STATEMENT OF VICTORIA COX, SENIOR VICE-PRESIDENT FOR NEXTGEN AND OPERATIONS PLANNING BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY ON THE NEXT GENERATION AIR TRANSPORTATION SYSTEM, SEPTEMBER 11, 2008

Good morning, Chairman Gordon, Congressman Hall, and Members of the Committee. I am Victoria Cox, Senior Vice-President for NextGen and Operations Planning in the Air Traffic Organization at the Federal Aviation Administration. I thank you for the opportunity to testify today about the status of the work we are doing to develop and deploy the Next Generation Air Transportation System (NextGen) and to discuss how we are providing operational, environmental, and safety enhancements that deliver benefits to our customers today and into the future.

As you know, NextGen is not a single capability or program to be delivered at some date in the future; it is a portfolio of capabilities and programs that we are beginning to deliver now- and will continue to provide in an evolutionary manner. It is also important to remember that NextGen is not simply about air traffic capabilities, but fostering improvements in ground infrastructure, aircraft technology, and alternative fuels.

Much progress has been made during the past year. We have moved to accelerate initiatives that yield benefits to stakeholders in the near- and mid-term. We have also taken steps to ensure a more holistic approach to managing NextGen and related legacy programs. Last spring, the Secretary of Transportation and the NextGen Senior Policy Committee, which was established by Public Law 108-176 (Vision 100) and is chaired

by Secretary Peters, asked us to take immediate action to accelerate the deployment of NextGen. In response to this call, the FAA and the other NextGen agencies have focused on accelerating deployment of operational improvements to address the greatest need and on developing the capabilities that will provide the greatest benefit. FAA has leveraged its research and development investments to accelerate targeted implementations and development of critical capabilities.

The introduction and wide-spread use of precision navigation tools that deliver increased precision to our operations represent the first step in our transition to NextGen. We are focusing deployment of Area Navigation (RNAV) and Required Navigation Performance (RNP) around our most congested airports, using these tools to increase capacity and operational efficiency. Partnerships with operators equipped to perform these procedures are yielding the biggest benefits from increases in operational efficiency and reductions in fuel use and emissions. Today, 87 percent of commercial operators are equipped to fly RNAV routes and procedures; and 39 percent are equipped to fly the RNP Special Aircraft and Aircrew Authorization Required (SAAAR) approaches that allow design of flight paths to achieve more optimal use of airspace. FAA has approved these types of approaches at Atlanta, Dallas/Fort Worth, Newark, Washington Dulles, LaGuardia, Chicago Midway, Miami, and San Francisco. To date this year, we have published 20 RNP SAAAR approach procedures at eight airports, including San Jose, Washington Reagan National, Indianapolis and Los Angeles. We have also published 63 RNAV Standard Instrument Departure (SID) and Standard Terminal Arrival (STAR) procedures

at 45 airports, including Atlanta, Charlotte, Cincinnati, Newark, Orlando, Phoenix, Portland (OR), Santa Monica and Tucson.

We are also seeing benefits today from the introduction of Optimized Profile Descents or OPD. The OPD lets pilots use the Continuous Descent Arrival (CDA) technique to fly a continuous descent path, rather than the traditional "step downs" typically flown today. Airplanes initiate descent from a high altitude with engines at low power and, ideally, maintain a continuous descent until cleared to land. Flight demonstrations at Louisville's Standiford Airport and testing at Atlanta Hartsfield have shown fuel savings averaging about 50-60 gallons of fuel for the arrival portion of flights and a reduction of as much as 1200 pounds of carbon dioxide per arrival. Significant noise reduction is also achieved through the later deployment of flaps and landing gear allowed by the CDA's gradual reduction in speed. Under its NextGen Demonstration program, FAA is continuing with targeted implementations of Optimized Profile Descent procedures at San Diego in addition to Atlanta and is cooperating with the United States Air Force Air Mobility Command to introduce OPD procedures with its C17 fleet in Charleston, SC. OPD procedures have been instituted in Los Angeles on a permanent basis and are delivering major benefits in terms of operational efficiency and the environment.

Another NextGen-related demonstration program is the Atlantic Interoperability Initiative to Reduce Emissions (AIRE), a research and technology development venture

between FAA, the European Commission and industry partners. AIRE focuses on upgrading air traffic control standards and procedures for trans-Atlantic flights. A similar initiative in the Asia-Pacific region, the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) has also been initiated. In fact, tomorrow Air New Zealand is operating a flight, nicknamed ASPIRE I, from Auckland to San Francisco that will demonstrate some of the potential efficiencies. Our Vice-President for Enroute and Oceanic Services will be onboard. Both of these initiatives will enhance fuel efficiency while reducing environmental impacts. Our first AIRE demonstrations showed one percent fuel savings in oceanic airspace – a significant amount of fuel and carbon emissions for these very long flights.

Other near-term benefits stemming from targeted implementations of the NextGen acceleration initiative include the introduction of surface management tools at JFK with the accelerated introduction of the Airport Surface Detection Equipment – Model X (ASDE-X). FAA, in partnership with the Port Authority of New York and New Jersey and airlines, is providing information about surface traffic in both movement and ramp areas on the airport to Airline Operation Centers, air traffic controllers and the FAA Command Center. This information gives common situational awareness that will allow airlines to better manage movement of their aircraft in crowded ramp areas. The inability for airlines to know the exact location of their aircraft on the surface relative to other traffic contributes to surface gridlock and difficulty moving aircraft back to gates when required. As of last month, this much-needed information is available.

This capability stems from a joint FAA/NASA research and development project at Memphis with FedEx and Northwest Airlines. The Memphis project is developing a surface traffic management system that employs a two-way, collaborative environment between the FAA and airlines to significantly improve the efficiency of ground operations and will be integrated with arrival and departure traffic to enable the most efficient use of airport and terminal facilities and reduce emissions that impact air quality.

These and other demonstrations are providing valuable information that will assist FAA in developing standards and procedures for operations in the NextGen environment while providing immediate benefits to targeted areas. FAA plans to continue these activities in an integrated test bed approach that focuses on Florida, the east coast, Texas, and the Gulf of Mexico and takes advantage of early Automatic Dependent Surveillance-Broadcast (ADS-B) deployment. Upcoming demonstrations include tailored arrivals in Miami starting later this month with American Airlines and with Air France. We will also begin integrating predictive weather information as part of the Traffic Management Advisor (TMA) at Daytona Beach with Embry Riddle and a consortium of companies in November. We have over 20 partners from the airlines, industry, academia, and other government agencies that are involved in demonstrating the effectiveness and safety of integrated NextGen capabilities. We will model these and another demonstration in ways that enable more rapid, widespread deployment of these capabilities in the future.

NextGen will bring major changes to the roles and responsibilities of all the participants in the NAS, especially the controller, as the NAS becomes more automated and some tasks are delegated to the pilots flying more sophisticated aircraft. A strategic job analysis has been initiated to examine how changes to technology, roles, responsibilities and procedures will impact the aptitudes, knowledge, skills and abilities that we will expect from controllers as NextGen matures. This will enable the NAS to go from a "controlled" airspace environment to a "managed" airspace environment, allowing automation to assist with decision-making.

The human factors research program has also delivered products that enable the use of data communications in the en route domain and is now focused on the increased use of RNAV, limited self spacing, and novel modes of grouping aircraft to enable an increase in capacity while reducing controller workload and error potential.

Another key NextGen transformation is the move from Forensic Safety Systems to Prognostic Safety Systems, as evidenced by the development of the Aviation Safety and Information Analysis and Sharing (ASIAS) system. The ASIAS program integrates a large number of previously unrelated data sources from both government and industry into a comprehensive safety picture that can assist in identifying emerging risks and enabling earlier interventions against these risks before they can lead to accidents.

Research and development in the weather arena is providing advanced weather capabilities to improve NAS operations during adverse conditions. This requires improvements in weather forecasting and observation network capabilities as well as integration of weather into decision support tools. Improvements in forecasts and observations quality developed by the Aviation Weather Research Program (AWRP) are aimed at providing more accurate aviation weather forecasts for phenomena such as turbulence, convective activity, icing, and restrictions to visibility. The Weather Technology in the Cockpit (WTIC) program will facilitate the development of technologies necessary to integrate weather information into aircraft-based decision support systems. WTIC will enable pilots to access weather information similar to that being utilized by air traffic controllers and dispatchers on the ground.

In Fiscal Year 2008, the wake turbulence research program completed prototype evaluations of the Wake Turbulence Mitigation for Departures tool, a product of NASA and FAA research and development, that permits increased departure capacity from airports with closely spaced parallel runways. Prototype evaluations of the system were conducted at Houston Intercontinental and Lambert St. Louis airports. Another application of research and development has been wake turbulence data collection and analysis in support of a National Rule Change which would allow the use of ILS procedures to Closely Spaced Runways for specific aircraft types, thus increasing capacity at five specific airports.

The wake program, along with global partners, has evaluated separation standards for new aircraft (B-747-8, A380) and has re-evaluated the B757 family of aircraft. We have also developed a methodology and optimization tools for the re-evaluation of wake turbulence categories and separation standards for today's aircraft fleet mix, which has changed significantly since the early 1990's. Working jointly with European Air Navigation Service Providers and aircraft manufacturers, FAA is seeking a harmonized set of wake categories and wake separation minima for the NAS and International fleet mixes.

In an example of concept validation that shows great promise, FAA researchers are developing the concept for an Integrated Arrival/Departure Control Service that we are calling "Big Airspace." Employing modeling and simulation, including human-in-the-loop simulations, researchers used scenarios that incorporated a generic large metropolitan area, a major airport and three small airports into the same Terminal Radar Approach Control (TRACON) facility. The "Big Airspace" concept extends terminal procedures to a portion of en route transition airspace, increasing the number of RNAV routes, and incorporating dynamic resectorization (a fundamental NextGen concept) to allow airspace boundaries to be more flexible. A key element of "Big Airspace" is the incorporation of all operations into one facility to reduce the amount of cross-facility coordination needed to safely manage traffic into and out of busy areas. Human-in-the-Loop simulations employed both terminal and en route controllers as well as pilots who flew simulated aircraft linked to the simulation. Results of the modeling and these simulations showed that controllers could handle up to 50 percent more traffic. With the

introduction of data communications, controllers may handle up to 150 percent more traffic before performance degraded, all without a significant change in the number of operational errors and with a significant decrease in the number of conflicts.

With 2012 projected traffic, "Big Airspace" simulations showed increased operational efficiencies of about a minute of flight time and five nautical miles in scenarios with weather present. To provide context for these savings, Southwest Airlines has indicated that for its operations a single minute of time saved on each flight contributes an annual savings of up to $25 million in fuel per year. Extend this to the number of flights operated by all carriers in major metropolitan areas and you can see that "Big Airspace" adds up to tremendous savings for all our airlines. FAA is building towards implementing "Big Airspace" as its mid-term concept in high density metropolitan areas.

Accelerating air traffic management improvements is leading to efficiencies and reducing fuel burn, but we are also pursuing other R&D strategies to mitigate NextGen environmental impacts. We are hastening the development of promising environmental improvements in aircraft technology. The President's budget funds 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 offers a good example of FAA and NASA partnership in advancing the NextGen plan as we worked together closely in developing this initiative to mature technology with NASA's foundational research efforts.

We are also exploring the potential of alternative fuels for aviation. Fuels that improve emissions performance at both the local and global level not only help the environment, but also enhance energy security and supplies. Issues of fuel supply and costs are having an increasing impact on the shape of the U.S. aviation system- as fuel costs now approach up to 40% of airline operating costs. To this end, the FAA helped form – and is an active participant in – the Commercial Aviation Alternative Fuels Initiative, or CAAFI. We have already seen coal-to-liquid and gas-to-liquid fuels in jets, and most recently completed a bio-fuel flight demonstration. Alternative fuels will be the "game changer" technology that gets us closer to carbon neutrality. Alternative fuels are a part of the CLEEN effort.

Activities like these that consist of concept validation employing modeling and simulation, prototyping and field demonstrations in an operational environment can accelerate the transition from concepts and research and development to implementation of operational systems. FAA is employing this approach in an effort to accelerate NextGen implementation. Not only will this approach speed the development of NextGen operational improvements, it is also aimed at speeding their acquisition by accomplishing, in parallel, required steps in FAA's Acquisition Management System.

Another way that FAA is accelerating transition from research to implementation is through Research Transition Teams (RTT) between NASA and FAA, facilitated by the JPDO. The goal of the RTTs is to ensure that R&D needed for NextGen implementation

is identified, conducted, and effectively transitioned to the implementing agency. Four teams are successfully underway with NASA and FAA engagement.

The approaches described above are mechanisms we have established to ensure that we retain the focus on the goals of NextGen while moving expeditiously to incorporate changes into the National Airspace System which support those goals and begin to achieve the benefits of a transformed system in a timely manner.

This year has seen a shift in focus for NextGen from planning to action. The realignment of responsibilities for NextGen under a Senior Vice President for NextGen and Operations Planning is an indication of that changing focus of NextGen from purely planning and research to actual implementation and integration of technologies that will transform the National Airspace System. As we enter this new phase, the Agency decided to place accountability for all aspects of NextGen, including management of the NextGen investment portfolio, under one senior official.

This realignment also responds to stakeholder requests for a single point of accountability for NextGen and addresses the suggestion raised by Industry, including members of JPDO Working Groups, that more focused oversight by FAA of JPDO deliverables would be desirable.

With the establishment of the NextGen and Operations Planning organization under the leadership of a Senior Vice President, the Joint Planning and Development Office (JPDO), the Operations Planning function, and the new Office of NextGen Integration and Implementation have a common reporting structure. For the FAA this ensures that the Agency acts promptly to achieve the JPDO vision by accomplishing the right kind of R&D and that a steady stream of improvements taking us along the road to NextGen are delivered for implementation and coordination with legacy systems operations. This arrangement increases FAA support for JPDO Working Groups as well as cross-agency initiatives by closer linking of FAA to JPDO.

The Senior Vice President for NextGen and Operations Planning is responsible for implementation of all elements of NextGen, most of which are executed by other service units in the Air Traffic Organization and other lines of business in the FAA, and has decision authority over all matters related to NextGen integration and implementation including allocation within the Agency of the $688 million NextGen budget request for fiscal years 2009.

NextGen implementation is a difficult and complex undertaking that cannot be accomplished without cooperation across the industry, the FAA and the NextGen partner agencies. The Senior Vice President for NextGen and Operations Planning has a direct

and immediate path to the FAA Administrator and the Secretary of Transportation should their assistance be required.

The highly successful FAA-wide Operational Evolution Plan (OEP) process is the basis for guiding NextGen integration and implementation and ensuring the cooperation of all elements within the FAA with NextGen responsibilities. This process includes all FAA organizations, within and outside of the ATO including the JPDO. The process tracks specific capability improvements through R&D, field demonstration, investment decision, acquisition and implementation, with clear objectives that result in specific commitments to the operating community outside FAA. An executive oversight board (NextGen Management Board) at the Associate Administrator level, chaired by the Deputy Administrator, oversees the process. A review board (NextGen Review Board) manages the flow of improvements from concept, through R&D, to investment decision, to implementation. Aviation community participation will be improved through a formal advisory process, Industry Days, and stepping up stakeholder participation at the SPC, which encourage feedback from users, operators, and developers.

An important product of the process described above is the NextGen Implementation Plan, the latest version of which was published on June 30, 2008. The plan details implementation commitments for the near-term (between 2009-2011), and describes more than 30 additional improvements targeted for introduction between 2012 and 2018.

This version shows how FY 09 research and development projects move us toward specific outcomes. The entire plan can be accessed on line at www.faa.gov/nextgen.

As directed by the Secretary of Transportation, who is chair of the NextGen SPC, JPDO will continue to focus on long-term (beyond 10 years) research and development and cross-agency coordination with FAA placing emphasis on near-term implementation and mid-term planning over a rolling 10 year timeframe. FAA will ensure that the Agency's implementation plans and Integrated Work Plan are aligned for the near and mid-term, while keeping an eye to the future that JPDO is defining through the long-term R&D plan. The JPDO Integrated Work Plan (IWP), will also be published this month, is still a work in progress, and the elements in it have not yet been prioritized. That said, it represents a great amount of work across the NextGen agencies and industry to document their initial development work and planning.

An overarching goal, and a clear responsibility of JPDO, is a long-term R&D program, with well-defined and prioritized research goals and supporting activities and that responsibility will be clearly assigned to the Partner agencies. Success will depend on assuring that agency R&D budgets are linked. Research must be aligned to leverage cross-agency investments and deliver products that will transition to implementation.

We are confident that planned investments lead to the capabilities described out to 2018. These are investments in the five transformational programs discussed later, as well as to seven solution sets. In total, they fund research, engineering, analysis, demonstrations, concept validation and ATC infrastructure enhancements. The far-term, beyond 2018, is dependent on research that is ongoing or planned in coordination with the JPDO. The results of that research will be used to guide the far term development. JPDO will continue to maintain the vision of NextGen and will update the Concept of Operations in accordance with results of the long-term research that it is charting.

JPDO will also continue to produce a yearly Progress Report. This year's progress has been noteworthy. The Senior Policy Committee (SPC), chaired by the Secretary of Transportation, provides directed focus on important efforts including a government-wide Safety Management System; a collaborative weather initiative involving the Department of Commerce (DoC), FAA and the Department of Defense (DoD); an initiative for net-centric aviation information sharing; and planning for integrated aviation surveillance with the DoD, Department of Homeland Security (DHS) and FAA.

JPDO has formalized organizational relationships with partners to facilitate transfer of technology for NextGen application by establishing the previously described Research Transition Teams to facilitate smooth transition of research products from NASA to FAA. Additionally, the DoD has established a NextGen Joint Planning Office with the U.S. Air Force leading to coordinated DoD contributions and technology transfer. The

DoD, DHS and FAA also jointly invested in a demonstration of Network Enabled Operations technology.

JPDO completed a gap analysis of NextGen partner agency programs against the Integrated Work Plan. The gap analysis identified seven critical interagency focus areas, including various ATM 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.

As we move forward with NextGen it is important for us to measure our progress by defining our near-term, mid-term, and long-term goals with suitable performance metrics. The right metrics will allow us to determine not only how well we are doing but also the impacts of events that reduce or delay progress. FAA plans to employ three methods of measurement. First, we will track progress against milestones established in the NextGen Implementation Plan. These are linked directly to the National Airspace System Enterprise Architecture decision points. We will also track investments, measuring whether specified products are delivered on time and on budget. We are also developing

methods to measure and report on benefits accrued with the implementation of NextGen capabilities in an integrated fashion rather than the case by case approach that we take today.

The FAA's National Aviation Research Plan (NARP) published in February 2008 identifies $740 Million for NextGen R&D in the President's Fiscal Year 2009-2013 budget with $83.5 Million requested in Fiscal Year 2009. Much of the other R&D work contained in the 2009 request is NextGen enabling.

My testimony has focused on R&D, Advanced Technology Development and Prototyping and Demonstration investments. Major NextGen transformational programs are making progress as well. ADS-B has continued to meet all the program milestones. Since the national contract was awarded last summer, the program has deployed the ground infrastructure in the Southern Florida key site area. The system has for the first time equipped pilots to receive traffic and weather in the cockpit for enhanced situational awareness. The system will reach an In Service Decision (ISD) for essential services for commissioning into the National Airspace System (NAS) in November 2008. Critical services IOC and ISD is planned for 2010.

While the agency has been busy with deploying the ground equipment, we are also simultaneously working on the rulemaking for ADS-B. The Notice of Proposed

Rulemaking (NPRM) was published in October 2007. The comment period closed in March 2008 and the agency is taking into account every single comment that was received. We have been working closely with all facets of the aviation community through the ADS-B Aviation Rulemaking Committee (ARC). We will consider all the recommendations from the aviation community in developing the final rule, which we estimate will be published in spring 2010.

The System-Wide Information (SWIM) Program recently awarded a $37M contract for commercial, off-the-shelf (COTS) software to Iona Technologies of Waltham, Massachusetts. This software will help FAA develop interfaces between systems more quickly and cheaply, and will help establish new connections between systems and with new users – just what's needed for NextGen.

The Data Communications program and the NAS Voice Switch program have both completed development of initial program requirements, and the NextGen Network Enabled Weather (NNEW) program has begun analysis to develop standards for universal access to a weather data base, which will contain forecast information of interest to all national airspace participants including FAA, Department of Defense, National Weather Service and our European partners.

I thank both this Administration and this Congress for supporting the FAA's NextGen budget requests and hope that issues surrounding the FAA's reauthorization are quickly

resolved. Be assured that we will identify NextGen as a key programmatic and budgetary issue requiring decisions from policymakers in the incoming Administration.

Given the impact of aviation on the U.S. economy and the longstanding support from this Committee, this Congress, and most of the aviation community, I sincerely believe that the impetus for NextGen and its program focus will continue and not suffer due to transition activities.

Mr. Chairman, this concludes my testimony. I would be happy to answer any questions the Committee may have.