STATEMENT OF VICTORIA COX, SENIOR VICE PRESIDENT FOR NEXTGEN AND OPERATIONS PLANNING SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION, ON AIR TRAFFIC CONTROL MODERNIZATION AND NEXTGEN: NEAR TERM ACHIEVABLE GOALS, BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, MARCH 18, 2009.

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

Thank you for inviting me here today to discuss the current state of the Federal Aviation Administration's (FAA) efforts on air traffic control modernization and the near term goals of the Next Generation Air Transportation System (NextGen).

Defining NextGen: The Basics

NextGen is a wide-ranging transformation of the entire national air transportation system to meet future demand and support the economic viability of the system while reducing delays, improving safety, and protecting the environment. NextGen will change the way the system operates – reducing congestion, noise, and emissions, expanding capacity and improving the passenger experience. NextGen is a highly complex, multilayered, long-term evolutionary process of developing and implementing new technologies and procedures. NextGen is **not** a single piece of equipment or a program or a system that will instantaneously transform the air transportation system. NextGen builds on legacy systems to increase capability in today's National Airspace System (NAS), adds new performance-based procedures and routes, and ultimately delivers programs that transform the NAS. NextGen takes advantage of new technology that is similarly being used to transform our personal lives and the way we do business, such as GPS, analog-to-digital, and network to network data sharing.

Defining NextGen: The Need

Although it is extremely safe, the current system is not performing adequately. Our preeminence as a nation in air transportation is not assured. NextGen is needed to bring to air transportation the same twenty-first century processes that give operations in other industries reliability, flexibility, and predictability.

Even in the face of falling demand and reduced capacity, we've seen congestion continue in our busiest airspace. We know that we must be poised to handle future demand that will surely return as the nation's economy improves. In fact, the aviation sector will be an important factor in the nation's economic recovery. In 2006, the FAA's Air Traffic Organization reported that civil aviation accounted for 11 million jobs and represented 5.6% of the Gross Domestic Product; and, according to the FAA's calculations using U.S. International Trade Commission's reported trade data statistics, at $61 billion, aerospace products and parts contributed more to the positive balance of trade than any other sector - $32 billion more than the next highest contributor.

NextGen must also address the constraints that will be levied on the air transportation system by environmental impacts from aircraft noise and emissions and concerns about energy. Increased efficiency with NextGen operations will lead to reduced fuel consumption resulting in lower carbon emissions. NextGen investments in engine and airframe design and alternative fuels will produce the changes needed to reduce the environmental impact of aviation.

NextGen will also increase the safety of an already exceedingly safe system. NextGen further enables FAA's transition from traditional forensic investigations of accidents and incidents with a prognostic approach to improving safety. NextGen promotes the open exchange of pertinent safety information to continuously improve aviation safety.

NextGen: Organizational Structure

As the Members of this Committee are well aware, in December 2003, Congress enacted Vision 100 (Public Law 108-176) and established, within the FAA, the Next Generation Air Transportation System Joint Planning and Development Office (JPDO). Since its founding in 2004, the JPDO has produced a national vision statement, a multi-agency research and development roadmap, a description of operational concepts to meet system performance requirements, a multi-agency enterprise architecture, and – in 2008 – an integrated work plan.

The integrated work plan captures at a high level the NextGen planning of all the JPDO partner agencies – the Department of Transportation (DOT), the Department of Defense (DoD), the Department of Commerce (Commerce), the Department of Homeland Security (DHS), and the National Aeronautics and Space Administration (NASA). With the delivery of the integrated work plan, the JPDO has produced the major deliverables required by Vision 100. JPDO must continue to work with the partner agencies to maintain an updated integrated plan, and agencies must move forward with implementation.

A year ago, we received several recommendations from varied sources about how we should deliver NextGen. The Senior Policy Committee of the JPDO asked us to accelerate NextGen, to shift from concept development to execution. Stakeholders continually asked for a single point of accountability for NextGen. Industry wanted more focused oversight by FAA of JPDO deliverables; and most experts recognized that the Air Traffic Organization (ATO), as the operator of the national airspace system, has ultimate responsibility and accountability for NextGen implementation in that system.

In response to these recommendations, the NextGen and Operations Planning Organization, under my leadership as a Senior Vice President in the Air Traffic Organization, was made accountable for delivering NextGen to the National Airspace System, the NAS. I am responsible for implementation of all elements of NextGen and have authority over all matters related to FAA NextGen research, technology development, acquisition, integration, and implementation including allocation within the FAA of NextGen budgets. My organization is made up of offices focused on NextGen delivery including the NextGen Integration and Implementation Office. This Office manages the integration of all NextGen activities within the FAA, ensuring that the planning and programming of the NextGen portfolio is coordinated across the FAA and with external stakeholders. It also develops and publishes the FAA's NextGen Implementation Plan and manages NextGen portfolio performance.

The Director of the JPDO continues to provide vital assistance to the government-wide implementation of NextGen by encouraging and facilitating cooperation among partner

departments and agencies and sponsoring industry participation in NextGen planning and development. JPDO also continues to develop a long-term vision for the air transportation system and aligns the necessary cross-departmental research to support that vision.

The FAA has maintained the NextGen Review Board and the NextGen Management Board, the governance structure that we put in place with the decision to use the successful Operational Evolution Partnership (OEP) as our framework for achieving NextGen. The NextGen Management Board is chaired by the Deputy Administrator and composed of FAA Associate Administrators, the Air Traffic Organization (ATO) Chief Operating Officer, ATO Senior Vice Presidents, the Director of the JPDO and representatives of the National Air Traffic Controllers Association (NATCA) and the Professional Aviation Safety Specialists (PASS). This is the Agency's senior governing body for NextGen. The NextGen Review Board - composed of FAA executives - looks at more technical issues including approving and prioritizing NextGen activities and making funding recommendations. So, we have a structure in place designed to achieve the NextGen vision and provide a steady stream of improvements to the air transportation system.

Impact of Executive Order 13479

This Executive Order, "Transformation of the National Air Transportation System," expressed Executive Branch support for the national air transportation system policy set forth in Vision 100. The order outlines functions of the Secretary of Transportation and the Senior Policy Committee (SPC) and specifies mechanisms to strengthen their role and elevate accountability. These mechanisms include establishing a staff within the DOT to support the Secretary and SPC in their NextGen duties, assuring that maximum value is obtained from the participation of the department and agency heads on the committee. They also include establishing an advisory committee to provide advice to the Secretary and SPC on the implementation of NextGen in a safe, secure, timely, environmentally sound, efficient, and effective manner.

The Order does not change the fundamental roles and responsibilities of the JPDO. The JPDO will continue to facilitate, coordinate and support cooperation among the partner departments and agencies. The JPDO will continue to manage the agenda for the JPDO Board and to gain private sector input through the NextGen Institute. The JPDO will also continue to be instrumental in the development of issues and topics for SPC attention. Because the coordination staff serves as a liaison between the Secretary and the partnering agencies, the staff will serve as an effective and efficient means of elevating JPDO interagency issues for attention.

NextGen: Progress to Date

The FAA officially began its development of NextGen in fiscal year 2007 by identifying and funding two transformational programs: Automatic Dependent Surveillance – Broadcast (ADS-B) and System Wide Information Management (SWIM). From that $109 million investment in 2007, and supported by sound evaluations and planning, FAA funding for NextGen grew to $202 million in fiscal year 2008 and $688 million this fiscal year. The fiscal year 2010 budget includes approximately $800 million for NextGen. The detailed planning results that are published in the January 2009 National Airspace System Enterprise Architecture (NASEA) and FAA's NextGen Implementation Plan support these funding numbers.

Moreover, this past year, we have seen the contributions to NextGen resulting from cross-department and cross-agency cooperation increase significantly. Through the cross-agency support provided by the JPDO and its SPC:

- FAA established a government-wide Safety Management System standard for implementation at the agencies;
- NextGen's collaborative weather initiative includes the active participation of Departments of Commerce, Defense and the FAA;
- FAA and NASA are working to establish a research consortium to accelerate development of lower energy, emissions, and noise technologies;
- DoD has established a net-centric division within the JPDO and is working with the FAA and other partner agencies on net-centric information sharing;
- FAA is working on integrated aviation surveillance with DoD and DHS;
- DoD formed an office within the Air Force to act as their coordinating office for all NextGen matters;

- DoD, DHS and FAA jointly invested in a demonstration of Network Enabled Operations technology;
- FAA, NASA, DOC, and USDA endeavors to foster sustainable alternative fuels; and
- JPDO has facilitated technology transfer from NASA to FAA with the formation of Research Transition Teams.

We have continued to make significant progress in the implementation and use across the FAA of the NAS Enterprise Architecture (NASEA) as a mechanism for governing the evolution of the current NAS to NextGen. The NASEA, published in January of this year, lays out important, detailed information, on the NAS mid-term architecture. This mid-term focus is a key step in the FAA's ability to move forward with NextGen implementation. Our progress in implementing and upgrading the NASEA as part of continuous improvement initiatives was a key factor in this year's removal of the FAA from the GAO's High Risk List.

Another product of the past year is the publication by the National Academy of Public Administration (NAPA) of a report titled "Identifying the Workforce to Respond to a National Imperative…the Next Generation Air Transportation System (NextGen)." The study behind the report was commissioned by the FAA with the objective of identifying skill sets needed by the non-operational (acquisition) workforce to design, develop, test, evaluate, integrate, and implement NextGen systems and procedures and the strategies to obtain the needed skills. FAA is currently in the process of determining how to implement the NAPA recommendations.

Last year, FAA conducted preliminary modeling of a series of NextGen capabilities. Preliminary results showed that by 2018 total flight delays will be reduced by 35-40 percent, saving almost a billion gallons of fuel. This is compared to the "do nothing" case, which shows what would happen if we operate in 2018 the same way as today. The current model includes approximately one third of the planned NextGen improvements. As our model matures we expect that benefit values will increase. Bottom line: by 2018, total flight delays and fuel use will be significantly reduced, while more flights can be accommodated.

FAA is working closely with all aspects of the aviation community to make NextGen a reality. We're partnering with several of the nation's air carriers for trials and demonstrations; we're engaging with universities like Embry Riddle. The FAA has established an integrated demonstration capability in Florida where, working with a wide range of government, university and industry partners, we are evaluating NextGen technologies. We're working with airport authorities, manufacturers and with government bodies and industry from around the world. We are collaborating with JPDO Working Groups, RTCA, and other industry groups to integrate stakeholder requirements into government commitments.

NextGen transformational programs made significant advances over the past year. ADS-B has been deployed in southern Florida and is being deployed in the Gulf of Mexico, where we have never had radar coverage. In December, FAA achieved its In-Service Decision for ADS-B in southern Florida. Achievement of this major milestone clears the way for national deployment of broadcast services. The National Aeronautics Association recognized ADS-B last year by presenting the ADS-B team with its Collier Trophy. This award is given yearly for "the greatest achievement in aeronautics or astronautics in America with respect to improving the performance, efficiency and safety of air or space vehicles." The Collier award is generally recognized as the epitome of aviation innovation and excellence.

The SWIM program, Data Communications, and NAS Voice Switch achieved major acquisition milestones, and NextGen Network Enabled Weather (NNEW) conducted demonstrations of the integration of weather data into automated decision support tools. This is a necessary step in the realization of improved management of weather in the NAS.

The latest version of the FAA's NextGen Implementation Plan was published in January 2009. This edition of the plan focuses on answering five fundamental questions: What does NextGen look like in 2018; what aircraft avionics are needed to support operations in 2018; what benefits will be delivered by 2018; what is the FAA specifically committed

to deploy in the near-term that makes the most of existing resources; and what activities are underway to support future capabilities?

While the focus of the FAA's NextGen Implementation Plan is on the mid-term, the plan, coupled with the NAS Enterprise Architecture, provides a picture of near-term (2009-2013) deliverables. FAA's near-term NextGen implementation efforts are targeted across three broad areas: airfield development, air traffic operations, and aircraft capabilities. Together, these efforts will increase capacity and operational efficiency, enhance safety, and improve our environmental performance. We are moving forward with a dual-pronged approach: maximizing the use of untapped capabilities in today's aircraft and ground infrastructure, while working aggressively to develop and deploy new systems and procedures that will form a foundation for more transformative capabilities that will be delivered in the mid-term. We believe this approach allows both government and industry to extract the greatest value from existing investments, while positioning the industry to gain exponential benefits in the mid-term and beyond.

NextGen is reaping the benefits originated under the OEP. New runways provide significant capacity and operational improvements. In November 2008, three major new runways opened: at Seattle-Tacoma, Washington Dulles, and Chicago O'Hare International Airports. The Seattle runway is expected to cut local delays in half by increasing capacity in bad weather by 60 percent, while the new runway at Dulles will provide capacity for an additional 100,000 annual operations. The new Chicago runway, which added capacity for an additional 52,300 annual operations, is a part of the greater O'Hare Modernization Program (OMP) that will reconfigure the airport's intersecting runways into a more modern, parallel layout. The OMP will substantially reduce delays in all weather conditions and increase capacity at the airfield, allowing O'Hare to meet the region's aviation needs well into the future. Looking forward for the next five years, the FAA has additional runway and taxiway improvement projects planned at a number of airports, including Charlotte, Dulles, Houston, Denver, Philadelphia, and, as mentioned, Chicago.

While airfield improvements offer significant capacity increases, they alone are not enough to address current problems at certain airports, or the growth in demand we expect in the future. New technology and procedures can help us gain extra use from existing runways.

Today, capacity for closely spaced parallel runway operations (CSPO) is dramatically reduced in poor visibility conditions. We are working on capabilities that allow for continued use of those runways in low visibility conditions by providing precise path assignments that provide safe separation between aircraft assigned on parallel paths, restoring capacity and reducing delays throughout the system. In November 2008, we published a national order that allows us to safely reduce separation between aircraft approaching parallel runways at Boston, Cleveland, Philadelphia, St. Louis and Seattle. In good visibility Seattle's pair of parallel runways, together, could handle roughly 60 operations per hour; poor visibility conditions cut that rate in half. Even in poor visibility, the new order now safely allows a rate of about 52 operations per hour, a significant improvement for the airport and its users. We are also beginning to see similar benefits in Boston.

This order is a first step in a phased approach for safely increasing the use of CSPOs through a combination of procedural changes and new ground and aircraft equipment. Down the road, new rules for CSPOs could give airports more design flexibility so that they can safely build runways more closely together, increasing their capacity within their existing boundaries, providing better service to their communities without requiring additional land.

Performance-based navigation is another building block for NextGen. Performance-based routes and procedures result in shorter distances flown, which add up to both fuel and time savings. Fuel savings equate to reduced emissions, enhancing environmental performance. Safety is increased as air traffic operations become more predictable. Performance-based navigation includes Area Navigation (RNAV) and Required Navigation Procedures (RNP), which allow equipped aircraft to fly more direct and precise paths, reducing flight time and fuel use, as well as localizer performance with

vertical guidance (LPV) procedures, which can increase access to airports, especially in low visibility conditions.

Advances in performance-based navigations procedures and routes allow for optimal use of airspace. The FAA maximizes the use of airspace, especially in congested areas, through targeted airspace and procedures enhancements. Continuing work in the New York area includes integration of RNAV procedures, relocation and expansion of airways, airspace reconfiguration, and creation of optimal descent procedures. In the Chicago area, the FAA is adding departure routes and changing procedures to allow for triple arrivals. In southern Nevada, the FAA is optimizing existing airports and airspace. Houston will also see additional departure routes and arrival procedures, along with improved procedures to avoid severe weather.

Operators like Southwest Airlines recognize the value of performance-based navigation. The airline made the business decision early last year to equip its entire fleet for RNAV and RNP procedures. The company envisions building a network of RNP routes for their system. Southwest believes its $175 million investment can be recouped within the next three to five years because of the operational efficiencies RNP offers. We are currently working with Southwest on a pilot project to build RNAV/RNP routes between Texas' Dallas Love Field and Houston Hobby airports.

Today, more than three-quarters of commercial aircraft are equipped for RNAV, and almost half of these are equipped for RNP precision procedures. Likewise, more than 20,000 aircraft are equipped for LPVs. This level of equipage provides an excellent opportunity for the aviation community use what it already has to produce ever-greater benefits. FAA has responded: last year the agency beat its own goals, publishing more than 600 performance-based navigation procedures and routes, versus our goal of almost 400. The FAA plans to keep up this pace each year for the next four years.

Because the realization of NextGen benefits is integrally linked to how quickly the airlines equip their aircraft, it is imperative that the FAA work closely with industry on NextGen deployment. As such, the FAA has established a NextGen Implementation

Task Force under the auspices of the Air Traffic Management Advisory Council that serves as a federal advisory committee to the Air Traffic Organization. The task force will provide recommendations on how to move forward together on implementation. FAA's governing principles for accelerating equipage, published in the January 2009 FAA's NextGen Implementation Plan, provide a starting point for this work. These principles focus on mitigating the risk for early adopters of NextGen avionics, while providing the maximum operational benefits in the airspace where they're most needed. They also focus on international interoperability, and incentivizing the equipage of aircraft that meet the agency's evolving environmental standards. The Task Force will deliver recommendations to the FAA in August 2009.

Our current national airspace system is safer than it has ever been. However, new means are required to ensure this remains the case as we transform the NAS. NextGen will continue that trend in the face of increasing traffic and the introduction of very light jets, unmanned aerial vehicles, and commercial space flights. To continue to minimize risk as we introduce a wave of new systems and procedures over the next decade, the aviation community will continue its move to safety management systems and other aspects of proactive management, where trends are analyzed to uncover problems early on. This allows preventive measures to be put in place before any accidents can occur. An important part of NAS modernization, the FAA's Aviation Safety and Information Analysis and Sharing program (ASIAS), provides a suite of tools that extract relevant knowledge from large amounts of disparate safety information. ASIAS also helps FAA and our industry partners to monitor the effectiveness of safety enhancements. In use today, ASIAS will ensure that the operational capabilities that produce capacity, efficiency and environmental benefits are first and foremost inherently safe. ASIAS has already demonstrated the ability to measure the performance of safety solutions to known problems, such as Loss of Control, Controlled Flight Into Terrain, Runway Incursion, Approach, and Landing Accident Reduction. Additionally, ASIAS has demonstrated the ability to detect new safety issues, such as terrain avoidance warning system alerts (TAWS) at mountainous terrain airports and identify solutions that have the potential to virtually eliminate these threats. Between now and fiscal year 2013, the FAA intends to

increase the number of databases ASIAS can access; expand ASIAS to include maintenance/air traffic information; increase membership by adding regional air carriers; increase community stakeholders to include general aviation, helicopter and military; and increase the automated search capabilities.

The primary environmental and energy issues that will significantly influence the future capacity and flexibility of the NAS are aircraft noise, air quality, global climate effects, energy availability, and water quality. Aviation accounts for approximately three percent of direct greenhouse gas emissions, and national and international concerns about climate impacts could constrain the industry in the future, if not properly addressed. An environmental management system approach will be used to integrate all environmental and energy considerations into core NextGen business and operational strategies.

In 2009, we are moving forward on a research consortium called Continuous Low Emissions, Energy and Noise (CLEEN), which will allow us to work with industry to accelerate the maturation of technology that will lower energy, emissions and noise. CLEEN also seeks to advance renewable alternative fuels for aviation. These fuels not only improve air quality and reduce life cycle greenhouse emissions, but also enhance energy security and supplies. FAA helped form – and is an active participant in – the Commercial Aviation Alternative Fuels Initiative, or CAAFI. Alternative fuels will be the "game changer" technology that gets us closer to carbon neutrality. Assuming funding, significant deliverables in the FY09-13 period include demonstrations of clean and quiet aircraft technologies that can be transitioned into new products and used to retrofit existing products, approval of generic renewable fuels for aviation, and models and guidance to improve our ability to quantify environmental costs and benefits and to optimize solutions, including those to address CO2 and non-CO2 aviation climate impacts.

Next Gen: Partner Agency Progress and Plans

As noted above, the JPDO facilitates the efforts of the partner departments and agencies to develop and deliver on NextGen.

In order to effectively manage and foster their cross-agency interactions, the FAA, NASA, and the JPDO constituted four research transition teams (RTT) during this year. The RTTs build upon the FAA's prior successful deployments of NASA-developed technologies, such as the Traffic Management Advisor with enhancements for major metropolitan areas and surface management tools. These teams impact near- and far-term capabilities stretching from the en route airspace to the terminal and surface including traffic flow management. In the near-term, the FAA is developing implementation requirements through joint demonstrations, such as Three-Dimensional Path Arrival Management, while NASA researchers are gathering data to further extend trajectory based operations through the same demonstration. By engaging earlier in the research, the FAA and NASA are now able to synchronize their plans to insure that NASA-developed products can be sufficiently matured for mid-term implementation. And in the far-term, the FAA is providing subject matter expertise to help guide the NASA research concepts.

The FAA, NOAA, and the DoD formed a NextGen Executive Weather Panel (NEWP), with senior executive agency principals to guide and review planning, budgeting, and implementation of required NextGen weather capabilities. The NEWP has provided continuous oversight into the development of an interagency plan to deliver an initial NextGen weather information database with an initial operational capability date of 2013, as well as an integrated strategy to incorporate the weather information directly into legacy and future NextGen systems. Both plans will be completed this fiscal year and implementation activities have already commenced.

We are working closely with DoD and the DHS through the JPDO on a number of important initiatives. Among them is the development of the first integrated interagency homeland air surveillance Concept of Operations, or CONOPS, the federal government has ever prepared. The Air Force is leading the interagency CONOPS effort, with the goal of interagency coordination of capabilities for national surveillance.

The DoD is leading the NextGen net-centric operations planning and coordination of implementation. So far, DoD has led development of a mid-term implementation plan

for an interagency net-centric capability that is aimed at implementation in the 2012 - 2016 timeframe. They have also led the demonstration of a limited Services Oriented Architecture information capability that will serve as the foundation for a NAS-wide implementation by 2025.

The DoD is maintaining and increasing the capabilities of the Global Positioning System (GPS), which is the foundation for NextGen navigation and surveillance. The continued funding and integrity of the planned launch schedule of the GPS constellation is vital to the nation moving ahead with NextGen. NextGen could benefit from the potential for greater efficiency of arriving and departing aircraft in all operating environments. To bolster this, the DoD is actively pursuing the development of the Joint Precision Approach and Landing System (JPALS).

FAA is collaborating with the DoD and DHS to support UAS operations in North Dakota from Grand Forks AFB. An interagency task force is developing a course of action. All options will be examined: procedural, technological, airspace. The task force will also look at using existing techniques in unique ways. The group is tasked with completing safety analysis and implementing a course of action no later than Summer 2010.

We are pursuing implementation of adaptive and predictable special use airspace. By leveraging emerging technologies such as ADS-B, Military Airspace Data Entry, etc, the Air Force in coordination with the FAA is pursuing the ability to dynamically define airspace and activate/de-activate only that portion of published special use airspace required for a particular mission. Additionally, the Air Force and FAA are collaborating on a concept that would allow expansion/relocation of Air Traffic Controlled Assigned Airspace (ATCAA) on a daily basis, to meet changing military training needs and freeing up unneeded airspace to enhance air traffic flow in the NAS.

Over the next few years, the FAA and DHS will develop an Integrated Risk Management System (IRM), which understands and prioritizes the threats, consequences, and vulnerabilities that can be exploited by potential adversaries, and determines which actions can provide the greatest total risk reduction for the least impact on limited

resources. DHS also continues to develop passenger, baggage and cargo screening technologies to more effectively mitigate all known air travel threats. The new checkpoint evolution concept, including whole body imaging and behavioral pattern recognition, will also aid threat detection. Cargo screening processes will be enhanced with prevention and detection screening capabilities that require screening prior to entering the air transportation system. These improvements will be accomplished by expanding and sharing the delivery of passenger, baggage and cargo security information with appropriate transportation stakeholders.

NextGen: FAA Near-Term Deliverables (2009-2013)

FAA continues to make progress with our transformational programs. These are the long-lead time acquisition programs. They are progressing in the acquisition process, laying the foundation for NextGen applications and will reap benefits for years to come. Of the five initially identified as transformational NextGen programs, ADS-B is most advanced; but all are projecting substantial advances between now and 2013. A brief description of these programs is shown on Figure 1 (attached).

Significant planned deliverables for the transformational programs – ADS-B, SWIM, Data Communications, NextGen Network Enable Weather and the NAS Voice Switch – are depicted in Figure 2 (attached).

The FAA is focusing on reaping maximum capability in the near term from existing equipage and infrastructure. We are also continuing with our pre-acquisition research, analyses and technology development that support concept and requirements development and with our demonstration projects, which further advance the maturity of requirements and contribute significantly to our understanding of future benefits. Crucial to our analysis efforts is an on-going assessment of critical gaps in FAA and cross-department NextGen architectures and planning.

JPDO completed a gap analysis of NextGen partner agency programs against the Integrated Work Plan. It identified seven critical interagency focus areas, including various air traffic management research topics, research to mitigate environmental

constraints, security risk management, and the verification and validation of complex systems. FAA was identified as the lead for three of the focus areas, NASA for two, DHS for one, and JPDO for one. Working with the partner agencies, the JPDO will incorporate operational improvements that address these gaps into the Integrated Work Plan and through the governance process, including the JPDO Board and SPC, will encourage partner agencies to include activities that support these operational improvements in their implementation plans and future year budgets.

FAA has completed a preliminary internal gap analysis against the mid-term NAS Enterprise Architecture that was delivered in January 2009. This is part of an on-going assessment of critical gaps in FAA and cross-department NextGen architectures and planning. We will deliver in Fiscal Year 2009 (anticipated August 2009 delivery), a gap analysis that includes requirements for addressing identified shortfalls.

Carefully planned and implemented pre-acquisition activities such as those described above significantly reduce risks in the development and implementation of complex systems such as NextGen.

As we transition to NextGen over the next few years, we are anticipating noteworthy progress with these activities as depicted in Figures 3 and 4 (attached).

Conclusion

As you can see, we are working steadily and carefully to bring NextGen to fruition. Our programs are currently on track, our partnerships are strong. We have mapped out our course and we are moving towards our goals, and we look forward to your continued guidance and oversight as we go forward.

Mr. Chairman, this concludes my prepared remarks. I would be happy to answer any questions you and the Members of the Subcommittee might have.

Figure 1: Descriptions of NextGen Transformational Programs

Automatic Dependent Surveillance – Broadcast (ADS-B)

- Moves air traffic control from a system based on radar to one that uses satellite-derived aircraft location data
- Aircraft transponders receive GPS signals and use them to determine the aircraft's precise position in the sky, which is combined with other data and broadcast out to other aircraft and air traffic controllers
- Offers more precision and additional services than radar, such as weather and traffic information.
- When properly equipped with ADS-B, both pilots and controllers will, for the very first time, see the same real-time displays of air traffic, thereby substantially improving safety.

Data Communications (Data Comm)

- Current use of voice communication is labor intensive, time consuming, and limits the ability of the NAS to effectively meet future traffic demand
- Transitions from the current decades old analog voice system to a predominantly digital mode of communication
- Provides data transmissions directly to pilots and their flight management systems, enabling more efficient operations, including trajectory-based routing, that evolve air traffic from short-term tactical control to managing flights gate-to-gate strategically
- Supports safety-of-flight command, control and information services by providing comprehensive data connectivity, including ground automation message generation, transmission and routing
- Automates repetitive tasks, supplements voice communications with less workload-intensive data communications and enable ground systems to use real-time aircraft data to improve traffic management

NextGen Network Enabled Weather (NNEW)

- Aids in reducing weathers impact in the NAS
- Defines, develops, and provides the FAA's portion of the inter-agency infrastructure known as the 4-Dimensional Weather Data Cube
- Will provide universal access to global aviation weather information in a SWIM-compatible network

NAS Voice Switch Activities (NVS)

- Replaces the current switch infrastructure of 13 different types of switches, with a single switch architecture that will meet NextGen operations, which require a more agile and flexible voice communication architecture
- Single switch will be able to be re-configured faster than today's switches allow
- Will be network-capable to allow for the better access to voice communication assets that will be needed for future NAS operations
- Allows for NextGen operations such as load-sharing and load balancing across facilities, airspace sharing, collocations and consolidations, business continuity planning, and virtual tower operations

System Wide Information Management (SWIM)

- Promotes the use of web services to share data between FAA systems, other agencies, and NAS users
- Leverages existing systems and networks, and will be based on technologies that have been proven to reduce cost and risk

Figure 2: NextGen Transformational Program Deliverables (FY09-FY13)

FY 2009

Automatic Dependents Surveillance – Broadcast (ADS-B)

- Louisville Service Acceptance Test (SAT)
- Gulf of Mexico SAT
- Philadelphia SAT
- Gulf of Mexico VHF Voice Communications Initial Operating Capability

Data Communications (Data Comm)

- Draft and begin validation of standards for avionics required for Data Comm operations
- Conduct human factors and operations research to develop concept of use for Data Comm

National Airspace System (NAS) Network Enabled Weather (NNEW):

- Demonstration of interagency Net-Enabled data sharing/interoperability
- Finalize Version 2 of the Data and Service Standards for IOC products for the 4-D Weather Data Cube

NAS Voice Switch Activities (NVS):

- Finalize initial requirements document
- NVS draft Specification
- Draft NVS functional architecture
- Legacy case cost analysis

System Wide Information Management (SWIM):

- Standards/guidance to SWIM implementing programs on SWIM Segment 1 core capabilities
- Service container software to implementing programs
- Code and test of initial Segment 1 capabilities
- Conduct analyses and prepare documentation for Final Investment Decision for Segment 2

FY 2010

ADS-B

- Juneau SAT
- Louisville Initial Operating Capability (IOC) of Surveillance Services
- Gulf of Mexico IOC for Surveillance Services
- Philadelphia IOC of Surveillance Services
- Juneau IOC of Surveillance Services
- Final Rule Published
- Critical Surveillance Services In-Service Decision for ADS-B
- Complete installation of 340 (of 794 total) ground stations

Data Comm

- Screening Information Request (SIR) release for Data Comm Network Service provider acquisition

NNEW

- Data and service standards products that will be used at IOC for the 4-D Weather Data Cube will be mature
- Demonstration of limited 4-D Weather Data Cube functionality including fault tolerance and federation of the registry/repository

NVS

- Initial Investment Decision

SWIM:

- Final requirements specification for Segment 2
- Final Investment Analysis for Segment 2 capabilities
- System integration and test for Aeronautical Information Management (AIM) portion of Special Use Airspace Automated Data Exchange capability
- Code and test for Integrated Terminal Weather System (ITWS) Data Publication
- Design and prototype for Pilot Report (PIREP) Data Publication
- Code for Initial Flight Data Services
- Requirements analysis for additional Traffic Flow Management (TFM) capabilities
- Requirements definition and prototyping for Terminal Data Distribution System (TDDS)

FY 2011

Data Comm

- Final Investment Decision for Data Comm Network Service provider acquisition
- Contract award for Data Comm Network Service provider acquisition

NNEW:

- Service adapters for selected legacy FAA systems
- Architecture for the 4-D Weather Data Cube

NVS:

- Screening Information Request (SIR) released
- Final Investment Decision
- Contract award

SWIM:

- TFM initial flow object prototype
- ITWS integration and test
- TDDS design
- SWIM Segment 1 capability deployment – Corridor Integrated Weather System (CIWS)

FY 2012

Data Comm

- Final Investment Decision for En Route automation enhancements acquisition
- Task order for En Route automation enhancements acquisition awarded

NNEW:

- Installation of initial set of hardware and software for FAA's portion of 4-D Weather Data Cube
- Demonstration of full IOC system in preparation for Operational Test & Evaluation (OT&E)

NVS:

- Switch Development/Modification initiated

SWIM:

- SWIM Segment 1 capability deployment – Weather Message Switching Center Replacement (WMSCR)
- TDDS deployment

FY 2013

ADS-B

- Installation completed at all remaining ground stations as well as NAS-wide Deployment of Essential and Critical services

Data Comm

- Training and operations policies developed to support use of Data Comm

NNEW:

- FAA-National Oceanic and Atmospheric Administration (NOAA) 4-D Weather Data Cube OT&E
- Weather Data Cube IOC

NVS:

- Initial system deployment at selected Key site(s)
- System testing initiation

SWIM:

- SWIM Segment 1 capability deployment - AIM, En Route Automation Modernization (ERAM), TDDS

Fig. 3: Selected Other NextGen Deliverables
(FY09-FY13)

FY 2009

Alternative Fuel Availability Targets
- 50% FT generic blends including biomass/coal/gas (FT = Fischer-Tropsch process for gasifying material and converting it to fuels)

Gap Analysis & Requirements

High Altitude Airspace Management Program
- Five geographic Q-Route corridors and transition of national playbooks
- National transition from ground-based navaids to area navigation to support foundation for NextGen

High Altitude Airspace Management Program
Improved Special Use Airspace/ATCAA access
- Adaptive airspace trials (2009-2010)

FY 2010

Alternative Fuel Availability Targets
- 100% FT generic including biomass
- 50% Hydrotreated Renewable Jet fuel

FY 2011

High Altitude Airspace Management Program
Navigation Reference System (NRS) Expansion
- Smart expansion to support key applications and NRS/Global Area Reference System integration (2011)

FY 2012

High Altitude Airspace Management Program
NRS Expansion
- Full expansion (2012-2015)

FY 2013

Alternative Fuel Availability Targets
- 100% Hydrotreated Renewable Jet fuel
- Other Biofuel processes

Figure 4: NextGen Research & Demonstration Activities
(FY09-FY13)

FY 2009

3D Path Arrival Management

- This project is a first step toward 4D trajectory operations in the arrival domain. In laymen's terms, this capability at high density airport will provide a means to achieve highly accurate, predictable and fuel efficient routes which will decrease controller and pilot workload, decrease adverse environmental impacts (emissions and noise) while potentially enhancing airport throughput. Apart from the capability itself, the major product from this project is a complete specification for a 4D trajectory synthesizer based on the NASA En route Descent Advisor which generates the route for the aircraft to fly. This route is then loaded into the aircrafts automation for execution.

4-D Flight Management System (4-D FMS)

- Demo 4-D FMS Trajectory Based Operations (TBO) to reduce pilot and Controller workload and environmental impact.

International Air Traffic Interoperability (IATI)

- Demonstrate potential benefits for oceanic trajectory optimization in terms of fuel savings and emissions reductions through partnerships and collaboration with the international aviation air navigation service providers (ANSPs), airlines and government agencies. Initial demonstrations being conducted with the Atlantic Interoperability Initiative to Reduce Emissions (AIRE) project.
-

International Flight Data Object (IFDO)

- Perform research and demonstrations leading to proof of concept and early implementation of NextGen capabilities such as International Flight Data Object.

Net Enabled Operations (NEO)

- NEO is a network information technology program with a set of spiral developmental efforts (until 2012) directed at developing / leveraging an innovative, effective and efficient system-to-system operational architecture, with supporting procedures to provide the FAA and its interagency partners with an agile, highly connective network for net centric shared situational awareness.

Oceanic Trajectory Based Operations

- Demonstrate potential benefits for oceanic optimization procedures. Partnerships and collaboration with the international aviation air navigation service providers (ANSPs), airlines and government agencies.

Staffed NextGen Towers (SNT)

- Field demonstrations will serve to validate the SNT concept and system(s) for the two phased implementation.

Surface Trajectory-Based Operations Project

- Conduct demonstrations and operational evaluations of future NextGen surface capabilities at Memphis, New York (JFK) and Orlando airports.

Tailored Arrivals (TA)

- In the final form, a Tailored Arrival (TA) is a comprehensive method of planning, communicating, and flying highly efficient, thus environmentally friendly, arrival trajectories from cruise altitudes to the runway threshold. Implementation of TAs at selected coastal airports is planned to occur by early FY-11. These initial trans-oceanic arrival operations are considered to be an early implementation strategy to realize immediate operational benefits in efficiency and reduced environmental impact.

Unmanned Aircraft Systems (UAS)

- Utilize advanced capabilities of UAS community as test for exploring future 4-Dimension (4-D; latitude, longitude, altitude and time) trajectory based concepts and examine potential concepts for wide-spread integration of UAS into future NextGen environment.

FY 2010

3D Path Arrival Management
- Continue flight deck centric and air traffic control centric simulation

4-D Flight Management System (4-D FMS)
- To be determined based on development efforts
- Initial human-in-the-loop simulations

International Flight Data Object (IFDO)
- Research and Demonstrations continues
- Potential to begin Pacific demonstrations

Net Enabled Operations (NEO)
- As determined from planning in FY-09

Oceanic Trajectory Based Operations
- Initial ADS-B In-trail Procedures, Pre-departure 4-D oceanic trajectory management, Web enabled Collaborative Trajectory Planning (CTP) and Oceanic Air space Management

Staffed NextGen Tower
- Complete field site preparation and field demonstration

Surface Trajectory Based Operations
- Follow-on spiral demonstrations/evaluation focused on enhancements to surface 4-D Trajectory Based Operations, including taxi conformance monitoring

Tailored Arrivals (TA)
- Resolve issues surrounding implementation and begin transfer of project to implementation / operational organization

Unmanned Aircraft Systems (UAS)
- Potential for 4-D TBO demonstrations in an operational environment

FY 2011

3D Path Arrival Management
- Complete technical transfer of decision support tools

4-D Flight Management System (4-D FMS)
- Continue proof of concept demonstration/simulation from FY-11

Net Enabled Operations (NEO)
- As determined from planning in FY-09 and FY10

Oceanic Trajectory Based Operations
- Continuing ADS-B In-trail Procedures, Pre-departure 4-D oceanic trajectory management, Web enabled Collaborative Trajectory Planning (CTP) and Oceanic Air space Management

Staffed NextGen Tower
- To be determined

Surface Trajectory Based Operations
- Follow-on spiral demonstrations / evaluation focused on enhancements to surface 4-D Trajectory Based Operations

Tailored Arrivals (TA)
- Begin full-time operations of TAs at selected costal airports (with oceanic arrivals) around the US

Unmanned Aircraft Systems (UAS)
- To be determined based on 4-D TBO demonstrations in an operational environment

FY 2012

3D Path Arrival Management
- Further refiner the decision support tool and support investment decision activities. Complete concept of use document

4-D Flight Management System (4-D FMS)
- Initial implementation

Net Enabled Operations (NEO)
- As determined from planning in FY-09 and FY10

Oceanic Trajectory Based Operations
- Continuing ADS-B In-trail Procedures, Pre-departure 4-D oceanic trajectory management, Web enabled Collaborative Trajectory Planning (CTP) and Oceanic Air space Management

Staffed NextGen Tower
- To be determined

Surface Trajectory Based Operations
- Follow-on spiral demonstrations / evaluation focused on enhancements to surface 4-D Trajectory Based Operations

Tailored Arrivals (TA)
- Begin full-time operations of TAs at selected costal airports (with oceanic arrivals) around the US

Unmanned Aircraft Systems (UAS)
- To be determined based on 4-D TBO demonstrations in an operational environment

FY 2013

3D Path Arrival Management
- ERAM/TMA implementation

4-D Flight Management System (4-D FMS)
- Continue proof of concept demonstration from FY-12