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NEXT GENERATION AIR TRANSPORTATION SYSTEM

FAA Faces Implementation Challenges

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Highlights

Highlights of GAO-12-1011T, a testimony to the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

To prepare for forecasted air traffic growth, FAA is planning for and implementing NextGen in partnership with other federal agencies and the aviation industry. NextGen is a complex undertaking that requires acquiring new integrated air traffic control systems; developing new flight procedures, standards, and regulations; and creating and maintaining supporting infrastructure to create a more automated aircraft-centered, satellite-based air transportation system. GAO has made recommendations to address delays in NextGen's acquisitions, improve FAA's processes, and focus on accountability and performance, which FAA is implementing.

This statement discusses five key challenges that GAO and others have previously identified that affect NextGen implementation, as well as steps FAA has taken to address these challenges. These challenges are (1) delivering and demonstrating NextGen's near-term benefits; (2) developing a cost-effective mechanism to encourage operators to equip with NextGen technologies; (3) maintaining timely delivery of acquisitions; (4) clearly defining NextGen leadership roles and responsibilities; and (5) balancing the needs of the current radar-based systems and NextGen systems through the transition. This statement is based on GAO's previous reports and testimonies, ongoing work for the committee, and updates on FAA's responses to these challenges through a review of FAA documents and interviews with FAA officials.

View GAO-12-1011T. For more information, contact Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov.

What GAO Found

Delivering and demonstrating the Next Generation Air Transportation System's (NextGen) benefits: The Federal Aviation Administration (FAA) must deliver capabilities that provide aircraft operators with a return on their investments in NextGen avionics to convince operators to continue making equipment investments. However, operators have expressed concerns that FAA has not produced the navigational procedures needed to achieve benefits from existing avionics, such as reduced fuel burn and flight time. To help produce more beneficial procedures, FAA is, among other things, involving air traffic controllers and other stakeholders in the design of new procedures.

Encouraging acquisition of NextGen equipage: For some technologies, realizing NextGen benefits requires a critical mass of properly equipped aircraft. Reaching that critical mass is a significant challenge because the first aircraft operators to purchase and install NextGen avionics will not obtain a return on their investment until many other operators are similarly equipped. FAA has begun to solicit industry input about how to design and implement a public-private financing program for equipment but has yet to make decisions about how to incentivize the airline operators' transition to NextGen.

Maintaining timely delivery of key systems: NextGen has significantly increased the number, cost, and complexity of FAA's acquisition programs, which must remain on time and within budget, particularly given current budget constraints and the interdependencies of many NextGen-related acquisitions. While these acquisitions are generally proceeding on time and within budget, previous challenges with the En Route Automation Modernization (ERAM) program—a critical program for NextGen—illustrate how delays can increase the costs and schedules of other acquisitions as well as the maintenance costs of the system that is meant to be replaced. Overall, NextGen implementation will be affected by how well FAA manages program interdependencies.

Clearly defining NextGen leadership roles and responsibilities: Although FAA has made organizational changes to increase visibility and accountability for NextGen, it has not made management changes called for by the FAA Modernization and Reform Act of 2012. According to FAA, those changes will not occur until a permanent FAA Administrator is in place. Further, FAA has not clearly defined the relationships among the Deputy Administrator (responsible for NextGen implementation and also the current Acting Administrator); the new Chief NextGen Officer position; and the Director of the Joint Planning and Development Office (responsible for NextGen planning and coordination).

Managing the transition to the NextGen system: Particularly in light of constrained budget resources, FAA will have to balance its priorities to help ensure that NextGen implementation stays on course while sustaining the current legacy infrastructure that will continue to be the core of the national airspace system for a number of years. For example, while FAA has an initial plan to consolidate facilities, the agency will need to keep long-term plans in mind so that it does not invest unnecessarily in facilities that may not be needed for NextGen.

Chairman Petri, Ranking Member Costello, and Members of the Subcommittee:

I appreciate the opportunity to testify today on progress toward implementing the Next Generation Air Transportation System (NextGen). The Federal Aviation Administration (FAA) predicts that, by 2025, the annual number of airline passengers in the United States will increase from about 700 million to about 1 billion per year and that the daily number of flights will increase from about 80,000 to more than 95,000. If FAA's predictions hold true, today's air transportation system will be strained under such demands, especially on some routes to and from hub airports and major cities. Accordingly, FAA, other federal agencies, and aviation industry stakeholders have worked in partnership to develop a plan for NextGen.[1] NextGen is an enormously complex undertaking that requires acquiring new integrated air traffic control systems; developing new flight procedures, standards, and regulations; and creating and maintaining supporting infrastructure to create a modern air transportation system that relies on satellite-based surveillance and navigation and network-centric operations.[2] NextGen is intended to increase air transportation system efficiency and capacity while maintaining its safety.

The initial planning for NextGen, starting with Vision 100[3] in 2003, focused on having NextGen in place by 2025. The improvements required to realize the full benefits of NextGen are numerous and involve many offices within FAA. In many cases, these improvements also depend on substantial investment and buy-in from aircraft operators. Recently, FAA has emphasized improvements that can be implemented through 2018[4]

[1]NextGen was designed as an interagency effort to leverage various agencies' expertise and funding to advance NextGen while avoiding duplication. In addition to FAA, federal partner agencies include the Departments of Commerce (particularly its National Oceanic and Atmospheric Administration), Defense, Homeland Security, and Transportation; the National Aeronautics and Space Administration; and the White House Office of Science and Technology Policy.

[2]Network-centric operations involve the instant sharing of information and data among users, systems, and networks. These operations use infrastructure and information services to provide the critical exchange of digital information for air-to-air and air-to-ground applications as well as applications involving satellite-based information sources.

[3]Vision 100—Century of Aviation Reauthorization Act, Pub. L. No. 108-176, §§ 709-710, 117 Stat. 2490, 2582-2585 (2003).

[4]According to FAA, midterm implementation for NextGen has shifted from 2018 to 2020.

as a means to respond to industry skepticism about FAA's ability to implement NextGen, build support for long-term NextGen investments, and more immediately address inefficiencies and delays in the current air traffic control system.[5] In past reports, we have made a number of recommendations to FAA to address delays in NextGen's development and acquisitions, improve FAA's processes, and focus on accountability and performance. Over the last 2 years, FAA has taken several steps and instituted a number of changes to address these issues.

My statement highlights five key challenges that we and others have previously identified that affect NextGen's implementation, as well as steps FAA has taken to address these challenges. These challenges are

- delivering and demonstrating NextGen's near-term benefits;
- developing a cost-effective mechanism to encourage operators to equip with NextGen technologies;
- maintaining timely delivery of acquisitions;
- clearly defining NextGen leadership roles and responsibilities; and
- balancing the needs of the current radar-based system as well as the NextGen system through the transition.

[5]FAA requested that RTCA—a private, not-for-profit corporation that develops consensus-based recommendations on communications, navigation, surveillance, and air traffic management system issues—create a NextGen Midterm Implementation Task Force, composed of industry stakeholders, to reach consensus within the aviation community on the operational improvements that can be implemented between now and 2018. The task force provided recommendations to FAA in September 2009.

This statement is based primarily on our previous reports and testimonies[6] and on ongoing work for this subcommittee that includes challenges associated with near-term NextGen implementation and FAA's efforts to transition from the current air traffic control system to the NextGen system. We updated information on FAA's responses to the five challenges that we discuss through a review of FAA documents and interviews with FAA officials. The GAO reports cited in this statement contain more detailed explanations of the methods used to conduct our work. We conducted all of our work in accordance with generally accepted government auditing standards.

FAA Is Taking Steps to Address Challenges in Delivering and Demonstrating NextGen's Benefits

Delivering NextGen Benefits

FAA must deliver systems, procedures, and capabilities that provide operators with a return on their investments in NextGen avionics in order to convince operators to continue making such equipment investments. For example, a large percentage of the current fleet is equipped to fly more precise performance-based navigation (PBN) procedures, such as following precise routes that use the Global Positioning System or glide

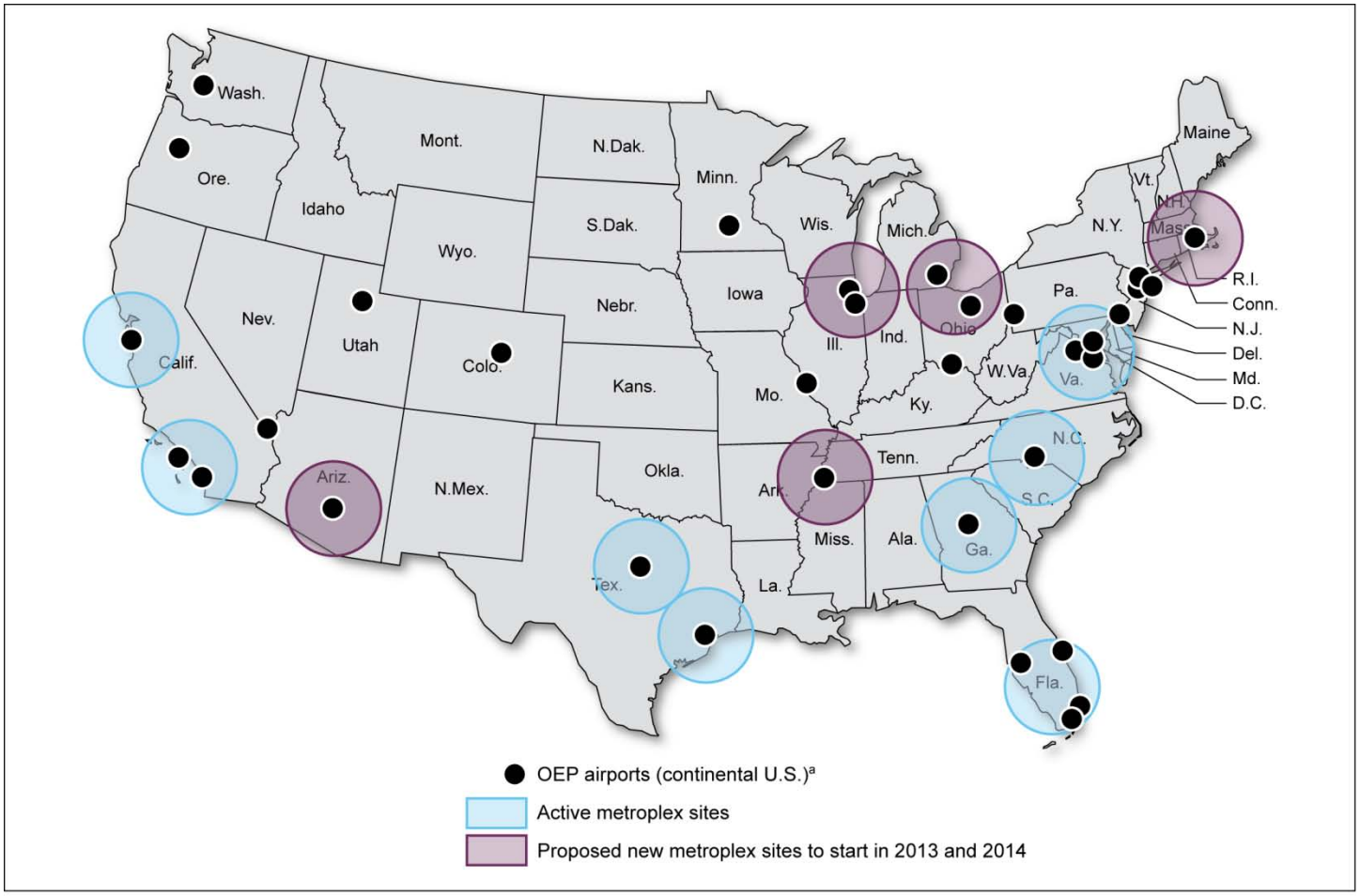
[6]GAO, *Next Generation Air Transportation System: FAA Has Made Some Progress in Implementation, but Delays Threaten to Impact Costs and Benefits*, GAO-12-141T (Washington, D.C. Oct. 5, 2012); *Air Traffic Control Modernization: Management Challenges Associated with Program Costs and Schedules Could Hinder Implementation*, GAO-12-223 (Washington, D.C. Feb. 16, 2012); *Aviation and the Environment: Systematically Addressing Environmental Impacts and Community Concerns Can Help Airports Reduce Project Delays*, GAO-10-50 (Washington, D.C.: Sept. 13, 2010); *NextGen Air Transportation System: FAA's Metrics Can Be Used to Report on Status of Individual Programs, but Not of Overall NextGen Implementation or Outcomes*, GAO-10-629, (Washington, D.C.: July 27, 2010); *Next Generation Air Transportation System: Challenges with Partner Agency and FAA Coordination Continue, and Efforts to Integrate Near-, Mid-, and Long-term Activities are Ongoing*, GAO-10-649T (Washington, D.C.: Apr. 21, 2010); *Next Generation Air Transportation System: FAA Faces Challenges in Responding to Task Force Recommendations*, GAO-10-188T (Washington, D.C.: Oct. 28, 2009); and *Next Generation Air Transportation System: Issues Associated with Midterm Implementation of Capabilities and Full System Transformation*, GAO-09-481T (Washington, D.C.: Mar. 25, 2009).

descent paths, which can save the operators money through reduced fuel burn and flight time.[7] However, aircraft operators have expressed concerns that FAA has not produced the most useful or beneficial PBN routes and procedures to date. As a means to leverage existing technology, provide immediate benefit to the industry, and in response to the RTCA Midterm Implementation Task Force's (Task Force) recommendations, FAA began an initiative to better use PBN procedures to resolve airspace problems in and provide benefits to areas around busy airports, known as "metroplexes." This initiative, the Optimization of Airspace and Procedures in the Metroplex (Metroplex), is under way in eight metropolitan areas across the country and planning is under way for other areas (see fig. 1).[8]

[7]The term procedures refers to the routes flown by aircraft and the rules governing those routes, such as required speeds and altitudes.

[8]The eight current Metroplex sites include: D.C.; North Texas; Charlotte, North Carolina; Northern California; Houston, Texas; Atlanta, Georgia; Southern California; and South/Central Florida. Five additional sites are planned to begin in 2012 or 2013: Phoenix, Arizona; Chicago, Illinois; Memphis, Tennessee; Detroit, Michigan; and Boston, Massachusetts.

Figure 1: Metroplex Sites as of July 2012



Source: FAA.

[a]The Operational Evolution Partnership (OEP) airports are 35 of the busiest commercial U.S. airports. Identified in 2000 based on lists from FAA and Congress, as well as a study on the most congested U.S. airports, these airports serve major metropolitan areas and also serve as hubs for airline operations.

FAA is working to design its Metroplex and other PBN initiatives to avoid some of the challenges that have limited the use and, in turn, potential benefits of existing PBN procedures. For example, FAA has found that some PBN procedures developed without air traffic controllers' involvement have been used infrequently, if at all, because of problems with the procedure design or other challenges. In response, FAA has worked to include stakeholders, such as air traffic controllers and airlines, in the study and design of new PBN procedures. For example, FAA

included airlines and local air traffic controllers in the design of PBN procedures under the Metroplex and Greener Skies over Seattle initiatives.[9] This inclusion, according to stakeholders involved, should help to ensure that the new PBN procedures can be used by local controllers and produce quantifiable benefits to aircraft operators. Greener Skies also formally involved local airports in the PBN procedure development process to help avoid adverse environmental—largely noise-related—community impacts. As we have previously reported, effective outreach to affected stakeholders can help anticipate and address potential community concerns—particularly with regard to noise.[10] If not addressed, these concerns can delay efforts to use airspace more efficiently.[11]

Many of FAA's near-term improvement efforts have focused on developing new PBN procedures rather than on other near-term improvements recommended by the Task Force, such as airborne or surface traffic-management improvements. Following up on the Task Force's work, the NextGen Advisory Committee (NAC)[12] made recommendations in May 2012 to help FAA identify and prioritize improvements—including and in addition to PBN procedures—that could provide near-term benefits. FAA is assessing the extent to which it can make these other improvements in later rounds of the Metroplex initiative.

[9]Greener Skies is a collaborative effort involving FAA, Alaska Airlines, Boeing, and the Port of Seattle. The effort resulted in new PBN procedures that route flights over local waterways—rather than over residential areas—and optimized profile descents (OPDs). OPD procedures use PBN capabilities to enable aircraft to descend from cruise altitude to final approach using a more efficient, idle glide, thereby eliminating what is referred to as the "level offs" or "step downs" of a traditional descent, resulting in fuel savings. These PBN procedures are expected to be implemented in 2013. Alaska Airlines estimates the Greener Skies procedures will cut fuel consumption by 2.1 million gallons annually, reduce carbon emissions by 22,000 metric tons, and reduce overflight noise exposure for an estimated 750,000 people. The effort was begun by Alaska Airlines, Boeing, and the Port of Seattle in 2008, and FAA assumed leadership of it in 2010.

[10]GAO-10-50.

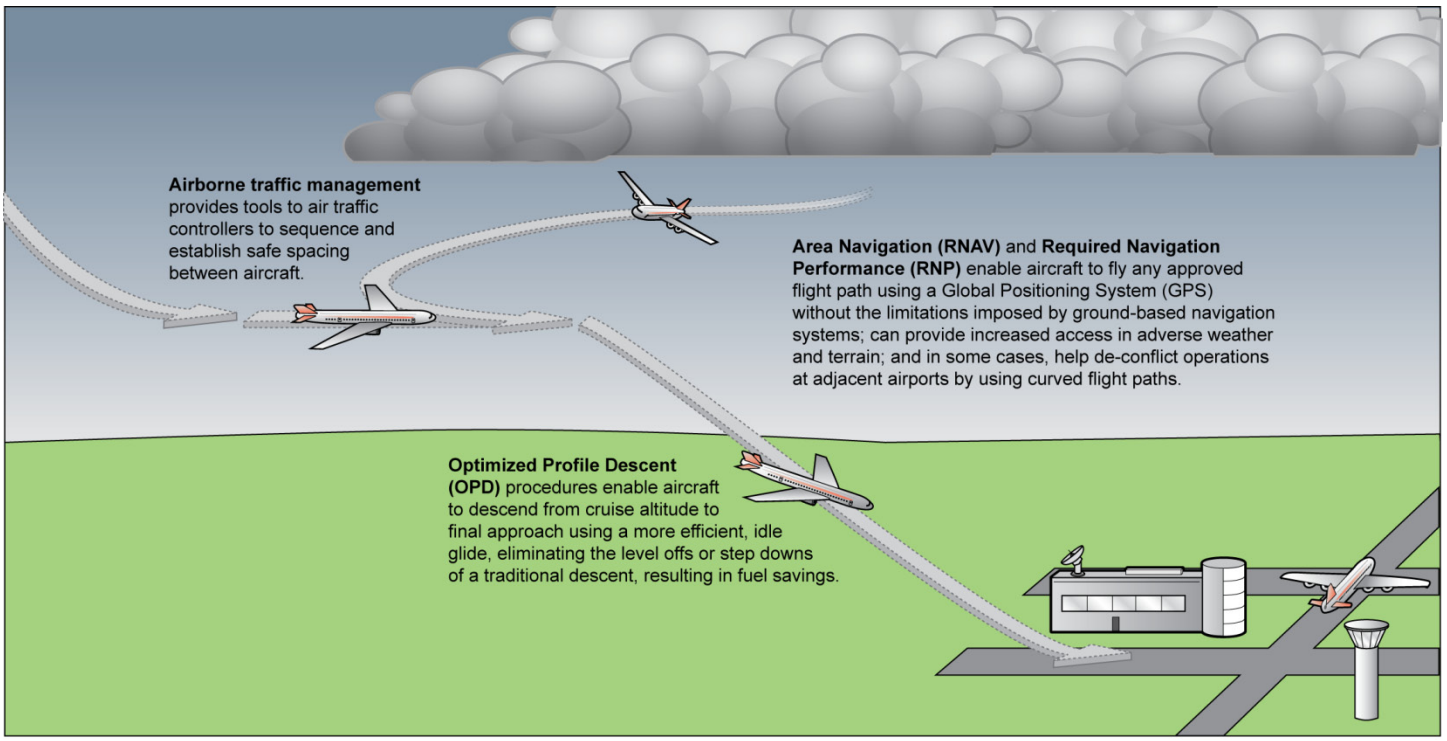
[11]GAO-09-481T.

[12]The NAC is comprised of aviation stakeholders from the government and industry. The committee works to develop a common understanding of priorities in the context of overall NextGen capabilities and implementation constraints, with an emphasis on improvements through 2018. The committee primarily focuses on implementation issues, including prioritization criteria at a national level, joint investment priorities, and location and timing of capability implementation.

In the meantime, the agency has turned its attention to expanding or developing some of these improvements—including the air-traffic-management tools that allow for the sequencing of planes—at some of the facilities that are the focus of ongoing Metroplex efforts. Generally, these efforts are still in the planning phase. Figure 2 shows the complexity of merging or sequencing traffic that is approaching an airport using PBN procedures, such as precision Required Navigation Performance (RNP) turns and optimized profile descents (OPD).[13] This complexity can be mitigated with the use of new airborne traffic management tools. Given the integrated nature of near-term NextGen improvements, it will be important for FAA to determine how its Metroplex initiative and airborne and surface traffic management improvements—as well as other improvements prioritized by the NAC—will be implemented and will work together so that the full benefits of these improvements can be realized.

[13]PBN includes Area Navigation (RNAV) and RNP. RNAV provides greater flexibility by reducing the limitations imposed by ground-based navigation systems. RNP is a form of RNAV that adds monitoring and altering capabilities to guide aircraft more precisely to and from airports.

Figure 2: Examples of Integrated Near-Term NextGen Operational Improvements



Source: GAO.

In addition, although FAA has made progress in developing new PBN procedures with its Metroplex and other PBN initiatives, much work remains to be done to improve the overall process for amending and implementing PBN procedures. According to FAA, the current process for implementing or amending flight procedures consists of a bundle of interconnected, overlapping, and sometimes competing processes, which, on occasion, results in the implementation of low or no-benefit flight procedures that have to be reworked or amended. Likewise, RTCA has recommended that FAA address problems with what it has termed FAA's inefficient processes for validating and certifying new technologies, which are critical steps in the process for allowing the use of new procedures. We have also expressed concerns about the time and human resources required for the validation and certification processes and have identified these processes as a significant risk to the timely and cost-effective implementation of NextGen. To address these challenges, FAA has undertaken a Navigation Lean (NAV Lean) project to streamline the implementation process for flight procedures. The agency anticipates

this project will be mostly in place by the end of 2015.[14] We have ongoing work for this committee that further explores issues and challenges associated with near-term NextGen implementation.

Demonstrating NextGen Benefits

As we have previously reported, FAA should regularly provide stakeholders, interested parties, Congress, and the American people with a clear picture of where NextGen's implementation stands, and whether the capabilities being implemented are resulting in positive outcomes and improved performance for operators and passengers.[15] We have recommended that FAA develop a timeline and action plan to work with industry and federal partner agencies to develop an agreed-upon list of outcome-based performance metrics, as well as goals for NextGen broadly and specific NextGen improvement areas. In addition, the FAA Modernization and Reform Act of 2012 requires FAA to report on measures of the agency's progress in implementing NextGen capabilities and operational results.[16] In 2011, the NAC recommended that FAA adopt a set of performance metrics to address operational changes affecting capacity, efficiency, predictability, and access. In addition, the NAC has continued to work on outcome-based metrics to inform the public about the overall status of NextGen implementation and the program's contribution to national aviation policy goals.[17] To date, FAA has established metrics for five of its key performance areas—capacity, efficiency, predictability, environment, and safety—but metrics for the three other key performance areas—access, equity, and flexibility—are still preliminary. FAA has also set performance goals for NextGen through 2018, including goals to improve the throughput of air traffic at key airports by 12 percent over 2009 levels in order to reduce delays by 27

[14]FAA's NAV Lean project is an effort to streamline all policies and processes used to implemented instrument flight procedures, which includes PBN procedures. There are 21 recommendations in the final NAV Lean report, and the last of these will be implemented in 2017. See FAA, *Navigation (NAV) Procedures Project Final Report* (Washington, D.C.: September 2010).

[15]GAO-10-629.

[16]Pub. L. No. 112–95, § 214, 126 Stat. 11, 50-51 (2012).

[17]In May 2012, the NAC forwarded preliminary recommendations for high-level performance metrics to FAA. The NAC will formally address the recommendations in October 2012.

percent from 2009 levels, and achieve a 5 percent reduction in average taxi-time at key airports.[18]

Developing metrics and NextGen performance goals are positive steps, but much work remains, including finalizing agency targets for specific improvement areas and making a link between NextGen performance goals and metrics and NextGen improvements. For example, public information about FAA's near-term plans for implementing additional capabilities lacks specifics about the timing and locations of implementation. According to RTCA, a lack of published information with specific implementation dates and locations for NextGen capabilities is an obstacle to incentivizing airlines to equip their aircraft with additional NextGen avionics. Without a clearer picture of the return on investment—and the progress being made—aircraft operators may be hesitant to make business and operational decisions necessary to fully realize NextGen benefits. Measuring performance of near-term NextGen improvements will be critical for FAA management and stakeholders to assess various impacts, make investment decisions, and monitor NextGen progress. We will report on this issue in more detail as part of our ongoing near-term NextGen implementation work for this committee.

FAA Is Working to Identify and Develop a Cost-effective Mechanism to Encourage Operators to Equip with NextGen Technologies

While some operational improvements can be made with existing aircraft equipment, realizing more significant NextGen benefits requires a critical mass of properly equipped aircraft. Reaching that critical mass is a significant challenge because the first aircraft operators to purchase and install NextGen-capable technologies will not obtain a return on the investment until many other operators are similarly equipped. FAA estimates that NextGen avionics needed on aircraft to realize significant midterm NextGen capabilities will cost private operators about $5 billion to $7 billion through 2020. For example, according to the RTCA, it would cost from $150,000 to $650,000 to equip a regional jet with an RNP package, which is one of the technologies that allows for precision approaches.[19]

[18]The goals include improvements from the implementation of NextGen technologies, as well as other infrastructure improvements, such as new or improved runways.

[19]See RTCA, *NextGen Equipage: User Business Case Gaps,* A Report of the NextGen Advisory Committee in Response to Tasking from the FAA, September 2011.

The FAA Modernization and Reform Act authorized the creation of a program to facilitate public-private financing, such as loan guarantees and other credit assistance tools, for equipping general aviation and commercial aircraft with NextGen technologies.[20] According to FAA, the goal for an equipage program would be to encourage deployment of NextGen-capable aircraft sooner than would have occurred without such funding assistance in place. FAA is soliciting industry input about how to design and implement such a program but has yet to decide on how to incentivize this transition. Although authorized, no funding has been appropriated to establish a public-private financing program. According to FAA, it is working to understand what options exist for establishing a program even if it receives no appropriations toward the program.

FAA Faces Challenges in Maintaining Timely Delivery of Key Acquisitions

NextGen has significantly increased the number, cost, and complexity of FAA's acquisition programs, and it is imperative that these programs remain on time and within budget, particularly given current budget constraints and the interdependencies of many NextGen-acquisitions. In February 2012, we reported that most of the key NextGen-related acquisition programs were generally proceeding on time and on budget.[21] See appendix I for the current cost and schedule performance of select baselined NextGen and related acquisition programs. However, delays with the En Route Automation Modernization (ERAM) program—a critical program for NextGen—illustrate how delays can affect overall acquisition and maintenance costs as well as time frames for other programs. As we previously reported, ERAM's schedule delays and cost increase of $330 million over 4 years were associated with

- unanticipated risks associated with operational complexities at the selected sites,

[20] Pub. L. No. 112–95, § 221, 126 Stat., 54. This act also requires FAA to identify options to encourage the equipage of aircraft with NextGen technologies, including a policy that gives priority to aircraft equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) technology and the costs and benefits of each option. Id., § 222, 126 Stat., 54-55. The NAC has identified the specific avionics required to achieve NextGen midterm capability goals, as well as the types of operational benefits that would be necessary to incentivize particular parts of the fleet to further equip their aircraft with such avionics. In response, FAA has developed a set of potential solutions to ensure that early adopters reap early operational benefits—such as decreased flight times and fuel burn.

[21] GAO-12-223.

- insufficient testing to identify software issues before deployment at key sites,
- insufficient communication between the program office and field sites, and
- insufficient stakeholder involvement during system development and deployment.[22]

The delays with ERAM added an estimated $18 million per year to the costs of maintaining the system that ERAM was meant to replace. Additionally, ERAM is important to the on-time implementation of two other key NextGen acquisitions—Data Communications (Data Comm) and System Wide Information Management (SWIM).[23] In part because of ERAM's delay, FAA pushed the Data Comm program's start date from September 2011 to May 2012,[24] revised the original plan for the first segment of SWIM to mitigate the impact of ERAM delays on the SWIM program, and delayed the start date for segment 2A of SWIM from 2010 to July 2012.[25] Looking more broadly, the implementation of NextGen—

[22]These factors are consistent with the factors that we reported in GAO-12-223 as part of our overall assessment of FAA's major air traffic control acquisition programs—many of which have been long-standing challenges for FAA. These challenges, if they persist, will impede the implementation of NextGen, especially given interdependencies among many acquisition programs in which cost increases or delays in one program can affect the costs and schedules of others. We recommended that FAA further incorporate best practices into its acquisition processes by requiring cost and schedule risk analysis, independent cost estimates, and integrated master schedules that take into account acquisition time frames for entire programs and not just individual segments. FAA generally concurred with our recommendation and is working to further incorporate best practices into its acquisition process.

[23]Data Comm is intended to provide capabilities for pilots and controllers to transmit digital messages, eventually replacing the current analog voice communication system. SWIM will provide an information technology infrastructure that will enable information sharing among the multiple systems that make up the NAS.

[24]According to FAA, the DataComm start date was also influenced by changes to the fiscal year 2011 budget environment.

[25]As noted in appendix I, SWIM Segments 1 and 2A are currently on schedule.

both in the midterm (through 2020) and in the long term (beyond 2020)—will be affected by how well FAA manages program interdependencies.[26]

NextGen Organizational Structure Has Undergone Changes, but Leadership Roles and Responsibilities Remain Unclear

As we have previously reported, industry stakeholders have expressed concerns about the fragmentation of authority and lack of accountability for NextGen, two factors that could delay its implementation.[27] We have also found that programs can be implemented most efficiently when managers are empowered to make critical decisions and are held accountable for results.[28] To ensure accountability for NextGen results, several stakeholders have suggested that an office is needed that would report directly to the FAA Administrator or the Secretary of Transportation. Stakeholders have also cited challenges with coordinating implementation of NextGen capabilities across FAA lines of business. With multiple FAA lines of business responsible for various NextGen activities, including offices within FAA's Air Traffic Organization (ATO)[29] and outside ATO, coordination and integration is vital since delays in actions required from several offices could prevent or delay NextGen benefits. FAA has made organizational changes in the past in an effort to address these concerns.[30]

[26]According to FAA progress reports, since the ERAM program was rebaselined in June 2011, the program has made progress toward its target of declaring operational readiness date (ORD) of ERAM by 2014, including five en route centers with continuous use of ERAM and an additional four en route centers having passed initial operating tests using ERAM for at least part of the day. However, ERAM capabilities have yet to be installed and tested in the remaining 11 centers, which include New York, Washington, and Florida.

[27]GAO-09-481T.

[28]See GAO, *Best Practices: Better Support of Weapon System Program Managers Needed to Improve Outcomes*, GAO-06-110 (Washington, D.C.: Nov. 30, 2005). In this study of private sector best practices that could be applied to federal programs, we found that program managers at highly successful companies were empowered to decide whether programs were ready to move forward and to resolve problems and implement solutions. In addition, program managers were held accountable for their choices.

[29]The ATO is responsible for operating, maintaining, and modernizing the nation's air traffic control system.

[30]For example, in May 2008, FAA announced a reorganization of its NextGen management structure and created a new Senior Vice President for NextGen and Operations Planning who reported to ATO's Chief Operating Officer (COO). It also made the JPDO director report directly to this newly created position. Prior to this change, the JPDO director reported directly to both the COO and the FAA Administrator.

Beginning in 2011, FAA made additional changes to its NextGen organizational structure to address these long-standing issues. Specifically, FAA reorganized the structure of the office responsible for carrying out NextGen implementation, moving the office from within the ATO to under FAA's Deputy Administrator (who is currently serving as the Acting Administrator). According to FAA, this change increased NextGen's visibility within and outside the agency and created a direct line of authority and responsibility for NextGen. However, in February 2012, the FAA Modernization and Reform Act designated that the Director of the Joint Planning and Development Office (JPDO)—who is responsible for NextGen planning and coordination—report directly to the FAA Administrator[31] and created a new leadership position—the Chief NextGen Officer[32]—who will also report directly to the Administrator. The Chief NextGen Officer position has not yet been filled. FAA has not yet made the organizational changes called for by the act or clearly defined the relationships among the Deputy Administrator, Chief NextGen Officer, and JPDO director. According to FAA, no organizational changes will be made until the agency has a permanent FAA Administrator in place.

FAA also reorganized its NextGen efforts around its "Ideas to In-Service Management" (I2I) process. According to FAA, the I2I will support enterprise-level, cross-program management in bringing capabilities into the national airspace system and will formalize collaboration among NextGen program offices, ATO, and other relevant FAA organizations such as Aviation Safety. Within ATO, a new Program Management Office has been established to improve oversight of ATO's NextGen implementation efforts. According to FAA, by combining acquisition program managers into one organization, ATO will ensure more coordinated program management throughout the full life cycle of NextGen acquisitions. While an increased focus on accountability for NextGen implementation is a positive step, it remains to be seen whether this latest reorganization will produce the desired results without a clarification of NextGen leadership roles and the fulfillment of all the necessary leadership positions. As we have previously reported, leadership is a critical element of success for large-scale systems integration efforts like NextGen.

[31]Pub. L. No. 112–95, § 204, 126 Stat., 37.

[32]Pub. L. No. 112–95, § 208(a), 126 Stat., 40.

FAA Faces Challenges in Balancing the Needs of the Current and NextGen Systems and Addressing Infrastructure and Operational Issues That Transcend NextGen

Particularly in light of constrained budget resources, FAA will have to balance its priorities to help ensure that NextGen implementation stays on course. Sustaining the current legacy infrastructure remains critical, as it will continue to be the core of the national airspace system for a number of years, and some of its components will be part of NextGen. For example, while FAA transitions to satellite-based surveillance through the deployment of Automatic Dependent Surveillance-Broadcast (ADS-B) technology, the agency expects to continue to operate and maintain current radar technology through at least 2020. At that time, FAA is scheduled to make decisions about which radars the agency will decommission and which will be maintained as the back-up system for ADS-B. If either ADS-B's deployment or airlines' efforts to equip with this technology should slip, then FAA may have to maintain and operate some of its radars longer than expected. We have ongoing work for this committee that is further exploring how FAA is preparing for the transition to NextGen and balancing the demands of the legacy and NextGen systems, including potential implications for the legacy systems and FAA budgets if NextGen implementation is delayed.

In addition, to fully realize NextGen's capabilities, reconfiguring facilities that handle air traffic control will be required. FAA recently approved an initial plan to consolidate en route centers and terminal radar approach-control facilities (TRACONs) into large, integrated facilities over the next two decades. However, FAA has yet to make key decisions, such as where to build the first integrated facility. These decisions could affect future consolidation plans. While FAA develops its facilities plan, it faces the immediate task of maintaining and repairing existing facilities so that the current air-traffic control system continues to operate safely and reliably during the expected 20-year transition. According to FAA, in 2011, 65 percent of its terminal facilities and 74 percent of its en route facilities were in either poor or fair condition with a total deferred maintenance backlog of $310 million for these facilities. Once FAA develops and implements a facility consolidation plan, it can identify which legacy facilities to continue to repair and maintain and, in doing so, potentially reduce overall facility repair and maintenance costs.[33] FAA has

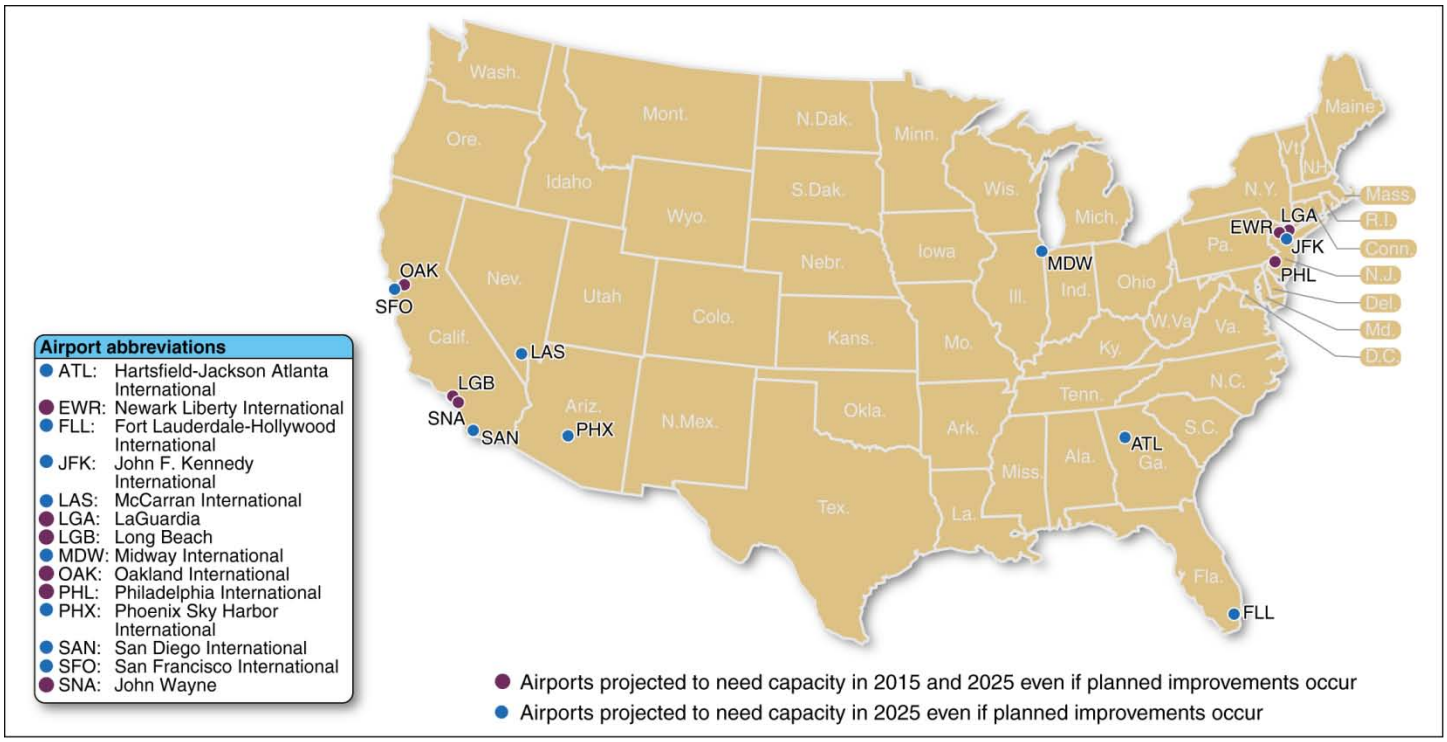
[33]As required by the FAA Modernization and Reform Act, we are reviewing FAA facility conditions, including identifying any conditions that could interfere with employees' ability to effectively and safely perform their duties. Pub. L. No. 112–95, § 610(a)(3), (c), 126 Stat., 117.

acknowledged the need to keep long-term plans in mind so that it does not invest unnecessarily in facilities that will not be used for NextGen.

Moreover, although NextGen is projected to keep delays at many airports from getting worse than would be expected without these improvements, NextGen alone is not likely to sufficiently expand the capacity of the national airspace system. For example, FAA's NextGen modeling indicates that even if all ongoing and planned NextGen technologies are implemented, 14 airports—including some of the 35 busiest—may not be able to meet the projected increases in demand (fig. 3).[34] The transformation to NextGen will also depend on the ability of airports to handle greater capacity. For example, decisions regarding using existing capacity more efficiently include certifying and approving standards for using closely spaced parallel runways. At some airports, policies may need to be developed to address situations where demand exceeds capacity (e.g., pricing, administrative rules, service priorities, and so forth). Planning infrastructure projects to increase capacity, such as building additional runways, can be a lengthy process and will require substantial advance planning and safety and cost analyses. Also, the improved efficiency in runway and airspace use that should result from some NextGen technologies may exacerbate capacity constraints in other areas, such as taxiways, terminal gates, or parking areas. Finally, increasing capacity must be handled within the context of limiting increases in emissions and noise that can affect the communities around airports.

[34]FAA is in the process of updating this analysis and anticipates completing its report in June 2013.

Figure 3: Airports Projected to Need Additional Capacity in 2015 and 2025, Even If Planned Improvements Occur



Source: GAO analysis of FAA data; MapArt (base map).

Chairman Petri, Ranking Member Costello, and Members of the Subcommittee, this concludes my prepared statement. I would be pleased to answer any questions that you may have at this time.

GAO Contact and Staff Acknowledgments

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Appendix I: Selected Baselined NextGen and Related Programs Cost and Schedule Performance as of July 2012

Dollars in millions

Program	Description	Start date	Original completion date	Projected completion date	Difference between original and projected completion dates (in months)	Original cost	Projected cost as of July 2012	Difference between original and projected cost
Automatic Dependent Surveillance Broadcast (ADS-B)	A satellite-based information broadcasting system to enable more precise control of aircraft	Aug. 2007	Sept. 2014	Sept. 2014	0	$1,682	$1,726	$45[a]
Collaborative Air Traffic Management (CATM)- includes work packages 1-3	Encompasses the development of systems to manage airspace and flight information	Aug. 2005	Dec. 2015	Dec. 2015	0	561	561	0
Data Communications-includes segment 1 phase 1	Provides data transmissions directly to pilots and their flight management systems	May 2012	Fiscal year 2019	Fiscal year 2019	0	1,519	1,519	0
System Wide Information Management (SWIM)-includes segment 1	The information management architecture for the national airspace system	July 2009	Sept. 2015	Sept. 2015	0	310	310	0
System Wide Information Management (SWIM)-includes segment 2A	The information management architecture for the national airspace system	July 2012	Dec. 2017	Dec. 2017	0	120	120	0
Time-Based Flow Management (TBFM)	Modernizes the Traffic Management Advisor (TMA) system aimed at integration of airport and air traffic control information	April 2010	Nov. 2014	Nov. 2014	0	115	115	0

Dollars in millions

Program	Description	Start date	Original completion date	Projected completion date	Difference between original and projected completion dates (in months)	Original cost	Projected cost as of July 2012	Difference between original and projected cost
En Route Automation Modernization (ERAM)	A new enroute air traffic control system for high altitude traffic	June 2003	Dec. 2010	Aug. 2014	44	2,155	2,485	330

Source: GAO analysis of FAA data.

[a]According to FAA, this difference is the result of additional work added to the ADS-B program baseline in March 2011 and includes congressional earmarks of $9.3 million in fiscal 2008 and $6.8 million in fiscal year 2009 as well as an additional $15 million held in reserve to mitigate potential automation risks. In addition, the Colorado Wide Area Multilateration Phase II was added to the program ($13.6 million).