral and vertical limits of arrival and departure airspace, including transition airspace. Concept validation experiments and cost/benefit analyses were completed in September 2007. Results of automation requirements, surveillance requirements, site selection analyses, and safety studies are expected to feed into new airspace projects in the 2015 timeframe.

The High Altitude Trajectory-based Airspace concept blends the principles of Generic Airspace with Trajectory-based Operations. A key enabling technology is Segment 2 Data Communications and two key principles are Generic Airspace and Flexible Airspace. High Altitude Trajectory-based Airspace is just entering the concept validation portion of the effort. Studies were performed in FY10 to understand the implications on airspace design, procedures, and roles and responsibilities. Experiments exploring the concepts are being performed in FY11 and the experimentation will continue in FY12.

Demonstrations and Trials: This section includes demonstrations or operational trials that support the future NextGen implementation.

There are several FAA-sponsored NextGen demonstration projects, exploring many research elements related to future Integrated Airspace and Procedures efforts. Some of these topics include 3D RNAV/RNP with Required Time of Arrival and seamless integration of Unmanned Aircraft Systems/Remotely Piloted Aircraft into the NAS. One of the most relevant sets of demonstrations involves International Air Traffic Interoperability and Oceanic Trajectory-based Operations. These demonstrations are directly related to a number of PBN routing and procedures advancements including procedures developed under the Atlantic Interoperability Initiative to Reduce Emissions (AIRE) and the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) projects. The FAA is also fully engaged in the Greener Skies Over Seattle project. Alaska Air Group, in collaboration with the Port of Seattle, initiated this project to reduce the environmental impact of aircraft arrivals at Seattle-Tacoma International Airport through shorter flight paths, reduced level flight segments, and increased fuel efficiency. Alaska Airlines developed initial designs of PBN instrument flight procedures with Optimized Profile Descents (OPDs) for the Greener Skies project and completed a set of operational trials. Based on the potential benefits at Seattle and elsewhere in the NAS, the FAA is now leading the Greener Skies Over Seattle project with the development of public PBN procedures and the initiation of an associated NextGen research program to enable full operational integration.

Research Efforts: JPDO's Dynamic Airspace Configuration (DAC) program is a collection of research efforts and concepts with the goal of enabling service providers to supply needed airspace capacity in the NAS. There are several research components in DAC:

- Generic Airspace targets resource flexibility by determining information needed to manage generic airspace and by prototyping automation to provide that needed information.

- Dynamic Airspace targets temporal flexibility. This research includes precoordinated dynamic airspace constructs such as airspace playbooks and dynamic airspace units.

- Restructured Airspace targets structural flexibility by exploring multiple classes of airspace operations including delegated separation, mixed operations, flow corridors, and dynamic SUA.

These research efforts target operational changes in the far-term NextGen timeframe, at the earliest 2019 2020. The results of this research will have a high level of relevance to future airspace and procedures efforts.

Emerging Capabilities: In the near and mid-term timeframe, there are a number of emerging capabilities and technologies that will be implemented. It is expected that these capabilities may enable new airspace and procedural constructs, and may provide additional efficiencies to currently planned airspace and procedural enhancements. These capabilities reinforce basic infrastructure, enhance controller abilities to use new procedures, and encourage new concepts in airspace management. The NextGen Implementation Plan, the NAS Enterprise Architecture Infrastructure Roadmaps, and other resources provide a comprehensive listing of tools and associated detailed descriptions.

SUMMARY

This NAPP provides a descriptive outline for the evolution of performance-based airspace and a depiction of the major airspace and procedures efforts, with an accounting of the associated activities with the NextGen portfolios. By examining efforts in three categories, this version of the plan presents an accurate rendering of the ongoing airspace projects and PBN procedure development efforts, and provides a glimpse into the future of Integrated Airspace and Procedures projects.

Appendix A
Optimization of Airspace and Procedures in the Metroplex

Optimization of Airspace and Procedures (OAPM) in the Metroplex is a systematic, integrated, and expedited approach to implementing Performance-based Navigation (PBN) procedures and associated airspace changes. OAPM was developed in direct response to RTCA's Task Force 5 Final Report on Mid-term Next Generation Air Transportation System (NextGen) Implementation, specifically the recommendations on the quality, timeliness, and scope of metroplex activities.

The FAA has been moving for several years toward an integrated approach to airspace redesign and PBN procedure development as the future for large-scale airspace and procedures efforts. OAPM focuses on a geographic area, rather than a single airport. This approach considers multiple airports and the airspace surrounding a metropolitan area, including all types of operations, as well as connectivity with other metroplexes. The OAPM solution approach is part of the larger metroplex solution approach and a foundational step for other NextGen implementation activities.

There are three factors that distinguish OAPM from the other traditional airspace redesign or PBN development efforts:

- Expedited life cycle of approximately three years from planning to implementation
- Focused scope with defined design parameters
- Prioritized national approach to address major metroplexes

The OAPM expedited timeline and focused scope bound airspace and procedures solutions to those that can be achieved without requiring an Environmental Impact Statement (e.g., only requiring an Environmental Assessment (EA) or Categorical Exclusion) and within current infrastructure and operating criteria. The major metroplexes addressed under OAPM have been defined in the RTCA Task Force 5 Final Report and the FAA Flight Plan, and have been prioritized using criteria and considerations developed through collaboration with FAA and industry stakeholders.

A characteristic of OAPM is its collaborative team concept. Study teams are the critcal first step of the OAPM process. Study teams provide a top-down, comprehensive, expeditious front-end strategic look at each major metroplex. The study teams analyze the operational challenges and situations, assess current/planned airspace and procedures efforts, and explore new solution opportunities in a consistent manner. Design and Implementation (D&I) teams provide a systematic, effective approach to the design, evaluation and implementation of PBN-optimized airspace and procedures.

Using the results of the study teams, D&I teams are responsible for executing the design, evaluation, and implementation portions of these projects.

The study team results may also identify airspace and procedures solutions that do not fit within the environmental and criteria boundaries of an OAPM project. These other recommendations then become candidates for other Integrated Airspace and Procedures efforts.

OAPM solutions are developed and implemented through a five-phase process:

- Study and Scoping: The Study Phase is conducted by study teams that identify issues and propose potential solutions through facility and industry interface meetings. The result of this phase is a set of conceptual designs, with a high-level assessment of benefits, costs, and risks.

- Design and Procedure Development: The Design Phase is where the detailed Integrated Airspace and Procedures design work is conducted. The work conducted in this phase uses the results of the study teams and is conducted by a D&I team. When appropriate and justified, on-site Human-in-the-Loop (HITL) simulations and other design analyses may be part of this phase.

- Operational Evaluation and Environmental Review: The Evaluation Phase is the second stage conducted by the D&I team. It includes all necessary operational modeling, safety analyses, and environmental reviews. If analyses are conducted during the Design Phase, they may feed into the Evaluation Phase.

- Implementation and Training: The Implementation Phase is the last part of the OAPM process conducted by the D&I team. This phase includes all steps required for implementation of the OAPM project including flight inspections, publishing procedures, planning and executing training.

- Post Implementation Review and Modifications: The Post-Implementation Phase includes a review of the implemented airspace and procedures changes to determine if they have delivered desired benefits and/or caused other impacts. Modifications or refinements may be made to better achieve desired benefits or address unforeseen impacts.

As of August 2011, four study teams have completed their efforts: Washington, D.C., North Texas, Charlotte, and Northern California:

- **Washington, D.C.:** The proposed solutions included modifying existing and creating new Area Navigation (RNAV) Standard Instrument Departures (SIDs) and Standard Terminal Arrivals (STARs), the application of Q /T Routes, and the modification of airspace. Quantitative analyses of the changes proposed by the Washington, D.C., Metroplex Study Team show that they could result in estimated annual fuel savings of 2.5 to 7.5 million gallons, primarily due to more efficient arrival profiles and reductions in lateral track distances. Carbon emissions are expected to be reduced between 25 and 75 thousand metric tons.

- North Texas: The proposed solutions included several conceptual procedural and air space changes including segregating Dallas/Fort Worth Terminal Radar Approach Control (TRACON) (D10) arrival flows, adding Optimized Profile Descents (OPDs) for Dallas/Fort Worth International Airport (DFW) primary STARs, introducing and modifying RNAV procedures (including Required Navigation Performance (RNP) – Authorization Required (RNP AR) procedures for Dallas Love Field Airport [DAL] arrivals), and adding ultra-high sectors in Fort Worth Center (ZFW). Quantitative analyses and stakeholder estimates of the changes proposed by the study team show they could result in annual fuel savings of 4.1 to 8.6 million gallons, largely from the use of OPDs and reduced track distances. Carbon emissions are expected to be reduced between 21 and 52 thousand metric tons.

- Charlotte: The proposed solutions included several procedural and airspace changes including segregating Charlotte/Douglas International Airport (CLT) arrival flows, adding dual OPDs for CLT STARs, adding additional departure gates supporting CLT SIDs, reducing the distance to divergence for CLT SIDs, and introducing and modifying RNAV procedures for the satellite and adjacent airports. Adopting the study team recommendations for CLT is estimated to result in increased fuel efficiency and reduced track distances. Fuel savings are estimated at 3.7 to 6.2 million gallons annually. Filed track distances are estimated to decrease about 2.5 million nautical miles reducing fuel loading requirements and resulting in cost-to-carry savings. In addition, increasing the number of departure gates, and reducing the distance to SID divergence should increase departure throughput. Carbon emissions are expected to be reduced between 35 and 59 thousand metric tons.

- Northern California: Proposed procedural changes included segregating arrival flows from the east, adding RNAV STARs with OPD benefits, and introducing RNAV SIDs with additional egress fixes. Adopting the study team recommendations is estimated to result in an annual savings of fuel savings 2.3 to 5.6 million gallons. Filed track distances are estimated to decrease about 1.5 million nautical miles reducing fuel loading requirements and resulting in cost-to-carry savings. Carbon emissions are expected to be reduced between 23 and 56 thousand metric tons.

Recent and upcoming milestones for OAPM include:

- Completing study of the Houston Metroplex--final study report is expected in September 2011
- Began D&I for Washington, D.C., Metro and North Texas in June/July 2011
- Began Atlanta and Southern California Study Teams in late August 2011
- Plan to identify FY 2012 study team sites in fall 2011
- Plan to begin Northern California D&I in winter 2012
- Plan to begin Charlotte and Atlanta D&I concurrently in winter 2011/2012

APPENDIX B
LEGACY AIRSPACE MANAGEMENT PROGRAM PROJECTS

The National Airspace and Procedures Plan (NAPP) is built on a foundation of many years of experience in airspace and procedures design, development, and implementation. In the mid-1990s, as part of the reorganization of the Air Traffic headquarters and regional offices, a national airspace review effort was initiated. On completion of that activity, the National Airspace Redesign (NAR) was created in 1998. NAR was the Federal Aviation Administration (FAA) initiative to review, redesign, and restructure the Nation's airspace. NAR included domestic and oceanic airspace, and addressed operational problems from small regional optimizations to large-scale high altitude redesign. In mid-2005, based on FAA organization changes and in response to a series of recommendations from the Department of Transportation's Inspector General, the FAA re-scoped and restructured NAR into the Airspace Management Program (AMP). Smaller and redefined, AMP has focused on completing the highest priority legacy NAR projects. Between 1998 and 2008, NAR and AMP completed approximately four dozen full or partial airspace projects, which have produced savings of over $700 million in direct operating costs to the aviation community.

The AMP legacy projects include projects started before the formation of the National Operational Airspace Council (NOAC) in August 2009. These projects are the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign, the Chicago Airspace Project (CAP), and the Las Vegas Optimization project.

The first version of the NAPP included reference to the HAATS project, which FAA completed in September 2010. The project was originally chartered in 2000 as the Houston Gulf Coast Airspace Project and renamed to align with associated infrastructure efforts. HAATS was designed to revamp Houston terminal and surrounding en route airspace. The objectives of the project were to accommodate growth and airport expansion, increase efficiencies in managing the co-mingled Dallas/Fort Worth International (DFW), Dallas Love Field (DAL), George Bush Intercontinental/Houston (IAH), and William P. Hobby (HOU) Airports flows, and to address the growth in traffic and leverage enhancements over the Gulf of Mexico.

NY/NJ/PHL Metropolitan Area Airspace Redesign: This project was started in 1998 and encompasses a complete redesign of the airspace in the New York and Philadelphia metropolitan areas. The project capitalizes on Performance-based Navigation (PBN), higher downwind segments for arrival aircraft, unrestricted departure climbs, fanned departure headings, and holding in terminal airspace. The purpose of the project is to increase the efficiency and reliability of the airspace structure and air traffic control (ATC) system to accommodate growth while enhancing safety, reducing delays, and taking advantage of new technologies. There were four alternatives in the NY/NJ/PHL

Metropolitan Area Airspace Redesign: Future No Action, Modifications of Existing Airspace, Ocean Routing, and Integrated Airspace. The Integrated Airspace Alternative was being examined with and without an associated facility. The alternatives addressed the baseline requirements of the National Environmental Policy Act (NEPA), the recommendations from the aviation community, and the input from the local communities gained during the environmental scoping process.

In September 2007, after an extensive environmental review process, the FAA signed a Record of Decision (ROD) selecting the Integrated Airspace Alternative with the Integrated Control Complex with Noise Mitigation Strategy. The implementation phase of the project was started in December 2007 with initial fanned headings at Newark Liberty International and Philadelphia International Airports. Implementation is segmented into four stages:

- Stage 1 includes procedural changes within the project's core facilities.
- Stage 2 concentrates on the Westgate departures. Stage 2 has two substages, 2A focused on New York changes and 2B focused on Philadelphia changes.
- Stage 3 focuses on Northgate departures.
- Stage 4 completes the project with full integration of the airspace.

Each stage is projected to overlap and take 12 18 months to complete. When implementation is completed, a 20 percent reduction in delays (compared to the No Action alternative) resulting in $300 million of direct operating cost savings is expected, as is a net reduction in noise levels for over 600,000 residents.

Upcoming milestones for NY/NJ/PHL Airspace Redesign:

- NY/NJ/PHL Airspace Redesign Stage 2A implementation – October 2011 (commitment)
- NY/NJ/PHL Airspace Redesign Stage 2B implementation – June 2012 (target)

Chicago Airspace Project (CAP): CAP was originally part of the Great Lakes Corridor project chartered in 1999. In its initial state, the project had several new departure routes planned (east, west, and south) and proposed a doubling of the en route departure capacity. In 2001, when the O'Hare Modernization Project (OMP) was initiated, CAP expanded to include the need for new airspace to support the planned new runways and associated triple arrivals. CAP now includes three stages:

- Stage 1 East Enhancements: Two additional departure routes to the east (new total of four). Stage 1 was completed in March 2007.

- Stage 2 South Enhancements: Two additional departure routes to the south (new total of five), and High and Wide arrival procedures for Chicago O'Hare International Airport (ORD) west flow (supporting the first OMP runway). Stage 2 was completed in November 2008.

- Stage 3 West Enhancements: Two additional departure routes to the west (new total of four), and High and Wide arrival procedures for ORD east flow (supporting the second OMP runway).

Benefits analysis indicates that the CAP airspace changes will provide a 10 percent reduction in delay in the east flow and a 20 percent reduction in the west flow (in terms of weighted arrival and departure delays). The addition of new runways under the OMP, in combination with the airspace changes, will enable triple simultaneous approaches capable of supporting balanced departure and arrival capacity during all weather conditions. The combination of the CAP airspace changes and the OMP airfield changes will produce a 66 percent decrease in average annual delays.

Upcoming milestone for CAP:

- Stage 3 implementation – December 2013 (coincident with OMP runway 10C/28C completion) (target)

Las Vegas Optimization Project: In 2005, the Clark County Department of Aviation (CCDOA) announced plans for the Southern Nevada Supplemental Airport (SNSA) project to develop a new airport in the Ivanpah Valley to provide supplemental commercial service for Las Vegas and the surrounding area. In early 2008, the Air Traffic Organization (ATO) began an airspace design process for SNSA to cover all runway construction options determined feasible by FAA Airports. The design also included an Optimization Design alternative to incorporate existing concepts/ideas to resolve near-term operational efficiency issues in the Las Vegas Valley airspace. The Optimization Design alternative was purposely constrained so that it would not require any airfield construction or be likely to cause significant environmental impacts.

In June 2010, as a result of the national economic downturn, CCDOA announced a suspension of the Environmental Impact Statement (EIS) for SNSA and the airfield development effort was put on hold. CCDOA and operational stakeholders stated that there was a strong need to provide interim operational enhancements for the Las Vegas aviation community, even with the suspension of the new airport.

After verifying the need for interim airspace changes, FAA leadership sanctioned an independent airspace efficiency improvement effort to provide near-term modification of airspace and procedures supporting the Las Vegas Valley. This effort, to carry forward a Las Vegas Optimization Design alternative, is developing new departure and arrival routes and realigning airspace to increase efficiency at Mc Carran International Airport and surrounding satellite airports.

The proposed Las Vegas Optimization Design changes are expected to provide an overall positive impact. Initial modeling results indicate improvements in fuel efficiency and an overall decrease in flying miles. User review and simulator analyses also indicate the Optimization Design would provide improved vertical profiles for arriving and departing aircraft.

Upcoming milestones for the Las Vegas Optimization Design include:

- Las Vegas Optimization Design Environmental Assessment (EA) completion – June 2012 (target)

- Las Vegas Optimization Design implementation – summer 2013 (target)

Appendix C
PBN Procedures and Routes

Performance-based Navigation (PBN) is a key transformational technology for Next Generation Air Transportation System (NextGen) advances. These advances are formulated around expanded use and evolution of Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures. RNAV operations provide aircraft with routing flexibility and more efficient trajectories, and can allow improved or continued access to airports. RNP adds requirements for aircraft onboard performance monitoring and alerting. PBN provides a simple foundation for the design and implementation of automated flight paths, as well as for airspace design, route separation, and obstacle clearance.

The FAA PBN Integration program is the result of over a decade of progress in the development and implementation of RNAV and RNP processes and procedures. In the late 1990s, the FAA established the RNAV Implementation Office within the Air Traffic Planning and Procedures (ATP) organization. Through 2001, in concert with the FAA/industry Satellite Operational Implementation Team (SOIT), the FAA developed the plans, processes, tools, procedures and phraseologies to fully implement PBN in the National Airspace System (NAS). Initial efforts focused on procedures at New York*, New Jersey, Philadelphia, Detroit*, Washington Dulles*, and Charlotte (*NAR sites collaborative effort). In collaboration with industry, the FAA developed the Operational Evolution Plan (OEP) for the initial development and implementation of PBN procedures at the key 34 OEP airports and beyond.

The FAA, in conjunction with the MITRE Corporation, has developed the Terminal Area Route Generation Evaluation and Simulation (TARGETS) tool, now the standard tool for field development of RNAV and RNP procedures, including en route procedures. The FAA also developed a multistep, collaborative process for the development and implementation of PBN procedures, now known as the "18-Step Process" and used in every PBN project.

In July 2002, FAA Administrator Jane Garvey issued the Administrator's Policy on Required Navigation Performance. The policy committed the FAA to a plan to implement public use PBN airspace and procedures in the NAS in global harmonization with the International Civil Aviation Organization (ICAO). The policy requires implementation of procedures in concert with the user community.

To implement and guide that plan, in 2003, the FAA established the RNP Program Office within the ATP organization. The RNP Program Office, through subsequent re-organizations, in 2010 became the PBN Integration Group within the Air Traffic Organization, Mission Support Services directorate. In 2003, and again in 2006, the FAA published the Roadmap for Performance-based Navigation, outlining the high-level plan for RNAV and RNP evolution in the NAS. Commitments outlined in the Roadmap for Performance-based Navigation have been incorporated in the NextGen Implementation Plan.

The PBN Integration Group is advancing PBN implementation through a more comprehensive integration of airspace and procedures plan, which includes advancements and commitments toward RTCA Task Force 5 recommendations. In the international area, global harmonization continues through active participation in the ICAO PBN Study Group and through collaborative international seminars, training, and conferences.

Within the NAS, PBN benefits have been proven at implementation locations such as Hartsfield-Jackson Atlanta International Airport, Dallas/Fort Worth International Airport, and others. These benefits include:

- Decreased air/ground voice communications with increased flight predictability
- Enhanced airport access and deconfliction of air traffic in areas with multiple airports
- Reduced miles flown, saving fuel and time
- Reduce fuel burn and emissions with more continuous climbs and descents

The PBN Integration Group is responsible for implementing four types of PBN projects: RNAV Standard Instrument Departure (SID) procedures, RNAV Standard Terminal Arrival (STAR) procedures, RNP approach procedures, and RNAV routes. Other PBN categories include Lateral Navigation/Vertical Navigation (LNAV/VNAV) and Wide Area Augmentation System (WAAS) (Localizer Performance with Vertical guidance (LPV)) procedures. To date, the FAA has implemented 287 RNAV routes, 430 RNAV SIDs/STARs, 277 RNP approaches, 6,992 LNAV/VNAV, and 2,843 WAAS (LPV) procedures in the NAS.

These include Optimized Profile Descents (OPDs) that result in substantial fuel savings and reduced emissions. Use of these procedures has already resulted in multimillion-dollar annual fuel cost savings for the airlines and better predictability for air traffic controllers. To increase the use and benefits of the procedures, the PBN Integration Group identifies optimization opportunities and re-publishes the procedures through an amendment process. Currently, there are 16 RNAV routes, 179 SIDs/STARs, 125 RNPs, 600 LNAV/VNAV, and 500 WAAS (LPV) procedures in development.

PBN procedures also address location-specific needs stemming from safety concerns (e.g., conflict alerts), infrastructure constraints (e.g., terrain, runway closure, construction and crane operations, runway ends not serviced by precision approach systems, etc.) and other needs that must be addressed in the immediate term. PBN may also add efficiency to existing structure with new procedures or by optimizing existing procedures. Over the years, the PBN Integration Group has continuously refined PBN concepts and processes to deliver increased benefits for both air traffic control and the operator.

The National Airspace and Procedures Team (NAPT) PBN production plan can be found at http://avn.faa.gov/acifp.asp.

Appendix D
Transition of the Conventional ATS Route Network to PBN

This Performance-based Navigation (PBN) route network includes Q and T routes that use Area Navigation (RNAV) waypoints and are independent of ground-based navigational aids (NAVAIDs). Q routes are RNAV routes above flight level (FL) 180 and T routes are RNAV routes below FL 180. Currently, there are 77 Q routes and 73 T routes in the National Airspace System (NAS). Expansion of Q and T routes will form a PBN route network that will efficiently connect metroplex areas and provide benefits to the users. Additional end-to-end benefits will be derived as this network is integrated with the existing, planned, and future PBN procedures at the busy airports. The PBN route network will take into account the outcomes of Optimization of Airspace and Procedures in the Metroplex (OAPM) designs and airspace redesign projects.

The PBN route network will also expand the David J. Hurley Air Traffic Control System Command Center (ATCSCC) playbook and wind routing options for air traffic management during irregular operations. Traditionally, playbooks have relied on fixed routes defined by ground-based NAVAIDs resulting in limited routing flexibility. The Q route network will enhance routing options in the NAS.

The Navigation Reference System (NRS) is a national grid of 991 RNAV waypoints. Air Traffic Organization (ATO) Planning funded the National Aeronautics and Space Administration (NASA) to conduct a three-phase study evaluating existing NRS points. NASA is finalizing its phase 2 report. In addition, Human Solutions, Inc., is conducting a human factors study at nine air route traffic control centers. Upon completion of these studies, the PBN Integration Group will make recommendations to FAA leadership on NRS.

Potential benefits of the PBN route network (Q/T routes):

- Reduce mileage, time, fuel use, fuel loading requirements, and emissions
- Reduce the number of intersecting flight paths
- Improve terminal ingress and egress
  - Provide a seamless flight path from Standard Instrument Departure (SID) to Standard Terminal Arrival (STAR)
- Reduce controller workload and reduce pilot-controller communications
- Expand routing options during irregular operations (weather reroutes)
- Eliminate underused conventional routes
  - Opportunity for NAVAID divestment (FAA cost savings)
- Q routes simplify flight planning, coordination, and controller phraseology and enhance tactical environments
- A NextGen database-driven digital environment less costly to maintain

- Harmonize with International Civil Aviation Organization (ICAO) RNAV performance expectations

Upcoming milestones in the Q route plan include:

- NY/NJ/PHL Metropolitan Area Airspace Redesign Q routes – October 2011
- NRS waypoint study, Phase 2 completion
- Air traffic human factors study completion expected – 2012

Appendix E
Process Descriptions

Process Overview

The design of airspace and procedures is a complex process that includes many steps. There are separate defined processes for the various types of airspace and procedures that may be included in a design project. Each of these processes must also consider relevant design standards and criteria, along with specific regulations, such as environmental and safety. Finally, there are processes for the implementation, approval, and operational use of the airspace and procedures.

This appendix provides a list of major references for the design process, standards and criteria, regulations, implementation and operational approval. This list is not inclusive.

The process for the design of airspace and for procedures has historically been a separate endeavor. There is an effort to bring these processes together into a single integrated airspace and procedure process. This appendix also includes a description of how this integrated process is being developed.

List of Processes and Applicable References

The following is a list of relevant references, along with a brief description of the purpose of the document.

FAA **Airspace Management Handbook –Version 2.2**
The handbook describes a step-by-step procedure for airspace design management where each step contains specific data requirements and defined products. The handbook distills the experience and best practices of many airspace design projects.

FAA **Safety Management System (SMS) Manual – Version 2.1, May 2008**
The Safety Management System (SMS) provides a systematic and integrated method for managing safety of air traffic control (ATC) and navigation services in the National Airspace System (NAS). This manual documents the SMS, building on existing Federal Aviation Administration (FAA) safety management capabilities.

FAA **Environmental Desk Reference for Airport Actions – October 2007**
As a compendium, the Desk Reference summarizes applicable special purpose laws in one location for convenience and quick reference. Its function is to help FAA integrate the compliance of the National

Environmental Policy Act of 1969 (NEPA) and applicable special purpose laws to the fullest extent possible. This integration should ensure that all environmental review procedures applicable to an airport action run concurrently rather than consecutively.

Order 1050.1E **Policies and Procedures for Considering Environmental Impacts**

This order provides FAA policy and procedures to ensure agency compliance with the requirements set forth in the Council on Environmental Quality (CEQ) regulations for implementing the provisions of the National Environmental Policy Act of 1969 (NEPA), title 40, Code of Federal Regulations (CFR), parts 1500-1508; Department of Transportation Order DOT 5610.1C, Procedures for Considering Environmental Impacts; and other related statutes and directives.

Order 1100.161 **Air Traffic Safety Oversight**

This order specifies the manner by which safety oversight will be conducted by the Air Traffic Safety Oversight Service (AOV), within the Office of the Associate Administrator for Aviation Safety (AVS), on the Air Traffic Organization (ATO), and other organizations within the FAA regarding safety management of the air traffic system.

Order 5050.4B **National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects**

FAA's Office of Airports (ARP) has prepared this order to ensure ARP personnel and others interested or involved in ARP actions are able to prepare accurate, timely, and high quality environmental documents that comply with NEPA.

Order 7100.9D **Standard Terminal Arrival Program and Procedures – Appendix 5, Guidelines for Implementing Terminal RNAV Procedures**

The order provides a standardized, systematic process for the development of terminal area navigation (RNAV) arrival and departures procedures. The process is also known as the "18-STEP" RNAV process.

Order 7210.3W **Facility Operation and Administration**

This order provides direction and guidance for the day-to-day operations of facilities and offices under administration of the FAA's Air Traffic Organization.

Order 7400.2H **Procedures for Handling Airspace Matters**

The order specifies procedures for use by all personnel in the joint administration of the airspace program. It contains six parts; general procedures for airspace management, objects affecting navigable airspace, airport airspace analysis, terminal and en route airspace, special use airspace, and miscellaneous procedures.

Order 7400.9U **Airspace Designations and Reporting Points**
Provides a listing of terminal and en route airspace designations and reporting points

Order 8260.3B **United States Standard for Terminal Instrument Procedures (TERPS)**
This order prescribes standardized methods for use in designing instrument flight procedures.

APPENDIX F
ACRONYMS

ADS-B	Automatic Dependent Surveillance-Broadcast
ALTRV	Altitude Reservations
AMP	Airspace Management Program
AOV	Air Traffic Safety Oversight Service
APNT	Alternate Positioning, Navigation, and Timing
AR	Aerial Refueling
AR	Authorization Required
ARP	Office of Airports
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATO	Air Traffic Organization
ATS	Air Traffic Service
AVS	Associate Administrator for Aviation Safety
CAP	Chicago Airspace Project
CCDOA	Clark County Department of Aviation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COI	Community of Interest
DAC	Dynamic Airspace Configuration
DME	Distance Measuring Equipment
EA	Environmental Assessment
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
GNSS	Global Navigation Satellite System
HAATS	Houston Area Air Traffic System
HAR	High Altitude Redesign
IR	Instrument Route
IRU	Inertial Reference Unit
JPDO	Joint Planning and Development Office
LNAV/VNAV	Lateral Navigation/Vertical Navigation
LP	Localizer Performance
LPV	Localizer Performance with Vertical Guidance
NAPP	National Airspace and Procedures Plan
NAPT	National Airspace and Procedures Team
NAR	National Airspace Redesign
NAS	National Airspace System
NAS EA	National Airspace System Enterprise Architecture
NEPA	National Environmental Policy Act
NextGen	Next Generation Air Transportation System
NGIP	NextGen Implementation Plan

NOAC	National Operational Airspace Council
NRS	Navigation Reference System
NSAAP	National Special Activity Airspace Project
NY/NJ/PHL	New York/New Jersey/Philadelphia
OAPM	Optimization of Airspace and Procedures in the Metroplex
OI	Operational Improvements
OPD	Optimized Profile Descent
PBN	Performance-based Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP AR	Required Navigation Performance - Authorization Required
SAA	Special Activity Airspace
SFRA	Special Flight Rules Area
SIAP	Standard Instrument Approach Procedure
SID	Standard Instrument Departure
SMS	Safety Management System
STAR	Standard Terminal Arrival
SUA	Special Use Airspace
TBO	Trajectory-based Operations
TERPS	Terminal Instrument Procedures
TFR	Temporary Flight Restrictions
VOR	Very High Frequency (VHF) Omni-directional Radio Range
VR	Visual Routes
WAAS	Wide Area Augmentation System

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