ATC MODERNIZATION AND NEXTGEN NEAR-TERM ACHIEVABLE GOALS

(111–14)

HEARING

BEFORE THE

SUBCOMMITTEE ON
AVIATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

MARCH 18, 2009

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March 16, 2009

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Aviation

FROM: Subcommittee on Aviation Staff

SUBJECT: Air Traffic Control Modernization and the Next Generation Air Transportation System: Near-Term Achievable Goals

PURPOSE OF HEARING

The Subcommittee will meet on Wednesday, March 18, 2009, at 10:00 a.m. in Room 2167 Rayburn House Office Building to receive testimony on ATC Modernization and the Next Generation Air Transportation System: Near-Term Achievable Goals.

Background

The present-day national airspace system ("NAS") consists of a network of en route[1] airways, much like an interstate highway grid in the sky, interconnected by ground-based navigation facilities that emit directional signals that aircraft use to navigate through geographic points in the airspace. Limits on the transmission distances of these signals prevent aircraft from flying direct routes on long-distance flights and limit the utilization of airspace to predefined routes where aircraft can reliably transition from one navigational signal to the next.

In the terminal environment, near busy airports and metropolitan areas, aircraft follow arrival and departure routes by tracking ground-based navigational signals, much like navigation during the en route phase of flight, or by following the instructions of air traffic controllers, often referred to as receiving radar vectors.

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[1] The FAA uses three types of facilities to control traffic: *Airport towers* direct traffic to the ground before landing and after takeoff within 5 nautical miles of the airport and about 3,000 feet above the airport. *Terminal Radar Approach Control Facilities ("TRACONs")* sequence and separate aircraft in terminal airspace – i.e., as they approach and leave airports, beginning about 5 nautical miles and ending about 50 nautical miles from the airport and generally up to 10,000 feet above the ground. *En route centers* control aircraft in high-altitude en route airspace – i.e., in transit and during approaches to some airports, generally controlling air space that extends above 18,000 feet for commercial aircraft.

Surveillance and separation of aircraft, both en route and in terminal airspace, is largely achieved by utilizing surveillance data through an extensive network of radar sites and air traffic controllers who are directly responsible for ensuring adequate separation between aircraft receiving radar services. Maintaining this separation is achieved through extensive use of voice communications between controllers and pilots over open two-way radio frequencies.

Under the current system, controller workload, radio frequency voice-communication, congestion, and the coverage and accuracy of ground-based navigational signals impose practical limitations on the capacity and throughput of aircraft in the system, particularly in busy terminal areas near major airports and around certain choke-points in the en route airway infrastructure where many flight paths converge.

Currently, the U.S. air transportation system handles about 50,000 flights over a 24-hour period. By 2025, air traffic is projected to increase two- to three-fold, equating to about 100,000 to 150,000 flights every 24 hours. It is widely acknowledged that the current U.S. air transportation system will not be able to meet these air traffic demands. In 2003, Congress created the Joint Planning and Development Office ("JPDO") in *Vision 100 – the Century of Aviation Reauthorization Act* (P.L. 108-176) within the Federal Aviation Administration ("FAA"), and tasked it with developing a Next Generation Air Transportation System ("NextGen") that will meet anticipated traffic demands.

The NextGen plan will consist of new concepts and capabilities for air traffic management and communications, navigations, and surveillance that will involve: transitioning from a ground-based radar system to a more automated, aircraft-centered, satellite-based surveillance system; developing more direct and efficient routes through the airspace; improving aviation weather systems; developing data communications capabilities between aircraft and the ground to reduce controller and pilot workload per aircraft; and creating shared and distributed information technology architectures.

Early industry feedback to initial NextGen planning documents expressed a desire for more detail on near- to mid-term NextGen capabilities, requirements and benefits. Accordingly, the FAA appears to be shifting its attention to the near- to mid-term, and is refining NextGen benchmarks for the next five to eight years while maintaining efforts to develop the end-state architecture.

I. The FAA's Current Air Traffic Control ("ATC") Modernization Effort

In 1981, the FAA initiated an ambitious effort to modernize the ATC system. According to the Government Accountability Office ("GAO"), the FAA initially estimated ATC Modernization would cost $12 billion and could be completed over 10 years. This ATC Modernization involved acquiring a vast network of radar, navigation, communications, and information-processing systems, as well as new air traffic control facilities. However, key projects within this ATC Modernization experienced significant cost overruns, schedule delays, and performance shortfalls that affected FAA's ability to deliver systems as promised.

In 1995, the GAO placed the FAA's ATC Modernization program on its "High-Risk List" because of the program's estimated $36 billion cost, its complexity, its criticality to FAA's mission of ensuring safe and efficient air travel, and its problem-plagued past. However, in January 2009, the GAO removed the FAA's ATC Modernization program from its "High-Risk List." The GAO notes that since the creation of the FAA's Air Traffic Organization ("ATO") in 2004, the FAA has shown significant improvement in its management of ATC Modernization and that many more acquisition programs are being completed within the original cost and time estimates than prior to the ATO's existence. The GAO has cited several steps that the ATO has taken to improve the management of its ATC acquisitions, including:

- Establishing a portfolio approach to managing investments. This approach allows the ATO to evaluate the relative merits of spending funds to develop new systems, enhance current systems, or continue operating and maintaining existing systems.

- Applying a business case approach to each project, which includes an analysis of assumptions, constraints, and alternatives to the project, and for each alternative, the full life cycle cost, benefit, schedule, risk, and economics.

- Establishing annual acquisition performance goals to improve oversight and accountability over acquisition processes.

Yet, it is worth noting that the GAO draws a distinction between ATC Modernization and NextGen. Whereas the FAA's ATC Modernization program focused primarily on the acquisition of ATC systems within the FAA's ATO, NextGen is a far more expansive "transformation" of the air transportation system that includes not only the acquisition of new systems, but also the integration of "legacy systems" (i.e., current ATC Modernization programs) with those new systems, along with the development of policies and procedures that will require cooperative relations between multiple government agencies and nonfederal aviation stakeholders. As such, the GAO has stated that NextGen is a high risk effort because of its dollar cost and complexity, but it is not currently on GAO's "High-Risk List" because NextGen has only recently begun to move from the planning stage to implementation.

The Department of Transportation Inspector General's ("DOT IG") office has also noted the ATO's ability to better control cost growth and schedule slips on major ATC Modernization programs. In April 2008, the DOT IG reported on 18 major FAA acquisitions valued at $17.5 billion. When comparing revised baselines,[2] only 2 of the 18 projects the DOT IG reviewed have experienced additional cost growth totaling $53 million and cumulative delays of 5 years since the DOT IG last reported in 2005. However, from program inception, six ATC Modernization programs have experienced cumulative cost growth of nearly $4.7 billion and schedule delays ranging from 1 to 12 years. Like the GAO, the DOT IG has described NextGen as a high-risk effort.

But it is worth noting that the DOT IG has attributed much of the ATO's ability to control growth and schedule slips to its "incremental approach" to ATC acquisitions, which at times has involved cancelling or deferring key decisions about ATC Modernization programs that may need to

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[2]"Baselining" refers to movement from research and development to deployment of a system. The FAA's Joint Resources Council ("JRC") - the FAA's senior decision making body for major acquisitions) makes a formal decision to invest in a technology and approves cost, schedule and/or performance targets. Rebaselining readjusts the cost and schedule milestones for a program, effectively resetting cost and schedule variances to zero. The FAA uses the current baseline schedule and costs for its performance measurement rather than the baseline set at an acquisition's inception.

be revived or reevaluated as part of the NextGen effort. The DOT IG has testified that while the ATO's incremental approach reduced risk in the near term, it has left several programs with no clear end-state, low visibility into their ultimate cost, and in certain instances, it has left the FAA in a difficult position to begin introducing NextGen.

Approximately 30 existing capital programs will serve as "platforms" for NextGen. According to the DOT IG, over the next 2 years the FAA must make more than 23 critical decisions about ongoing programs that will have a direct bearing on the FAA's ability to meet NextGen mid- and long-term goals and capability requirements, including:

- **Terminal Modernization:** The FAA plans to make an initial investment decision on how to modernize displays and computers that controllers use to manage traffic in the vicinity of airports. This will be particularly important for busy and complex facilities like New York, Chicago, and Atlanta. The FAA's final investment decision leading to a contract award is expected in late 2010.

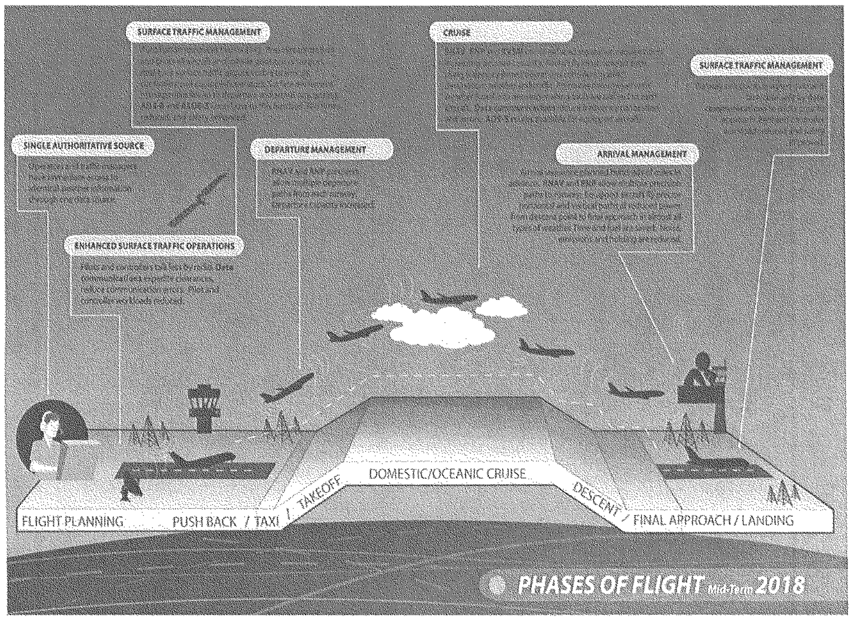
- **Surface and Tower Automation:** The FAA is pursuing ways to improve the management of aircraft on the airport surface. The Airport Surface Detection Equipment - X ("ASDE-X") system was originally considered as a safety system, but is now viewed as a way to enhance efficiency and capacity. In 2009 and 2010, the FAA will decide how to incorporate ASDE-X data (the location of aircraft on runways and taxiways) into other systems that are planned for airport towers as well as systems owned and operated by airlines and airports. The FAA is demonstrating this capability at John F. Kennedy International airport, but costs for a wider deployment are uncertain.

- **Traffic Flow Management:** The FAA relies on traffic flow management to manage air traffic system-wide and reduce the impacts of bad weather. This includes efforts to link the FAA's Command Center with airlines, which are known as "collaborative air traffic management." This fall, FAA plans to decide what additional capabilities will be incorporated into the system.

II. NextGen in the Near-Term

A. Transformational Programs

Between fiscal year ("FY") 2009 and 2013, the FAA plans to spend $5.3 billion on NextGen capital and research, engineering and development programs. In addition to several NextGen technology demonstration projects, the FAA is focused on implementing five core NextGen "transformational" capital programs:



Source: FAA

- **Automatic Dependent Surveillance – Broadcast ("ADS-B")**: ADS-B is the FAA's flagship program to transition to satellite-based surveillance. Equipped aircraft receive Global Positioning System ("GPS") signals and use them to transmit the aircraft's precise position (along with identification and other information) to automation systems, air traffic controllers and other pilots with properly equipped aircraft. In 2007, the FAA awarded a performance-based service contract for ADS-B services to a consortium led by ITT Corporation and published a notice of proposed rulemaking that would require aircraft operating in certain classes of airspace to equip with "ADS-B Out"[3] avionics by 2020.[4] The FAA plans to complete the installation of ADS-B ground stations and deploy ADS-B

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[3] "ADS-B Out" refers to the broadcast of information by equipped aircraft out to other aircraft equipped to receive the data and ADS-B ground stations. "ADS-B In" refers to a properly equipped aircraft's ability to receive another aircraft's "ADS-B Out" information, as well as traffic information transmitted from the ground. In other words, "ADS-B In" enables aircraft to "see" other aircraft on flight deck displays.

[4] Last month, Europe's regulatory body, the European Commission, issued a Eurocontrol notice of proposed rulemaking ("ENPRM") mandating "ADS-B Out" after Feb. 5, 2015.

services NAS-wide by 2013. The FAA plans to spend approximately $1.2 billion on ADS-B between FY 2009 and FY 2013.

- **System Wide Information Management ("SWIM"):** SWIM is an information technology platform that will provide common situational awareness between the FAA, other agencies, and NAS operators regarding weather, traffic flows, and other information to support strategic decision making. The FAA has described SWIM as "an internet-like network, making information accessible, secure and usable in real time for all stakeholders..." The FAA plans to spend $164 million on SWIM between FY 2009 and FY 2013.

- **NextGen Networked Enabled Weather ("NNEW"):** According to the FAA, approximately 70 percent of annual NAS delays are attributed to weather. The FAA believes that NNEW will help it cut weather-related delays at least in half. FAA officials state that the weather dissemination system today is inefficient to operate and maintain, and information gathered by one system is not easily shared with other systems.

  If SWIM will function as an internet-like network for NAS operators, the FAA, and other agencies, then NNEW will manage the weather information content of that network. In other words, NNEW will integrate weather information from multiple weather sources and package that information for dissemination on the SWIM network to meet the specific needs of individual NAS operators. The FAA plans to spend $110 million on NNEW between FY 2009 and FY 2013.

- **Data Communications:** Data communications will provide an email-like means for two-way exchange between controllers and flight crews for air traffic control clearances, instructions, advisories, flight crew requests and reports. This platform is expected to alleviate air-to-ground voice frequency congestion and reduce communications errors. The FAA estimates that with 70 percent of aircraft data-link equipped, exchanging routine controller-pilot messages and clearances via data will enable controllers to safely handle approximately 30 percent more traffic. Data communications benefits will depend on aircraft equipage with avionics, and the FAA and industry are currently working to define data communications avionics requirements. The FAA plans to spend $892 million on data communications between FY 2009 and FY 2013.

- **NAS Voice Switch ("NVS"):** In the NAS, the voice communication architecture consists of ground telecommunication lines that connect facilities, radios that allow for conversations with aircraft providing the air-to-ground connection, and voice switches that direct the controller's voice either across the ground lines to other facilities, or across the ground lines to the radios for talking to aircraft. The connections between the voice switches and the radios and between voice switches in adjacent facilities are all "hard-wired" and cannot be changed easily.

  The existing FAA voice switches are aging, and a number are over 20 years old and in need of replacement. However, a simple replacement of the existing switches will not meet the future NextGen requirements. In the future, controllers in one facility will need to talk with aircraft that can only be reached today by another facility. Therefore, the NVS must be able to let controllers utilize a wide array of radio and communications equipment to talk to airplanes outside their current facility's area of control. In FY 2009, the FAA will publish initial requirements and a draft functional architecture. The FAA expects to award a contract by 2011. The FAA plans to spend $200 million on NVS between FY 2009 and FY 2013.

In addition, FAA officials have testified that NextGen funding requirements for government development and deployment costs the first 10 years range from $8 billion to $10 billion, and that preliminary estimates suggest that the investments necessary to achieve the end state NextGen system infrastructure range from $15 billion to $22 billion in FAA funding. However, the DOT IG has reported that there are still considerable unknowns, and costs will depend on, among other things, performance requirements for new automation, weather initiatives, and the extent to which FAA intends to consolidate facilities.[5]

B. Area Navigation ("RNAV") and Required Navigation Performance ("RNP")

In addition to legacy ATC Modernization platforms and the five core NextGen transformational programs, both the FAA and system operators hold high expectations for RNAV and RNP procedures to provide near- to mid-term benefits. Most major carriers are already using these procedures today. RNAV/RNP relies on aircraft avionics[6] for improved route precision: RNAV allows aircraft to fly any desired flight path without the limitations imposed by ground-based navigation systems; and RNP is RNAV with the addition of an onboard monitoring and alerting capability for pilots that takes advantage of an aircraft's onboard navigation capability to fly more precise flight and efficient paths into and out of airports. These procedures can potentially reduce fuel burn, noise and carbon emissions, boost controller productivity and increase capacity.

As of February 2009, the FAA has published a total of over 535 RNAV/RNP procedures. For FY 2008, the FAA published 78 RNAV procedures and 63 RNP procedures. Typically, the FAA initiates development efforts on 75 to 100 RNAV and RNP sites at a time, which enables it to publish a minimum of 50 RNAV and 50 RNP procedures each year.

The FAA and industry are engaged in establishing new, more aggressive goals for RNAV/RNP procedure development. Plans are being developed to better connect RNAV/RNP procedures in a systematic way for NextGen. This vision is focused on developing procedures that deconflict and optimize arrival and departure interactions in terminal airspace and that connect city pairs for seamless, end-to-end RNAV/RNP operations.

While RNAV/RNP procedures hold potential for near-term benefits, the FAA may face significant challenges going forward. For example, current RNAV/RNP routes are largely overlays of existing routes and have not required extensive environmental reviews. To maximize benefits of RNAV/RNP, the FAA will need to look at future airspace changes and environmental impacts of moving routes and procedures outside of existing ground tracks. However, these new routes may require more extensive environmental reviews, which could take up to 8 years.

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[5] These estimates do not include avionics equipage costs incurred by airspace operators.
[6] Data provided by MITRE – Center for Advanced Aviation System Development ("MITRE") indicates that aircraft already equipped for some level of RNAV/RNP capability represent over 80 percent of all instrument flight rule ("IFR") operations at the nation's top 34 airports. Proponents of accelerating RNAV/RNP deployment point to the high rate of RNAV/RNP equipage as a reason why RNAV/RNP deployment could provide very near-term benefits.

Moreover, controller training has, to date, been minimal because the controllers are already familiar with the existing routes. However, new and more sophisticated routes likely will require additional controller training. According to the FAA, the RNAV/RNP computer-based instruction is undergoing extensive revision to ensure controller training is up to date and certification requirements are met.

To help speed the introduction of RNAV/RNP procedures, the FAA signed agreements with two private vendors (Naverus and Jeppesen) to develop and implement these procedures; the Bush Administration proposed giving greater authority for developing and implementing new procedures to third-party private vendors. However, in February 2008, the president of the union representing technicians and specialists who certify and maintain FAA equipment and procedures expressed doubts about the FAA's ability to adequately regulate, supervise or review the work of third-party design initiatives. H.R. 915, the *FAA Reauthorization Act of 2009*, requires the DOT IG to assess the FAA's reliance on third-parties for development of new procedures and determine the FAA's ability to provide oversight.

C. Airspace Redesign

The FAA's airspace redesign efforts will also play a critical near-term role in enhancing capacity, reducing delays, transitioning to more flexible routing and ultimately saving money for airlines and airspace operators in fuel costs. The critical importance of airspace redesign efforts is underscored by the fact that they are highlighted in FAA strategic plans, including the Flight Plan 2009-2013 and the NextGen Implementation Plan.

However, since 2005, the airspace redesign program has experienced significant funding reductions, from $15.3 million to $8.6 million—a 40-percent decrease. The DOT IG has expressed concern that these budget cuts could steer the program off track. For FY 2007, the FAA approved seven airspace redesign projects as national programs. However, only three projects received substantial funding due to budget shortfalls (New York/New Jersey/Philadelphia Metropolitan Airspace Redesign,[7] Chicago Airspace, and Houston Area Air Traffic System). H.R. 915 authorizes funding to mitigate the impact of these budget cuts.

D. NextGen Mid-Term Planning

Early industry feedback to initial NextGen planning documents expressed a desire for more detail on near- to mid-term NextGen capabilities, requirements, and benefits. For example, industry stakeholders have urged the FAA to develop an interim planning document that provides sufficient detail on commitments needed to deliver real operational benefits in the mid-term that would help the industry justify and plan for the investments it needs to make in aircraft equipage. Accordingly, the FAA appears to be shifting its attention to the near- to mid-term and is refining NextGen benchmarks for the next five to eight years. In January, the FAA published: 1) a Mid-Term Architecture, which is a general blueprint for NextGen through 2018; and 2) a new release of its

[7] With regard to the New York/New Jersey/Philadelphia Metropolitan Airspace Redesign, after 9 years of evaluation and a cost of over $53 million, the FAA announced that it would implement a new airspace structure for the five major airports and several regional airports serving the New York/New Jersey/Philadelphia metropolitan area in September 2007. The redesign is currently the subject of 13 different lawsuits. While litigation is ongoing, the FAA is continuing to implement the redesign.

NextGen Implementation Plan that provides a concise framework of NextGen capabilities, requirements, and benefits from now through 2018.

In addition, the FAA has commissioned the RTCA[8] to establish the NextGen Mid-Term Implementation Task Force ("Task Force") to review mid-term NextGen priorities and provide a final report is August 2009. The Task Force report will recommend a prioritized list of desired operational capabilities (including specific technologies, procedures, pilot and controller training, policies, etc. needed to achieve those capabilities) to be fully deployed by 2018, along with strategies for closing the business case on these recommended capabilities. To develop this prioritized list, the Task Force will attempt to forge a consensus among the aviation stakeholders, and its final recommendations will include the commitments required from both the FAA and NAS operators to achieve the full benefits of these new operational capabilities. The Task Force will also likely recommend a formal mechanism for jointly tracking the progress of FAA and operator commitments.

Moreover, because the entire airspace system is highly interdependent, delays at one airport may lead to delays rippling across the system throughout the day. Therefore the Task Force is also expected to address where NextGen might be deployed first to achieve the greatest benefit:

> A review of mid-term NextGen priorities should give FAA a clear idea of what the system operators want most, says FAA Chief Operating Officer Hank Krakowski in a message to employees. The agency expects to hear proposals like addressing the major "pain points" in the system, such as New York, Chicago and Atlanta before focusing on NextGen solutions across the country. . . RTCA has been tasked with finding out what the operator community wants and will report back this summer.[9]

E. Aircraft Equipage

NextGen planning documents call for operators to equip with a range of new avionics including ADS-B, data communications and RNAV/RNP. In 2007, MITRE, working with FAA/JPDO, developed a preliminary estimate of the NextGen avionics costs, which concluded that the most probable range of total avionics costs to civil operators is $14 billion to $20 billion.[10] The FAA/JPDO estimated that the equipage costs for general aviation operators will range from $7,000 - $30,000 per aircraft, whereas equipage costs for commercial operators will range from $32,000 - $670,000 per aircraft, depending on the type and age of the aircraft, and desired level of capability.

Traditionally, the FAA mandates the equipage of aircraft and provides several years for operators to comply. For a variety of reasons, some operators do not equip until the deadline for equipping is near: electronic equipment tends to decrease in price over time; airlines want to ensure

[8] RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance, and air traffic management system issues. RTCA functions as a Federal Advisory Committee and includes roughly 335 government, industry and academic organizations from the United States and around the world. Members represent all facets of the aviation community, including government organizations, airlines, airspace users and airport associations, labor unions, aviation service and equipment suppliers.

[9] *Aviation Daily, Intelligence*, March 2, 2009.

[10] According to MITRE, ongoing work continues to validate these estimates. However, some avionics manufactures suggest that costs for equipage could decrease once technical standards are finalized and production begins, but to what extent remains unclear.

that standards and technology are mature to avoid double-equipping; and the time value of money suggests delaying investments until economic, operational or safety benefits are compelling.

The FAA has proposed an option to incentivize early equipage, referred to as "best-equipped, best-served." Under this option, the FAA would offer those aircraft operators who choose to equip their aircraft as soon as possible with various operational benefits, such as preferred airspace, routings, or runway access. While operators that equip early would reap the greatest benefits, lesser equipped aircraft must still be safely and appropriately accommodated. The FAA has asked the NextGen Mid-Term Implementation Task Force to provide recommendations on the best means to implement "best-equipped, best served" principles in a way that accommodates all types of operators with varying levels of equipage, while maximizing overall system performance and enhancing safety.

A coalition of industry stakeholders argued that $4 billion should have been included in the *American Recovery and Reinvestment Act of 2009* (the "Recovery Act")(P.L. 111-5) to equip aircraft and accelerate NextGen efforts, including $2 billion specifically for ADS-B. As stakeholders pointed out, there is a precedent for helping airspace operators equip specifically with ADS-B avionics. The FAA purchased ADS-B avionics for operators in Alaska as part of the Capstone initiative.[11] This provided a base of properly equipped aircraft and allowed the FAA to examine the costs and benefits of the new technology.

Congress did not provide funding for aircraft equipage in the Recovery Act, but incentivizing operators to equip will remain an important issue in the debate about how to move forward with NextGen. Stakeholders have suggested that incentives could take a number of forms, including: purchasing equipment for operators, an investment tax credit, an adjustment to current excise taxes for equipped aircraft, or research and development tax credits specifically for avionics manufacturers.

III. Organizational Structure and Workforce Issues

A. Organizational Structure

Pursuant to Vision 100, the JPDO was created within the FAA to leverage the expertise and resources of the Departments of Transportation, Defense, Commerce, and Homeland Security, as well as the National Aeronautics and Space Administration and the White House Office of Science and Technology Policy to develop the NextGen plan. The JPDO organizational structure includes:

- A Director who works with the JPDO's government and industry partners to strategically integrate their respective activities, commitments and contributions.

- A NextGen Institute ("Institute") to provide a structure for direct industry involvement in NextGen. Members of the Institute include over 300 stakeholders from private industry, state and local governments, and academia. The Institute's governing body is the Institute

[11] The Capstone Project was a joint industry and FAA research and development effort to improve aviation safety and efficiency in Alaska. Under Capstone, FAA provided avionics equipment for aircraft and the supporting ground infrastructure. The Capstone Project operated from 1999 to 2006, and its success in Alaska laid the groundwork for the nationwide deployment of ADS-B.

Management Council and is composed of 15 top officials and representatives from the aviation community.

- While the JPDO has its own staff of approximately 18 full-time employees, it relies heavily on the contributions of nine workgroups. These include workgroups on: Aircraft, Aircraft Equipage, Airports, Environment, Global Harmonization, Safety, Security, Net-Centric Operations, and Weather. These teams are made up of representatives from industry and government and each team has an industry co-chair and a government co-chair.

In 2007, the GAO reported that the JPDO's placement within FAA and its dual reporting to both the FAA Administrator and the ATO's Chief Operating Officer ("COO") hindered its ability to interact on equal footing with ATO and other federal agencies. In addition, industry stakeholders expressed concerns that the dual reporting structure would subordinate the JPDO's long-term planning mission to the COO day-to-day operational priorities. Therefore, the GAO suggested that the JPDO should have some independence from the ATO and recommended that the JPDO Director report directly to the FAA Administrator. To increase the authority and visibility of the JPDO, H.R. 915 elevates the Director of the JPDO to the status of Associate Administrator for NextGen within the FAA, reporting directly to the FAA Administrator.

Nevertheless, in May 2008, the FAA announced a reorganization of its NextGen management structure and named a Senior Vice President for NextGen and Operations Planning who reports to the COO. As part of this reorganization, JPDO is now housed within the new NextGen and Operations Planning Office and reports through the Senior Vice President for NextGen and Operations Planning only to ATO's COO. Under this new structure, JPDO will focus on long-term planning and cross-agency cooperation. Other offices within the NextGen and Operations Planning Office will carry out other aspects of implementing and planning for NextGen. Now that JPDO is no longer a separate, independent office within the FAA and no longer reports directly to the FAA Administrator, its organizational position within the FAA has declined.

In addition, Vision 100 created a Senior Policy Committee ("SPC") that provides advice to the Secretary of Transportation on national goals and strategic objectives for NextGen to meet future U.S. air transportation needs. SPC members, heads of partnering departments and agencies, provide policy guidance for the JPDO's integrated work plan,[12] identify resource needs, and make recommendations for funding for planning, research and development activities within their organizations.

In November 2008, President Bush issued Executive Order 13479, which affirms Executive Branch support for the policy regarding NextGen as set forth in Vision 100. It outlines functions of the Secretary of Transportation and the SPC, strengthening their role and increasing their accountability. Specifically, the Order calls for quarterly SPC meetings, thus increasing SPC visibility into NextGen issues; provides a Department-level support staff to assist the Secretary and SPC in the conduct of their duties; and adds an advisory committee to provide private-sector advice to the SPC on aviation-related subjects and related performance measures.

B. Workforce Issues

[12] The Integrated Work Plan describes the capabilities needed to transition to NextGen from the current system and provides the interagency research, policy, regulation, and acquisition timelines necessary to achieve NextGen by 2025.

To manage the implementation of NextGen, the FAA will need staff with technical skills, such as systems engineering and contract management expertise. Because of the scope and complexity of the NextGen effort, the GAO has noted that the FAA may not currently have the in-house expertise to manage the transition to NextGen without assistance.

In response to recommendations from both the GAO and the DOT IG, the FAA contracted with the National Academy of Public Administration ("NAPA") to determine the mix of skills needed by the acquisition workforce to implement NextGen, and to identify strategies for obtaining the necessary workforce competencies. In September 2008, NAPA issued a report that identified 26 competencies - including software development, systems engineering, research and development, strategic planning, financial budget analysis, and contract administration – where the FAA currently lacks both the capacity and capabilities to execute NextGen implementation. The FAA plans to fill between 300 and 400 NextGen positions over the next two years to address some of its skill mix requirements.

With regard to the operational workforce, both the DOT IG and the GAO have noted that the FAA's efforts to replace its retiring air traffic controllers appear to be on track. However, the pace of hiring and training has changed some of FAA's training procedures. More often than in the past, the FAA sends developmental controllers[13] directly to busy facilities to begin their on-the-job training ("OJT"):

> The FAA is hiring thousands of air traffic controllers to stay ahead of the spike in retirements, but this is raising concerns about an increasingly inexperienced workforce. Trainees now comprise a quarter of the U.S. controller staff – up to half at some facilities – and this ratio is set to rise further. . . Veteran controllers are being replaced by recruits who need further on-the-job training before becoming fully certified. "We do have concerns – not over the total size of the workforce, but over the skill level and training level" of new controllers, says U.S. Transportation Dept. Inspector General Calvin Scovel.[14]

The GAO has stated that the FAA must carefully manage the flow of developmental controllers to each facility so that their numbers do not overwhelm the facility's capacity to train them. Furthermore, with fewer fully certified controllers and greater OJT training demands, controllers may work more overtime hours. The DOT IG has cautioned that as attrition increases, the FAA must also continue addressing controller human factor issues such as fatigue and attention. According to DOT IG, human factors training is critical since almost 90 percent of controller operational errors (when a controller allows two aircraft to get too close together either on the runway or in the air) are due to human factors issues rather than procedural or equipment deficiencies. Moreover, as new NextGen technologies are introduced, the FAA must provide

[13] A developmental controller is an air traffic controller in training at an FAA field facility who has not attained the Certified Professional Controller (CPC) level. After controllers complete classroom and simulation training they begin OJT, which is conducted by CPC who observes and instructs trainee controllers individually as they work the control position. Controllers in training achieve certification on each position as they move through the various stages. After they have certified on all positions within their assigned area, they are commissioned as a CPC at that facility.

[14] Adrian Schofield, Rookie Ratio: FAA's Controllers Hiring Drive Puts More Trainees in Towers, *Aviation Week*, Feb. 23, 2009.

technical training for all of its controllers on the new equipment necessary for NextGen while maintaining skills on existing equipment.

The GAO has reported that the lack of stakeholder or expert involvement early and throughout the development and implementation of ATC modernization projects has been a key factor leading to cost overruns and delays. More specifically, the GAO has stated that input from current air traffic controllers with recent experience controlling aircraft, who will be responsible for managing traffic in the NextGen environment, and from current technicians, who will maintain NextGen equipment, is important when considering human factors and safety issues.

In September 2008, the GAO reported that active air traffic controllers largely were not involved in the NextGen planning effort. Since then, GAO notes that some progress has been made. However, according to the GAO, the technicians' union does not generally participate in NextGen efforts, although it has a liaison working on ADS-B and is seeking to participate in the NextGen Mid-Term Implementation Task Force. H.R. 915 requires the FAA to establish a process for including and collaborating with qualified employees selected by each impacted exclusive collective bargaining representative in the planning, development, and deployment of air traffic control modernization projects, including NextGen.

AGENDA

Subcommittee on Aviation

Hearing

Wednesday, March 18, 2009
10:00 a.m.
2167 Rayburn House Office Building

ATC Modernization and NextGen: Near-Term Achievable Goals

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WITNESSES

PANEL I

Ms. Victoria Cox
Senior Vice President for NextGen and
Operations Planning Services
Air Traffic Organization
Federal Aviation Administration

Dr. Karlin Toner
Director, Staff to the Secretary and
Senior Policy Committee for NextGen Coordination
U.S. Department of Transportation

Dr. Gerald Dillingham
Director, Physical Infrastructure Issues
U.S. Government Accountability Office

The Honorable Calvin L. Scovel, III
Inspector General
U.S. Department of Transportation

Dr. Agam N. Sinha, Sr.
Senior Vice President and General Manager
The MITRE Corporation

Mr. Robert M. Tobias
Panel Member – NextGen Study
National Academy of Public Administration and
Director, Public Sector Executive Education
American University

PANEL II

Ms. Marion C. Blakey
President and Chief Executive Officer
Aerospace Industries Association of America, Inc.

Mr. Peter Bunce
President and CEO
General Aviation Manufacturers Association

Mr. James C. May
President and CEO
Air Transport Association

Captain Rory Kay
Executive Air Safety Chairman
and United Airlines Pilot
Air Line Pilots Association, International

Mr. Patrick Forrey
President
National Air Traffic Controllers Association

Mr. Tom Brantley
President
Professional Aviation Safety Specialists, AFL-CIO

AIR TRAFFIC CONTROL MODERNIZATION AND THE NEXT GENERATION AIR TRANSPORTATION SYSTEM: NEAR-TERM ACHIEVABLE GOALS

Wednesday, March 18, 2009

HOUSE OF REPRESENTATIVES,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
SUBCOMMITTEE ON AVIATION,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:03 a.m., in Room 2167, Rayburn House Office Building, Hon. Jerry F. Costello [Chairman of the Subcommittee] presiding.

Mr. COSTELLO. The Subcommittee will come to order. The Chair will ask all Members, staff, and everyone to turn electronic devices off or on vibrate.

The Subcommittee is meeting today to hear testimony on the ″ATC Modernization: Near-Term Achievable Goals.″

Before I give my summary of my opening statement—I have an opening statement that I will submit for the record. I will summarize it, and then I will call on the Ranking Member for any statement that he would like to make or any comments. And then we will go to the first panel of witnesses.

I welcome everyone to the Subcommittee hearing today on ″Air Traffic Control Modernization and Next-Generation Air Transportation Systems: Near-Term Achievable Goals,″ which is being conducted as one of several hearings that meet the oversight requirement of the rules of the House. This is the first of several hearings that the Aviation Subcommittee will hold this year on NextGen, covering a wide range of topics.

Everyone agrees that our ATC system must be modernized. The total number of passengers carried in the United States airspace was approximately 700 million a year and is expected to go to 1 billion in the next 7 to 12 years. For that and other reasons, it is very important that we, not only the House but also the other body, quickly pass the FAA reauthorization bill.

H.R. 915, the FAA Reauthorization Act of 2009, authorizes $13.4 billion for the FAA's facility and equipment account, the primary vehicle for modernizing the national airspace system. These historic funding levels will accelerate the implementation of NextGen, enable the FAA to replace and repair existing facilities and equipment, and provide for the implementation of high-priority safety-related systems.

Two years ago at a hearing on airline delays and consumer issues, I asked and called upon government and the government agencies and industry to begin a frank discussion about what near-term relief can realistically be provided with new technology. Many in the industry have since expressed similar sentiments, given that we are making key investments over the next few years, and stakeholders and everyone else want to know more about details about the near-term capabilities, benefits, and requirements of this new system.

In response, the FAA updated its NextGen implementation plan and published a NextGen mid-term architecture. In addition, the FAA has commissioned the RTCA to form a Mid-Term Implementation Task Force that will work with industry to prioritize which NextGen capabilities should be deployed first and where they should be deployed to achieve the greatest benefits.

Regarding industry investments, it has been estimated that the total NextGen-related avionics costs for aircraft operators may be between $14 billion and $20 billion. Near-term NextGen benefits will depend largely on how quickly operators are willing to equip. Industry stakeholders want to know from government if they will partially subsidize early NextGen equipage. And the FAA has proposed that operational incentives, such as preferred routes or runway access, be given to operators that equip as soon as possible. I believe that all of those options should be on the table.

In addition, concerns have been expressed as to whether the FAA can manage a project of this magnitude to ensure NextGen's success. In September of 2008, the National Academy of Public Administration released a report detailing key workforce competencies that the FAA needs to strengthen. In response, the FAA plans to hire between 300 and 400 new NextGen personnel.

I am interested in hearing from our witnesses today on that point.

Leadership and overall organizational structure of NextGen efforts is important for the successful implementation. To increase the authority and visibility of the FAA's Joint Planning and Development Office, H.R. 915 elevates the director of JPDO to the status of associate administrator for NextGen within the FAA, reporting directly to the administrator, which is completely the opposite of what the FAA did in their reorganization in May of 2008. And we, of course, believe that, in order to elevate the stature and to implement NextGen, that that position ought to be reporting directly to the administrator.

Further, in November of 2008, President Bush signed Executive Order 13479, which outlines the function of the Secretary of Transportation, the Senior Policy Committee, and the NextGen effort. I am pleased to see this affirmed the NextGen policies, as outlined in Vision 100. In addition, I firmly believe there needs to be greater White House involvement in order to pull all of the agencies and stakeholders together if we are going to be successful in implementing NextGen and getting the project done.

In the past, I have stated that the FAA cannot let over reliance on its contractors compromise its objectivity with regard to a contractor's performance or the protection of consumers. To ensure the safety of the ATC systems, the FAA maintains a comprehensive certification program for systems used in the NAS.

I am concerned about a recent change that the FAA has made in the certification program, requiring that only FAA-owned systems need certification. Given that major NextGen acquisitions, such as ADS-B, will not be owned or operated by the FAA, I am particularly concerned that this policy change could potentially weaken the government's oversight of these key systems. Therefore, Chairman Oberstar and I have asked the Department of Transportation Inspector General to review the changes that the FAA has made to its certification program.

With that, I again welcome all of our witnesses here today. I look forward to your testimony.

And before I recognize Mr. Petri, the Ranking Member, for his opening statement or remarks, I ask unanimous consent to allow 2 weeks for all Members to revise and extend their remarks and to permit the submission of additional statements and materials by Members and witnesses.

Without objection, so ordered.

And the Chair now recognizes the Ranking Member, Mr. Petri, for his opening statement or comments.

Mr. PETRI. Thank you very much, Mr. Chairman.

I just want to begin by commending you for not only having today's hearing but for the previous hearings on this subject and a number of oversight and informational meetings that you have had on the whole NextGen process. I think Congress is often criticized for running around expressing alarm after things run amok, and this is an example where, hopefully, things will go right because attention is being paid not only on the legislative side but, even more importantly, within the administration and the community, so that problems can be worked out and planned and informed judgments can be made.

It is very important to get NextGen right. Other industries have switched from analog and other systems to digital-type systems, with all the changes and advantages that that implies. And there is certainly no reason why the aviation industry, at least the government section of that, can't do it. The defense part of it I think has pretty well already done it, and we need to do it to keep competitive and to accommodate growth in our national aviation industry.

So today's hearings should allow us to get an update on the progress of NextGen and the benefits that can be obtained from it near-term. Modernization of our air traffic control system has to be a priority, and I know it is of this Committee. Forecasts for future passenger and operational growth can't be ignored. While passenger traffic has decreased for obvious reasons recently, it is expected to rebound and grow over the next several decades.

Transforming the almost continuously operating air traffic control system into the NextGen concept is a big test of the FAA's abilities. Maintaining the existing system, training four generations of air traffic controllers, transitioning to a new satellite-based system, and securing its operation are just a few of the challenges facing the agency.

As we look to the future, we must focus on how decisions that will shape tomorrow are made. Both commercial and general aviation users could benefit from the capacity and safety improvements that NextGen is reported to offer.

Though I do have some concerns with some provisions in the proposed reauthorization bill, H.R. 915, the bill does include key NextGen improvements that we worked on in a bipartisan manner at the beginning of the last Congress. These include provisions to reorganize the governance structure, create more robust FAA reporting requirements to Congress. By elevating the authority of the Joint Planning and Development Office director to the associate administrator level and increasing reporting requirements, the NextGen provisions of the bill seek to enhance accountability.

In addition to the long-term planning needs for NextGen, the FAA must be sure to do everything it can to meet today's demands. It is my understanding that there are several improvements that, if implemented, could yield benefits in the near term. And I am interested in hearing from our witnesses about procedural changes, airspace redesign efforts, and the status of NextGen transformational programs that will help to make our system more efficient in the near term. Also interested in hearing how those improvements prepare the agency to deliver the long-term NextGen architecture.

Equally important to airspace modernization are efforts to expand ground capacity at our Nation's airports. Without more ground capacity, either through new construction or with more efficient surface management tools, airports' outdated ground infrastructure will become a bottleneck. I am interested in hearing how the FAA is planning to address potential gridlock at our Nation's airports.

Finally, as we transition to more technology-based air traffic control procedures, it will be important that training keeps pace, both for FAA employees and for the user community. So I am interested in learning what steps the FAA is taking to be sure that the aviation workforce is prepared to make the transition to new technology. And I also look forward to hearing FAA's plans to allow increased stakeholder participation in technology development and implementation planning.

So I, again, thank the Chairman for calling this hearing, and I look forward to the testimony of the witnesses before us.

Mr. COSTELLO. The Chair thanks the Ranking Member for his statement and now recognizes the distinguished Chairman of the Full Committee, Chairman Oberstar.

Mr. OBERSTAR. Thank you, Mr. Chairman. Thank you, Mr. Petri, for your comments; staff, for preparing this hearing.

This is a very important hearing. It is a benchmark, threshold hearing on the status of the modernization—the continuing modernization of the air traffic control system. People talk about modernization as though it is a snapshot. Take a picture of it, here we are today, and then it is done. It is an ongoing work of trying to stay ahead of the technology and of the dynamic forces of aviation in the domestic and international market.

It has been a long-pursued objective of this Subcommittee, over three decades, to stay on top of the continuing modernization and oversee the nearly 70,000 items of technology that FAA has put in place, beginning in about 1980, when the serious modernization of air traffic control technology began.

And we can look back over time and see the same ups and downs of the waves of concern, periods of severe congestion, delays, half of which are weather, but weather compounded by inadequacy, the capacity of the air traffic control technology in place at the time, and then moving up and then slipping down; and also the ups and downs of financing and investment in the air traffic control system. We need solid baselines of support that build from one year to the next if we are going to stay ahead of technology.

Mr. Costello, Chairman, last year—actually, 2 years ago—and he cited it in his opening remarks—said we need to begin a frank discussion about near-term relief and what can realistically be delivered by NextGen. And each time that the FAA comes up with a new technology approach, with greater capacity, there are great hopes, great expectations, and then it seems to dribble out and take forever to implement.

FAA is doing a better job. They are shifting attention to the near term, refining the NextGen benchmarks over the next 5 to 8 years. I think it is a mark of progress that the FAA commissioned the NextGen Mid-Term Implementation Task Force to develop a plan in cooperation with industry. But I hope they are also involving the air traffic controllers in this same initiative.

And, Mr. Scovel, you need to watch over that very carefully to make sure they don't repeat the mistakes of the past, of omission, of failing to engage in the design, engineer, and planning of technology by leaving out those who have to operate it, the controllers. And that is without regard to whatever administration is in office at the White House. This is a failing that goes back a very long time. It is a cultural gap.

Now, how quickly NextGen benefits come about will depend not only on the progress FAA makes, the providers of the technology in the private sector, but also the airline companies themselves, their willingness to equip aircraft in advance of regulatory mandates.

I remember a hearing we had in this Committee room when the CEO of Continental Airlines had a stack of pieces of equipment 15 feet high and said, "This is what we are going to take out of our aircraft and replace with a box this size," as we were working to harmonize progress at FAA and progress with the carriers. Now, they have to continue to see their own benefit in making the investments, coordinated with the FAA. If the estimates are on target—and they usually aren't—that the airlines could be facing investments of $14 billion to $20 billion—I think those are probably on the very high side and are based on estimates of certain numbers of aircraft—but that information needs to be made much more precise, much more carefully thought through than just a horseback, off-the-top-of-the-back information.

Earlier this year, there was a big push to try to get money in the Recovery Act, the stimulus plan, to put some $4 billion. Mr. Costello and I were supporting that initiative. But, in the end, what prevented that from happening is a lack of appreciation, or lack of confidence, I should say, on the part of the administration, the Appropriations Committees, that the industry, that the FAA were ready to use that money effectively.

There is a precedent for us doing that. And I don't need to go on; I will put this in the record. I will just say that there is a precedent. There is a plausible case to be made that properly structured subsidies and incentives of the kind that we are talking about could advance NextGen.

But the case had to be made long before we proposed the investment. And the case wasn't made. We just kept running up against a blank wall. People didn't understand it, didn't know it, didn't believe, didn't have confidence that industry on the one side could cooperate and do their part and that FAA on its side would be able to make the investments properly and that the suppliers of technology would be able to develop.

We saw how critically important both technology policy and procedure are in the U.S. Airways incident early this year, January, when the controller in the tower, the crew in the flight deck, the airline dispatchers all had the right skills, the right training, the right preparation at that moment—spent 30 years of training and preparation and experience for 30 seconds of right judgment. And that is essential to this modernization of NextGen.

Let's not get caught in the trap of thinking that all we need is to put this technology in place and everything will be fine, because it is people that make the technology work. If you don't have the right people, that stuff isn't going to happen.

What troubles me, also, in the rush to NextGen is the deterioration of the air traffic control workforce as they retire. With fewer fully certified, fewer FPL controllers in place and more demand for on-the-job training, we are seeing something that I thought was a problem in the past and troubling now, and that is putting developmentals in some of the toughest air traffic control facilities in the country.

There was a period of time when we were being fed a line by the FAA, oh, we can—this was in the aftermath, Mr. Chairman, of the firing of the controllers in 1981—″Oh, there is a whole new generation, Nintendo, young people who will learn this stuff, and they will be able to perform instantly.″ Well, they didn't. You can't make a 5-year FPL in 18 months no more than you can raise a 2-year-old heifer in less than 24 months. And we saw that, putting risky people in high-tension positions.

The FAA must also evaluate the skill mix within its acquisition workforce—I remember early on when David Hinson came into the FAA, looked over the acquisition, found that we were years behind and heading towards billions of dollars in overruns, and brought in experts from the Navy to evaluate FAA's procurement practices. And the report came back to our Committee, which I chaired at the time, that they have never handled multi-billion-dollar contracts before. They don't have people in place that know how to manage. And recommended sweeping changes, which, to his credit, then-Administrator Hinson undertook. Well, we are at the same place today. Do we have people in place that really know how to manage these huge contracts that are going to stretch out over years?

I was pleased that the—or encouraged, let me put it that way—that the FAA got the National Academy of Public Administration to review, and that they issued a report citing competencies in the FAA workforce, software development, contract administration improvements. But, my goodness, there is a huge, huge task ahead. They need over 300 to 400 new personnel in the agency to manage a contract of this size.

And then I also want to cite a cautionary note about the relationship that we saw, the customer service initiative that was destructive—destructive—in the oversight of maintenance. Led to worldwide loss of confidence in the FAA as the gold standard of aviation safety, which I heard firsthand from transport ministers of the E.U. A year ago in May. And now we are seeing that slip over into this contracting arena, this consortium led by ITT to build the ADS-B ground stations and own and operate the equipment.

And I just recall back to the many hearings I had over the years. We started with the 9020 IBM computer systems that were running the air traffic control system. And, at that time, you couldn't tell where IBM left off and FAA began or where FAA left off and IBM began. There was no critical thinking on the part of the FAA program managers over IBM's product and their recommendations for the future; and, when problems occurred, no critical thinking about IBM's recommendations, because FAA was so bound up with and tied in with them they couldn't separate themselves. Don't let that happen again.

The excessive reliance on contractors has, in the past, led to FAA's loss of objectivity, undermines its ability to evaluate critically how the system is performing and how it will perform in the future.

So this hearing is foundational for the future of the continuing modernization of the air traffic control system.

And, General Scovel, I just want to cite last year your testimony before the Committee: Quote, "FAA could find itself in a situation where it knows very little about the system that is expected to be the cornerstone of NextGen." That is not a prediction. That is a restatement of recent history.

Thank you, Mr. Chairman, for this foundational hearing.

Mr. COSTELLO. The Chair thanks you and now recognizes the gentleman from North Carolina.

And I want to wish you a happy birthday, as well.

It is the gentleman from North Carolina's birthday today.

Mr. COBLE. I try to forget those, Mr. Chairman, but thank you for that.

Mr. Chairman, I will be very brief. I just wanted to report to you and Mr. Petri that I did, in fact, present my e-ticket to the NextGen flight, which took off from Rayburn foyer earlier this week. And, as you know, the FAA sponsored it, and I found it to be a very interesting and informative presentation and flight. I just wanted to share that with you.

Thank you.

Mr. COSTELLO. The Chair thanks the gentleman.

And now we would recognize the gentlelady from Texas, Chairwoman Johnson.

Ms. JOHNSON. Thank you very much, Mr. Chairman.

And happy birthday, Mr. Coble.

As the Chairman of the Full Committee stated, this is a very important hearing. And I have received correspondence from Southwest Airlines that I would like to ask unanimous consent to include in the record.

Mr. COSTELLO. Without objection.

Ms. JOHNSON. They completed an RNP, Required Navigation Performance, procedures round-trip between Dallas Love Field, which is in my district, and Houston Hobby, achieving a major milestone in the airline's quest to revolutionize the skies and become the first airline to fly the required navigation performance procedures in every airport that it serves. And they estimated that carbon reduction of 904 pounds of CO2 per round-trip flight between Dallas and Love Field; estimated carbon reduction in 1 year of flying the RNP procedures between Dallas Love and Houston Hobby could equal a reduction of 8.42 million pounds of CO2. This is equivalent to removing 699 passenger cars from the road in 1 year.

And it goes on, but I would like to have it as a part of the record.

And thank you very much for this time, and I yield back.

Mr. COSTELLO. The Chair thanks the gentlelady and now will introduce the first panel of witnesses.

First, Ms. Victoria Cox, a senior vice president for NextGen and operations planning services, Air Traffic Organization at the FAA; Dr. Karlin Toner, director, staff to the Secretary and Senior Policy Committee for NextGen at the U.S. Department of Transportation; Dr. Gerald Dillingham, director of physical infrastructure issues with the U.S. Government Accountability Office; the Honorable Calvin Scovel III, who is the Inspector General with the U.S. Department of Transportation; and Dr. Agam Sinha, who is the senior vice president and general manager at The MITRE Corporation.

Ladies and gentlemen, your entire statements will appear in the record, and we would ask you to summarize your testimony.

And the Chair now recognizes Ms. Cox.

STATEMENTS OF VICTORIA COX, SENIOR VICE PRESIDENT FOR NEXTGEN AND OPERATIONS PLANNING SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION; KARLIN TONER, DIRECTOR, STAFF TO THE SECRETARY AND SENIOR POLICY COMMITTEE FOR NEXTGEN COORDINATION, U.S. DEPARTMENT OF TRANSPORTATION; GERALD DILLINGHAM, DIRECTOR, PHYSICAL INFRASTRUCTURE ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE; HON. CALVIN L. SCOVEL III, INSPECTOR GENERAL, U.S. DEPARTMENT OF TRANSPORTATION; AGAM SINHA, SENIOR VICE PRESIDENT AND GENERAL MANAGER, THE MITRE CORPORATION; ROBERT M. TOBIAS, PANEL MEMBER, NEXTGEN STUDY, NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, DIRECTOR, PUBLIC SECTOR EXECUTIVE EDUCATION, AMERICAN UNIVERSITY

Ms. COX. Thank you. Committee Chairman Oberstar, Chairman Costello, Ranking Member Petri, and Members of the Subcommittee, thank you for inviting me here today to discuss the current state of FAA's efforts for air traffic modernization and the near-term goals of the Next-Generation Air Transportation System.

As you know, NextGen is a combination of technologies and procedures that will reduce delays, expand capacity, and reduce the environmental impacts of aviation, all while increasing the overall safety of the system and maintaining the economic viability of this important sector. In order to maintain the preeminence of the U.S. aviation system, we need NextGen, to bring to air transportation the same 21st-century processes that give other industries reliability, flexibility, and predictability.

We were listening last year when you indicated that you would be watching our progress closely. And we believe that we have a lot of progress to report, because we are delivering NextGen now. The JPDO has made significant advances in fostering collaborative efforts with its partner agencies, and I am going to mention just a few of them here.

DOD established a division at JPDO to work on efficient and secure information-sharing. The Departments of Commerce, Defense, FAA, and NASA have collaborated to deliver the first NextGen weather capability in 2013. JPDO has conceived and facilitated the formation of research transition teams to further the effective transition of research from NASA to implementation in the FAA. Working with partner agencies and other stakeholders, the FAA has established an integrated demonstration capability in Florida. We are working with a wide range of government, university, and industry partners who are evaluating NextGen technologies.

In November 2008, three major new runways opened in Washington Dulles, Chicago O'Hare, and Seattle Tacoma, and you have probably been on some of them. More new runways are planned within the next 5 years at Chicago and Charlotte.

While runways offer significant capacity increases, new runways aren't always possible at congested airports like New York. New technology and procedures can help us gain additional use from existing airport configurations, such as those with closely spaced parallel runways.

In November 2008, as a result of NextGen research on wake turbulence, 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 Seattle alone, this resulted in capacity increases of more than 70 percent in low-visibility conditions.

Advances in performance-based navigation procedures and routes allow for optimal use of airspace for equipped users. Because the realization of NextGen benefits is integrally linked to equipage rates, it is imperative that the FAA work closely with industry on NextGen deployment.

Operators like Southwest Airlines recognize the value of performance-based navigation. This airline made the business decision early last year to equip its entire fleet for Area Navigation and Required Navigation Performance procedures. Southwest believes that its $175 million investment can be recouped within the next 5 years because of the operational efficiencies offered.

Among our five long-lead-time programs—the programs that will truly transform the NAS—Automatic Dependence Surveillance-Broadcast, ADS-B, is the most advanced. ADS-B has already been deployed in southern Florida. By the end of this year, ADS-B will provide, for the first time, surveillance in the Gulf of Mexico, where there has never been radar coverage. The FAA achieved a major developmental milestone with ADS-B in December that puts it on a path for full national deployment, which we expect to be completed in 2013.

Last year, the NextGen Network Enabled Weather Program began conducting demonstrations of the integration of weather information into decision support tools that are used for air traffic control automation. This is a key step in reducing the impact of weather.

To guide us in the transition from near to mid-term, we have made significant progress in the implementation and use across the FAA of the National Airspace System Enterprise Architecture. Published in January of this year, the NAS Enterprise Architecture lays out important, detailed information about the mid-term. The FAA NextGen Implementation Plan, also published in January, has a mid-term focus, as well.

The FAA is working hard to transition to NextGen responsibly and safely. And let me reiterate, we are delivering NextGen now.

Chairman Costello, Congressman Petri, Members of the Committee, thank you. This concludes my remarks, and I would be happy to answer any questions.

Mr. COSTELLO. The Chair thanks you and now recognizes Dr. Toner.

Ms. TONER. Good morning, Chairman Costello, Ranking Member Petri, and Members of the Subcommittee. I want to thank you for the opportunity to come here today and discuss with you the role of the Senior Policy Committee, or the SPC, who will set the strategic direction for NextGen.

I was pleased to hear in the Chairman's opening remarks his comment concerning needing executive branch support for NextGen. I hope to do my job well and enable our department and agency heads.

As a brief introduction to me, I am an FAA executive assigned to the Department of Transportation to advise on NextGen. I have more than 15 years of experience leading research programs at NASA that involved government, industry, and academia. I have published on topics ranging from aircraft aerodynamics to the performance of air traffic management systems.

So let's talk about our strategic leadership. NextGen is going to require us to rethink the national air transportation system. Our system is going to be more capable. It is going to be more environmentally responsive and more effective at achieving our security and defense needs. Operations will be harmonized globally, and delays due to weather will be reduced, and more.

So, to do this, we must consider the capabilities of aircraft, of airports, and of operations. We need to look at the system as a whole, integrating safety right from the very earliest conceptual design. So, to achieve national needs for NextGen, we must align the air transportation-related vision and activities among several Federal agencies. That is the reason for Vision 100 and the establishment of the SPC and the JPDO.

Five SPC partners are chartered with leading this transformation. The members of the SPC are heads of the partner agencies, and they advise the Secretary on national goals and objectives in order to meet the U.S. aviation needs. The members provide policy guidance for the integrated work plan that is created by the JPDO, and they make recommendations for funding for the planning, research and development that is carried out within their own agencies.

The Secretary and the SPC are accountable for NextGen, a national effort that has a broad scope of policy, economic, and technological complexity. They have to have the tools to do this difficult interagency leadership job. So there are two new additions to their toolbox to enable their effective participation: a direct SPC support staff and an advisory committee. As staff director, I will tell you that I will lead the action to ensure that these two new tools are ready and up to the task.

Let's start with the support staff. I am the liaison between the Secretary and the SPC partnering agencies, and I am working with the partners to fill staff positions, ensuring that the duties for each position are absolutely required at the Department level. The staff will lead the resolution of the highest-level interagency policy issues related to NextGen transformation. They will provide oversight of the crosscutting budgets and the performance measures. And they will monitor progress toward the deployment of interagency NextGen demonstrations, the focus fully on interagency actions. And I also want to point out to you that the support staff will work with the SPC to deliver a report that measures the collective progress towards NextGen.

Work has already started to establish an advisory committee that has a broad spectrum of non-Federal Aviation representatives, including those from general and commercial aviation and labor. Through public discussions, this committee will identify areas where the community can forge consensus to inform SPC decisions, enabling the SPC to set a path forward. The committee will focus on policy, planning, and performance measures.

Establishing and maintaining a national air transportation system that meets our civil aviation, security, economic, environmental, and national defense needs is not easy. To get there, we have to do a superior job addressing the national policies, executing interagency plans, and gauging progress against performance measures. The SPC must lead us there.

Thank you.

Mr. COSTELLO. The Chair thanks you and now recognizes Dr. Dillingham.

Mr. DILLINGHAM. Thank you, Mr. Chairman, Mr. Petri, Members of the Subcommittee.

Since FAA first announced the air traffic control modernization program in 1981, the Nation has spent a little over $50 billion on ATC improvements. However, today's ATC system cannot meet tomorrow's forecasted demands and is straining to meet current demands.

Seven years ago, the Commission on the Future of the Aerospace Industry recommended the establishment of a joint program office to plan for meeting the Nation's air transportation needs in the 21st century. FAA has developed a vision for NextGen, which it plans to fully implement by 2025, and has completed much of the planning for it.

Support for the vision is widespread, but some in the aviation community maintain that the plans are not sufficiently detailed, especially for airlines, manufacturers, and other systems users. Stakeholders have also expressed concerns about the governance and management plan for implementing NextGen. Some major stakeholders are still saying that they are not sure what is and what is not included in NextGen.

During the last year or 2, we identified a shift in stakeholder emphasis. Instead of focusing on 2025 and a full and complete systems transformation, stakeholders are asking for specifics about what can be done immediately to address current system delays and congestion. In 2008, almost one in four flights arrived late or was cancelled. The average flight delay increased despite a 6 percent decline in the total number of operations.

We have previously reported to this Committee on stakeholders' interests in what some refer to as NowGen. NowGen focuses on obtaining the maximum benefits available from existing and proven capabilities and existing NAS infrastructure as a bridge to NextGen.

FAA is to be commended for its recent actions to address today's problems, including the issuance of the January 2009 NextGen implementation plan that focuses on improving the efficiency and capacity of the NAS between now and 2018. Another recent action is FAA's establishment of the RTCA Task Force, which is charged with identifying the capabilities that can be implemented in the next few years and prioritizing them according to their relative merits and net benefits.

To obtain the full benefits of the new capabilities, the private sector will have to invest in them, as well as the government. But for the private-sector stakeholders, especially airlines, to invest, they will need to be convinced that their investment will produce relatively quick returns in the form of enhanced operational capabilities, fuel savings, or environmental benefits. Given the financial health of the industry and the economy, FAA may have to create some incentives for airlines to make early investments in new technologies and capabilities.

FAA also faces other key challenges in the mid-term and longer term. These challenges include: first, developing standards and procedures and regulations that will further enable the use of existing capabilities; second, maintaining and repairing existing facilities so they can continue to be used safely and reliably as part of the current system and, in some cases, integrated into NextGen; and third, addressing FAA's human capital resource needs so that adequate numbers of staff with the right skill mix are available to implement the transition; and finally, supporting research and development, especially with regard to weather, human factors, and environmental issues.

Work on longer-term challenges, such as infrastructure development, will also need to begin as soon as possible to ensure that solutions are available when needed. For example, FAA has already identified 14 major airports that will need additional runways by 2025 to meet the forecasted demands. According to one expert, technology solutions may increase capacity by 5 to 10 percent, but runways can increase capacity by 25 to 100 percent.

Mr. Chairman, without the necessary follow through on transitioning and transforming the national airspace system, the prediction of system gridlock could come true, adversely affecting the traveling public, the national economy, and the U.S.'s global competitive position.

Thank you.

Mr. COSTELLO. The Chair thanks you and now recognizes Mr. Scovel.

Mr. SCOVEL. Thank you, Chairman Costello. Good morning Ranking Member Petri, Members of the Subcommittee. We appreciate the opportunity to discuss FAA's efforts to develop NextGen and what can be achieved in the near and mid term.

NextGen is a high-risk effort, involving billion-dollar investments from both the Government—in new ground systems—and airspace users—in new avionics. The challenges with NextGen are multidimensional. They involve research and development, complex software development and integration, workforce changes, and policy questions about how to spur aircraft equipage.

FAA is presented with an opportunity to strategically position itself for when air travel rebounds. Our work shows that FAA must now set expectations, establish priorities and realistic funding estimates, and develop executable transition plans. After more than 4 years of planning, FAA must take a number of actions to advance NextGen.

I will make four points today.

First, while FAA is developing NextGen, it must also sustain the existing system. This will be important, since about 30 existing projects form the platforms for NextGen initiatives.

We found that FAA must make numerous critical decisions over the next several years that will have significant budgetary implications and materially affect the pace of NextGen. For example, FAA must decide what is needed for terminal modernization—that is, displays and automation systems that controllers rely on to manage traffic in the vicinity of airports. Costs have not been formally baselined, but the price tag is projected to be $600 million.

Second, it is important for FAA to maintain focus on near-term efforts that can enhance the flow of air traffic. These include new airport infrastructure projects, airspace redesign projects, and performance-based navigation initiatives, commonly referred to as RNAV/RNP.

As we noted in our September 2008 report, these new routes and procedures have significant potential to enhance capacity, reduce fuel burn, boost controller productivity, and reduce noise. These routes will take advantage of avionics already installed on aircraft, and they represent an important bridge from today's system to NextGen. However, to reach their full potential, these routes need to be fully integrated with airspace redesign initiatives. This is important as future routes shift away from localized operations to networking city pairs such as Washington and Chicago.

Third, FAA must complete the gap analysis of the current system and vastly different NextGen system and refine its interim architecture. FAA is focusing considerable attention on NextGen's mid-term goals, now targeted for 2018. However, FAA has not reached consensus with stakeholders on how best to move forward, and fundamental issues need to be addressed. For example, FAA has begun the gap analysis but will not complete it until this summer. Completing this action to identify all mission and performance gaps is essential to a successful transition.

Further, while FAA has made progress with developing the interim NextGen architecture, it has not yet developed firm requirements. Such requirements are needed to produce reliable cost and schedule estimates and to successfully meet mid-term objectives.

We are encouraged that FAA is working with RTCA, a joint FAA/industry forum, to reach consensus on top priorities, implementation plans, and actions needed to realize benefits. The RTCA Task Force is scheduled to complete its work this summer.

Fourth, FAA must make a number of business and management actions to move NextGen planning to mid-term implementation. These include: establish priorities and agency commitments with stakeholders and reflect them in planning and budgetary documents. This is a necessary road map for stakeholders to make sound investment decisions. FAA should provide this Committee with its investment decisions and identify the proper sequencing of efforts.

Next, manage NextGen initiatives as integrated portfolios and establish clear lines of responsibility, authority, and accountability. Accordingly, FAA will need to adjust its acquisition management system so that it can effectively manage NextGen investments.

Next, acquire the necessary skill mix to manage and execute NextGen. A recent study pointed out that FAA lacks the workforce needed to execute a large-scale system integration, a workforce that is crucial to the successful implementation of NextGen.

Finally, examine what can reasonably be implemented by the Agency and key stakeholders in given time increments. For example, FAA will need to balance training large numbers of developmental controllers to sustain the existing system while introducing the new training needed for NextGen capabilities.

In summary, FAA faces many critical decisions in the next year. A clear picture of FAA's priorities and an executable path for NextGen should emerge this summer when the task force completes its work. A considerable level of oversight will be required by Congress and the Department, and we will continue to monitor this important effort.

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

Mr. COSTELLO. The Chair thanks you and now recognizes Dr. Sinha.

Mr. SINHA. Good morning, Chairman Costello, Ranking Member Petri, and Members of the Subcommittee. Thank you for inviting me to participate in today's hearing on "ATC Modernization and NextGen: Near-Term Achievable Goals."

Statistics tell us that even though traffic has declined almost 9 percent between 2004 and 2008, delays have increased. What it doesn't tell us is that although traffic at some airports has certainly declined, operations at many major airports have continued to increase, leading to higher delays across the NAS. For example, the summer traffic, June through August, of 2008 is up 9 percent compared to 2000 at seven major airports: Atlanta, Newark, Houston, Kennedy, LaGuardia, O'Hare, and Philadelphia.

I will touch upon just a few of the near-term initiatives which have been implemented or are under way.

RNAV procedures implemented at Atlanta in 2006 have increased throughput and reduced delays, with a measured capacity gain of nine to 12 departures per hour. This equates to $30 million annual benefits. Similar procedures have been implemented at airports such as Dallas-Fort Worth, Las Vegas, Los Angeles, and Phoenix.

RNAV and RNP applications also help deconflict operations at major airports in close proximity. The use of an RNAV departure procedure at Chicago O'Hare in combination with an RNAV approach procedure for Chicago Midway allows both traffic streams to flow without interfering with each other.

The airports that are approved to use a new procedure for dependent closely spaced parallel operations are Boston Cleveland, Philadelphia, Seattle, and St. Louis. Cleveland, for example, experiences reduced visibility conditions about 23 percent of the time. With this new procedure, up to 16 additional aircraft will be able to land each hour during periods of low visibility.

The New York/New Jersey/Philadelphia metropolitan area airspace redesign, when fully implemented in 2012, will provide a 20 percent reduction in delay and approximately $250 million in annual user benefits. Similar airspace projects are under implementation at Chicago and Houston.

To facilitate general aviation operations at small community airports, new RNAV approach procedures with vertical guidance are providing low-visibility access using GPS and the Wide Area Augmentation System, known as WAAS. There are currently 1,333 RNAV approaches with vertical guidance around the U.S. at 833 airports.

ADS-B-based weather, NAV status, and traffic information services have been available to GA pilots in southern Florida since November 2008. Such services will be available nationwide by 2013.

An important initiative in its early stages is the Aviation Safety Information Analysis and Sharing, known as ASIAS, which integrates public and private data from government and industry for the purpose of identifying safety trends and detection of systemic risks before they contribute to accidents.

Procedures generally known as optimized profile descents use reduced thrust, resulting in fuel and emission benefits. Variations of optimized profile descents are undergoing trial implementations at Louisville, Los Angeles, Atlanta, and Miami.

Looking ahead, the FAA and the aviation community will need to invest in new technologies, procedures, and, in some cases, new policies to meet current and future needs. Some examples are: closely spaced parallel runway operations, surface traffic management and surveillance, air-ground data communications, and new decision support tools for controllers and traffic flow managers as well as for pilots.

The Performance-Based Aviation Rulemaking Committee, known as PARC, and Commercial Aviation Safety Team, CAST, and RTCA are three examples of collaboration between FAA and the aviation community to make NextGen happen. The recently formed RTCA NextGen Implementation Task Force, convened at the request of the FAA, is building aviation community consensus on overall priorities and strategies to implement near-term and mid-term improvements.

NextGen implementation also depends on a strong partnership among multiple government agencies: NASA, Department of Commerce, National Weather Service, Department of Transportation, the FAA, Department of Homeland Security, and Department of Defense.

In summary, there are many near-term improvements that make a real difference in the performance of the NAS. While these provide significant benefits, more needs to be done in the areas of technology, procedures, and policies.

And finally, it is important to recognize that implementing NextGen will require significant collaboration and investment across multiple government agencies, as well as private industry.

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

Mr. COSTELLO. The Chair thanks you and now would like to welcome and thank Mr. Robert Tobias for joining this panel.

Mr. Tobias is a panel member for the NextGen study for the National Academy of Public Administration and is also the director of Public Sector Executive Education at American University.

Mr. Tobias, thank you for being here, and you are recognized.

Mr. TOBIAS. Chairman Costello and Ranking Member Petri and Members of the Subcommittee, thank you for inviting the National Academy of Public Administration to testify at this hearing.

I served as a member of the NAPA panel that issued the September 2008 report entitled, "Identifying the Workforce to Respond to a National Imperative: The Next Generation Air Transportation System." The panel was convened in response to ongoing concerns raised by GAO and ATO, who engaged the National Academy in June 2007 to, one, identify the mix of skills needed by the nonoperational workforce to design, develop, test, evaluate, integrate, and implement NextGen; and two, to identify strategies to acquire those skills.

Now, the nonoperational workforce includes positions such as systems engineers, project managers, contracting specialists, researchers, persons in business and financial management, but does not include the air traffic controllers, safety inspectors, and other employees who install, test, and repair equipment.

The panel identified a list of workforce competencies that are contained in my full statement that are critical to NextGen's success. The panel then recommended a comprehensive approach to obtain the necessary competencies that includes: reviewing the existing human resource flexibilities made possible under the FAA's 1996 human resources reform legislation; two, reviewing all of the government-wide flexibilities available; and recommending, if necessary, the creation of new flexibilities to address ATO's unique needs.

Within this framework, the panel recommended several key strategies targeted to the career employees to acquire the skills needed by the ATO acquisition workforce. First, we recommended that this program be aggressively marketed by creating and marketing the NextGen vision and mission. The panel found that FAA and ATO could do more to generate excitement and interest around the NextGen vision to make the work more attractive to prospective candidates.

Two, we recommended developing a more strategic approach, creating a pipeline of talent in science, technology, engineering, and mathematics occupations which will be critical to NextGen's success.

Competency identification is important. Strategies to attract and retain the necessary competencies are important. But the panel found that the single most important elements of success for large-scale systems integration efforts like NextGen is effective leadership.

So the first question is, do current FAA leaders have the leadership skills to design and implement NextGen? I think the short answer is "no." But the panel did find the existing FAA leadership program to be very comprehensive in its approach and that a platform exists to provide the appropriate training and professional experience needed by NextGen leaders.

However, to be successful, the panel concluded that the program needs to continue to focus on some key competencies already included in the program, as well as expand its focus on leadership development competencies that are found in other programs. And we created a comprehensive list that is included in my testimony.

The other critical elements of leadership identified by the panel include: effective communication, creating the right governance structure to ensure that the changes suggested by the new leadership competencies are heard and implemented, and acquiring the skills necessary to create a culture that is receptive to the significant organizational and individual changes implicit in NextGen. FAA is addressing each of these elements of leadership as the report is being completed.

In addition to leadership, the panel identified several other implementation challenges that may impede the progress of NextGen. They included, first, the NextGen plans. The panel recommended that ATO complete its work to develop a detailed NextGen implementation plan and communicate it to the workforce, stakeholders and Congress. We were told that this plan would be issued, and we commend FAA for meeting this important milestone.

Second, labor management relations: As you know, FAA's workforce is highly unionized, and the ATO's ability to successfully transition to NextGen will require that the Agency develop and implement a breakthrough strategy to successfully engage the unions that represent its employees, who are in some cases the end users of NextGen technology. I certainly want to associate my remarks here with those of Chairman Oberstar, who pointed out in his opening remarks that people do, indeed, make the technology work.

Third, human resources: The panel recommended that FAA and ATO evaluate the structure and content of their HR operations and services to ensure that both are optimally designed to support NextGen.

In conclusion, the Academy panel is confident that FAA will take the necessary steps to meet its short-term goals of acquiring the necessary competencies. However, the panel is much less optimistic that ATO has created the right organizational environment to actually retain and maximize the contributions of those competencies. Until ATO fully addresses its implementation challenge, especially its leadership issues, the panel is concerned that these issues may derail the Agency's NextGen plan.

Mr. Chairman, that concludes my statement. Thank you for inviting the National Academy to testify at this hearing, and I would be happy to answer any questions.

Mr. COSTELLO. The Chair thanks you, Mr. Tobias.

The Chair now yields to the Chairman of the Full Committee, Chairman Oberstar.

Mr. OBERSTAR. I promise you just one question for Dr. Dillingham and Inspector General Scovel.

As to this reorganization structure of the FAA that we have just come across recently that was created out of whole cloth without any legislative authority, establishing a senior vice president in four positions and a string of vice presidents for various activities: There is only one vice president in the government. We have never had in any government agency any designation of this kind. This is an arrogance ascribing to itself authority and corporate, sector-like status that has no foundation law nor authority.

In restructuring in defiance of Vision 100, the joint planning and development office, putting it down at the bottom of the organizational chart, how in heaven's name does this advance the cause of NextGen?

Mr. Dillingham. Mr. Chairman, I think, to start off with, the GAO has always been in support of the reorganization in which the Committee has included in its reauthorization bill. And we still support that, but I would like to add to that, that the reorganization that ATO undertook began to address some of the concerns that the stakeholders had about trying to have a unified place where authority and responsibility would reside, but it did not address all of the issues.

Now, what we have is, in our opinion, even greater confusion in terms of who is in charge and where the responsibility stops. You have what the Committee has proposed. You have the ATO reauthorization. You have the executive order, which also lays another dimension on it.

So it is clearly a concern to us, but I think, in the end, whatever the Committee decides to do—although organizational structure is important, one of the things that we want to look at is sort of what is the outcome. I mean, the process is very important, but equally important is the outcome; and it is not clear how another reorganization would affect this whole process.

You know, the bottom line is, there is work to be done here.

Mr. SCOVEL. Good morning, Chairman Oberstar.

As our statement today makes clear, we think that the Committee's proposal in the reauthorization bill to name an associate administrator for NextGen, reporting directly to the FAA administrator, has merit, and that is the expression that we use in our statement today. We are on the record with that same term in hearings past.

We think the jury is clearly out on the current organization of NextGen, which places it within the ATO. As our statement, I hope, makes clear, we have reservations about the roles and responsibilities of the NextGen operation under the ATO. We think that it has led to fragmentary budgetary responsibilities, specifically with respect to programs having to do with en route services, with terminal modernization, and with ADS-B. Ms. Cox does not have budgetary authority over those programs.

We also think that it may potentially lead to confusion on the interagency side. When Ms. Cox must deal with DOD, with Homeland Security, with the Department of Commerce on NOAA and weather questions, we think that the higher visibility provision, reporting directly to the FAA Administrator, will certainly give the Agency that needed leverage.

I will acknowledge the concerns of some of the industry stakeholders that this organization may present an opportunity to better match operations with NextGen initiatives, but I think those have to be balanced against the countervailing considerations that I just mentioned.

Mr. OBERSTAR. Thank you both very much for those thoughts.

It underscores, Mr. Chairman, the urgency of getting the other body to move our bill and for this administration to come forward with their recommendations for revenue, which is really holding up the process at Ways and Means.

I just a moment ago said on the House floor that our patience is running out. They need to get their act together, to put forward their proposals for the future of the revenue stream at FAA, and we need to fix this organizational chart that arrogates unto itself titles that have no meaning and no ability to improve the performance. We are going to stay on their case.

Mr. COSTELLO. Thank you, Chairman Oberstar.

Let me just follow up by commenting, not only is this restructuring within the FAA contrary to Vision 100, but the FAA knew very clearly what this Committee's and the full House's position was in H.R. 2881. The language for the associate administrator's making the person in charge of JPDO, reporting directly as an associate administrator to the FAA administrator, was clearly the intent of this Committee when we passed H.R. 2881, and it was clearly the intent of the House when they voted.

It was interesting, after the restructuring came out, that we learned about it in news reports, and I contacted Mr. Krakowski at the time and the acting administrator and said, Did the thought ever cross your mind that the House has already spoken on this issue? We are waiting to hear from the other body, and you have heard from the GAO, and you have heard from the inspector general. Did the thought cross your mind to consult with the Committee or to consult with staff?

You are exactly right. I mean, there is a level of arrogance here that you are very correct in pointing out; and we need to get this straightened out. If, in fact, NextGen is going to happen and if, in fact, the Agency has the ability to handle a project of this magnitude, the way that we are going to be able to get that done is to make certain, as I said in my opening statement, that the White House is committed and will be involved in the process. Also that the person who is in charge of implementing this project will, in fact, report directly to the administrator and will give the level of visibility that it deserves if, in fact, this is the priority project that everyone wants it to be.

Mr. OBERSTAR. If the Chairman would yield just briefly, Vision 100 was done during, I think, Mr. Duncan's Chairmanship of the Aviation Subcommittee. We reaffirmed those decisions made back then when we crafted the bill in the last Congress. So the actions of FAA are in contravention of bipartisan judgment on the needs of the future of aviation and the future structure and delivery capability of FAA; and I am very disrupted by it.

Mr. COSTELLO. The Chair thanks you.

We will ask just a few questions and then call on the Ranking Member.

Dr. Dillingham, you, or the GAO, recently took the ATC modernization off the high-risk list. I am wondering, number one, if you will comment as to why you did that, and number two, are you taking NextGen off the high-risk list, too; or is there a distinction between the two and the way you view them?

Mr. DILLINGHAM. Thank you, Chairman Costello.

Yes, we did. After 12 years on the high-risk list, we removed FAA's ATC modernization program from that list. The reason we did that is that we set some criteria, including bringing in some of those systems on time and on budget, coming closer to the goals that they set, as well as putting in place the management capabilities that would maintain that.

The Congress established the ATO with part of its mandate being, you know, fix up ATC modernization, and we measured from the time the ATO was established until, I think, it was 2008. During that course in time, the FAA met the criteria; its costs and schedules came into line. They implemented about 50 of our recommendations that we put forward to make sure ATC modernization was on the right track.

We do make a distinction between ATC modernization and NextGen. ATC modernization was almost totally, from our perspective, systems acquisitions; and NextGen is a complete, you know, curb-to-curb, multi-Cabinet-level agency, a multiapproach to transforming the system. We have not placed NextGen on our high-risk list, primarily because it is just beginning to start implementation, and so we wanted to wait until we had, you know, enough information to see where it was.

This Committee has asked us to establish a monitoring program and give you real-time information on the progress of NextGen, and we will certainly be doing that beginning in the next quarter.

Mr. COSTELLO. While you have not placed it on the high-risk list, it is, in your opinion, a high-risk project; is that correct?

Mr. Dillingham. There is no question that it meets a lot of the primary criteria. Mainly, it is high dollar, it is very complex, and it is a long time running. So—those are some of the primary characteristics, so it is high-risk; it is just not on our list yet.

Mr. COSTELLO. Mr. Scovel, you credit much of the ATO's ability now to better manage the cost and schedule of the ATC modernization to its incremental approach to acquisitions in particular. That is something that we have asked for and that we have discussed many times in your testimony and in Dr. Dillingham's testimony.

I wonder if you might elaborate and explain the credit that you give them and explain how they have used an incremental approach.

Mr. SCOVEL. Sure.

Mr. Chairman, we do give credit to FAA for using an incremental approach that is segmenting its acquisition programs in order to get a better handle on overall cost and schedule. In no small measure that approach has been responsible for, I think, GAO's removal of ATC modernization from its high-risk list. At the same time, I think we have to recognize that the incremental approach has had certain detrimental effects.

If we could use as an example the STARS program, which I know the Committee is familiar with, it began as a program to place terminal modernization apparatuses at 172 sites for a cost of about $940-plus million. As the program unwound, it turned into 50 sites for $1.4 billion or so, and the FAA confronted the need to establish a substitute program, an interim program with Common Arts, and that is where we are with terminal modernization today.

As our statement, I hope, makes clear, what we see as the primary disadvantage is that with the incremental approach, as costs rise, as schedules drag out, frankly, as patience wears thin sometimes up here on the Hill—and in the Administration, too—the programs can come to a stop without good visibility on where the proper end state should be. That then can lead to a gap, as we are encountering today, between the state of terminal automation and what is needed for NextGen.

Mr. COSTELLO. You mentioned in your testimony, both written and in your summary of your testimony, about the 30 existing capital programs that serve, I think you described them, as "platforms" for NextGen and that the FAA has some critical decisions to make over the next 2 years. Obviously, these decisions are going to involve costs.

As I said yesterday in a meeting with the Speaker on another topic, the devil is always in the details, and it is always in the funding. Has the administration in their 5-year capital investment plan planned for these additional costs as the FAA moves forward with these 30 capital programs?

Mr. SCOVEL. Mr. Chairman, some programs are reflected in the capital investment plan by firm dollar figures when those programs have been officially baselined by senior FAA management. Other programs, though, simply have a dollar placeholder in the CIP. I could run down a couple of those.

For instance, terminal modernization, that I discussed just a minute ago, is planned for a decision going forward in 2010; placeholder value, $600 million.

The LAAS and WAAS programs: Again, decisions are pending for 2009-2010, but upwards of $2 billion is planned between those two programs.

Traffic flow management: Decisions again pending; placeholder, $450 million.

ERAM, which the Committee is familiar with, is due to be completed in 2011, but enhancements may be necessary in order to again bridge the gap and get us into NextGen territory, specifically focusing on the 2018 date.

Those enhancements may cost some billions of dollars as well, so we can see that there are placeholders. As the next year or two firms up—especially with the recommendations of the RTCA Task Force and as FAA evaluates those—it should be able to apply better dollar figures to those programs.

Mr. COSTELLO. I thank you.

One final question and then I will go to the Ranking Member. And then I will have other questions as time permits.

You heard me talk in my opening statement about my concerns about the FAA, which, as you know, maintains the comprehensive certification program. They have recently indicated that the program would be limited in its scope to those systems owned by the FAA.

I know that you have stated in previous testimony your concern about ADS-B. You expressed concerns such as, are we going to find ourselves in a situation where the FAA knows very little about a system that is expected to be the cornerstone of NextGen. So do you have the same concerns that I have, if we are going to limit the certification program just to the systems that are owned by the FAA and not have certification over programs that are not owned by the FAA?

That gives me a lot of heartburn. I want to hear from you on it.

Mr. SCOVEL. Mr. Chairman, we do have concerns.

We received your request and Chairman Oberstar's request yesterday that my office assess the FAA's decision to back away from the certification of all programs and limit itself to those programs, to those systems, which it owns.

You are correct. We are on the record as saying with regard to ADS-B that we have concerns about FAA's oversight of that program. As the Committee knows, FAA essentially contracted to buy a service and not the system itself. We think that perhaps there is a natural tendency in all people to think that when you hire a contractor and you buy a piece of hardware, you are also perhaps buying the oversight from the contractor, too. That is the danger that we would want to examine perhaps with FAA's actions, both with regard to ADS-B and with regard to certification.

I want to make clear, however, that we are not examining the policy basis for any decision to enter into a contract as opposed to procuring or developing it in house. Our focus will be with oversight, with the quality of oversight, with the safety implications of any lack of oversight, and with the Agency's overall attitude towards its oversight responsibilities.

Mr. COSTELLO. I thank you.

The Chair now recognizes the Ranking Member, Mr. Petri.

Mr. PETRI. Thank you very much, Mr. Chairman.

I have lots of questions and would like, if I could, to submit some for a written response——

Mr. COSTELLO. Without objection.

Mr. PETRI. —given the time constraints that we are operating under.

I do have one question for Ms. Cox, which has to do with the assertion of some that the Agency wants to decommission many of the current radar sites, which could end up with gaps in coverage and with an incomplete system.

How are you planning to ensure there is adequate backup surveillance in the event of a GPS failure or some kind of intentional action or accident?

Ms. COX. Well, as you know, for the near term, the backup strategy for ADS-B is to use radar. We have done a careful assessment of the current secondary radar systems and believe that with about 50 percent of those current radars, we can have sufficient coverage.

You might remember that when the radar coverage first was put into place, it was around existing capabilities. I think we can get better coverage today than we were able to in the past, and we have done the site surveys to ensure coverage with radar in the event that the ADS-B goes out.

Mr. PETRI. So you are confident that because of improvements in the technology and range of radar, you can operate as well with fewer sites, as was the case back when the original system was put in place as a supplement to GPS?

Ms. COX. As a supplement, yes.

Remember, too, that there is no intention to remove any of the primary radar systems that we have in place, so that in the event of a loss of an aircraft's transmission, we will be able to track that aircraft.

Mr. PETRI. Thank you.

Inspector General Scovel, at this point, who would you say is the one person who is in charge of NextGen? Is there someone?

We have these conflicting structures and changes and so on. We would like to figure out whom we praise or take out and replace if there is a problem.

Mr. SCOVEL. A tall order, Mr. Petri.

Day-to-day responsibility for NextGen clearly belongs to Ms. Cox, seated down the table to my right. With the President's executive order from last November, however, President Bush designated the Secretary of Transportation as the most senior official in Government responsible for the implementation of NextGen. Clearly, the FAA Administrator has a role in that, too, and that position, as everyone knows, remains to be filled.

There is a lot to be done, moving forward, with sorting out those responsibilities. I know this is a priority for Secretary LaHood, and he is working with Dr. Toner to establish the groundwork for his responsibility and authority with regard to the NextGen project.

Mr. PETRI. Well, it is important.

I have one other question that I would like to ask at this point, and that is: In your testimony, you cite airspace redesign efforts as an important effort toward improving airspace efficiency in the near term. We are all aware of the congestion in the New York and East Coast area.

Could you describe a little bit about that process and which airspace redesign projects hold the most promise of unlocking capacity in the national system, short term?

Mr. SCOVEL. Yes, sir.

The FAA has ongoing projects in the New York, Chicago, and Houston areas, as well as elsewhere, in order to find ways to unlock the hidden capacity in the NAS, if you will. In 2010, we are told that FAA will begin airspace work in areas such as Denver, Dallas, southern California, and Las Vegas.

We have identified a couple of challenges or barriers that might impede FAA's progress in this area. The first would be establishing a linkage and maintaining it between airspace redesign and the emerging, performance-based navigation initiatives—RNAV and RNP; second, coordinating among the ATO lines of business to manage and oversee airspace redesign.

Right now, airspace redesign is fairly decentralized, and we understand that field offices around the country are pursuing airspace redesign projects, certainly with FAA Headquarter's knowledge and funding, but they are pursuing it largely on their own. We think that, perhaps, some greater level of oversight and control by Headquarters might be beneficial.

We also think that realistic funding profiles for airspace redesign projects are necessary. Funding for airspace redesign has been reduced in the last couple of budgets, and we think that the potential advantages would certainly merit increased funding.

Mr. OBERSTAR. Mr. Chairman, if the gentleman from Wisconsin has concluded, may I follow up on that, please?

Mr. COSTELLO. The gentleman from Wisconsin yields to the Chairman.

Mr. OBERSTAR. Mr. Scovel, do you know off the top of your head how many airports are managed by the New York TRACON? 45.

Do you know how many operations are managed by the New York TRACON? 1.2 million. That is equal to all of Europe combined.

The southern California TRACON handles 1.4 million operations a year; that, too, is equal to all of Europe combined.

This is the most complex airspace in the world. To think that we can just tinker around the edges and shift a plane here and a plane there and an arrival here and a departure there is folly.

There have been a dozen airspace redesigns over the 25 years that I have been engaged in aviation, and every one of them runs into some kind of problem—either not enough concrete or more noise over some neighborhood group that has not been receiving that noise before. Nobody gets relief from the noise. Even if we move to Chapter 4 noise reduction, you are still going to have people perceiving there is more noise.

To reduce the funding for the redesign is folly. There needs to be a much more serious effort at this airspace redesign initiative. Frankly, the FAA needs to convene the New York/New Jersey Port Authority and the Governors of the two States and put some resources into the Atlantic City Airport, which has a 10,000-foot runway, needs high-speed ground connection to the other airports in the region and to the major centers, and use that capacity to relieve the pressure on the other airports.

Mr. COSTELLO. The Chair thanks you and now recognizes the gentleman from Iowa, Mr. Boswell.

Mr. BOSWELL. Thank you, Mr. Chairman.

Mr. Oberstar, on this Committee, I am going on my 13th year, and I wonder when we are going to get off this subject and go on to something else. On this point—and I am not being frivolous at all—it just kind of weighs us down.

So I will start with you, Dr. Dillingham and then all of you.

What are the first two things that need to get done to get us to move? We all know we need an administrator; that is not the point, so leave that off the table.

What are the first two things? First you and then Mr. Scovel and anybody else who wants to jump in. What must we do to get going?

Mr. DILLINGHAM. Mr. Boswell, that is an excellent question.

I think one thing is the realization that ATC modernization is more of an evolutionary process. It is not going to be where we sort of all of a sudden flip a switch and we have got NextGen.

Mr. BOSWELL. You are saying the technology is moving fast, but we have still got to start. We understand that.

Mr. Dillingham. So I think the steps that are being taken now, which are to focus on the current delays and congestion use, and to make the best use of the capabilities that we currently have on the ground and in the aircraft, address immediate problems.

Mr. BOSWELL. Do you have number two?

Mr. Dillingham. Oh, okay.

Number two is, in order to do that, it is what has been said a number of times: It is a people issue. It is bringing them in, making sure that you have the appropriate stakeholders involved in it, as well as, from the FAA's perspective, having the people in FAA who can manage and implement this, what we are now calling NowGen.

Mr. BOSWELL. Too much turnover?

Mr. Dillingham. No, not too much turnover. It is a need that is manifesting itself because of what they are trying to do.

Mr. BOSWELL. I am thinking continuity.

Mr. Dillingham. Well, you have had a lot of turnover, but the Committee has addressed that. We now have a 5-year administrator, but we are now in a turn—you know, a new Secretary, a new administrator and so forth.

Mr. BOSWELL. Thank you.

Mr. Scovel.

Mr. SCOVEL. Mr. Boswell, two things: Number one would be, press the RTCA Task Force that is currently in session and that is due out this summer to deliver a comprehensive report. This is, we think, key, and it makes this year a critical juncture for NextGen's ultimate success.

The RTCA Task Force is now the platform for stakeholders across the board to speak with FAA and to reach consensus on all of the capability and prioritization questions that have for so long been, frankly, frustrating the industry.

Number two would be to use that report to complete the gap analysis and the interim architecture and then to move out from there.

Mr. BOSWELL. Thank you.

Well, I have just learned, Ms. Cox, it all fell on your shoulders a little while ago. So tell me, what do we need to do to make it happen?

Ms. COX. I agree with the previous two speakers. We are putting in place the RTCA Task Force to get commitment from industry and their input on what the next best steps are, using the existing equipment that——

Mr. BOSWELL. What is your timeline?

Ms. COX. They report out in August of this year.

On the FAA side, we can make better use of the existing capabilities that we have to use the performance-based navigation in important places like the New York airspace and others that are more congested today, like a traffic management adviser to do metering into those airspaces.

We can do that today, and many operators today fly aircraft with capabilities that they do not take advantage of. Those operators and pilots are trained on those capabilities, and the FAA makes the capability available at the airfields.

Then we can see great steps forward in the near term.

Mr. BOSWELL. Well, I use the GPS quite a bit. You know, I do not think hardly any of us are asking for the airways anymore, but are you saying that people who have got the IFR-qualified GPS are not using them?

Ms. COX. In the commercial aircraft today, about 90 percent are equipped to fly the area navigation capability, but far fewer are qualified to fly the required navigation performance, SAAAR approaches, that will allow us to get better use of the airspace that we have today. It is about 18 percent.

Mr. BOSWELL. Thank you.

Mr. Chairman, before I yield back, do we know what we have got to do maybe? Do we?

Mr. COSTELLO. Well, we are waiting on the JPDO and others to formulate a plan.

Mr. BOSWELL. Well, thank you. I yield back.

Mr. COSTELLO. The Chair now recognizes the gentleman from New Jersey, Mr. LoBiondo.

Mr. LOBIONDO. Thank you, Mr. Chairman, for holding this very important hearing.

While Chairman Oberstar has left the room, I want to thank him for his understanding and for the acknowledgment of the role that Atlantic City can play in the future, in his recent visit to the region.

To our panel, thank you for being here and for what you are doing.

In particular, Ms. Cox, thank you for your work. You know the Tech Center that I have the honor of representing and the work that they have done with research and development for safety and security and technology.

I have, like, three questions total, but would you take a brief moment to explain your vision for the role of the Tech Center and what they will play in the implementation and in the integration of the NextGen system?

Ms. COX. Well, the role of the Technical Center, as you know, is extremely important in the development and implementation of the NextGen system. We have taken care to integrate capabilities at the Tech Center into our research and development, technology development, and prototyping and testing of NextGen systems; and the Technical Center will be very involved in the life cycle test and evaluation of the NextGen systems of systems moving forward.

That test and evaluation capability is something that the group up there is working very hard to put into place—benchmarking, looking at best practices out there today, because the ability to test the systems of systems is something that is new and unique as we move forward.

Mr. LoBiondo. Thank you.

Ms. Cox, as you know, we have had an initiative that has gotten under way that involves great partnership with local government, academia, industry, the Federal Government, partnering to build a research and development park on land that is actually adjacent to the Technical Center and focused on providing expertise to the FAA and to the research and development test and evaluation field of the NextGen system.

In your opinion, do you feel that the facility would benefit the FAA in the Next Generation mission as it starts to get off the ground? We are expecting ground breaking in another month or two.

Ms. Cox. Absolutely. These types of partnerships that the research and technology facility in Atlantic City provide are exactly the kind of partnerships that the FAA is looking at as we move forward.

As I mentioned, NextGen is something that the FAA cannot do alone. It requires the involvement of academia, industry and all of our stakeholders as we move ahead.

Mr. LoBiondo. Thank you.

Lastly, can you explain whether the FAA is actively reviewing current labs at the Tech Center as well as the legacy research and development programs under way there to determine their place in the NextGen system? Can you provide me with a list of the labs and programs which are undergoing such a review?

Ms. Cox. Congressman LoBiondo, I am not aware of any comprehensive review of laboratories at the Technical Center. We have a lot of legacy systems that depend on capabilities at the Technical Center for their ongoing maintenance. We have recently established a business continuity plan facility at the Technical Center; in the event one of our centers should go down we will use that facility at the Technical Center to maintain capability.

We are developing new labs that support specific NextGen systems, like system-wide information management. We test ADS-B with the aircraft at the Technical Center. All of those are going forward.

There is an assessment ongoing of a fuels laboratory in the Technical Center that has been funded under our research, engineering, and development program. That fuels laboratory is aimed specifically at looking at moving general aviation away from leaded fuels to unleaded products successfully. We have taken on a group of experts to examine the capabilities of that facility and where it might fit into the NextGen environment.

Mr. LoBiondo. I thank you very much for your participation and for your answers today, for the work that you are doing, for your teammates at the FAA.

Particularly, I want to thank the men and women of the FAA Technical Center in southern New Jersey and Egg Harbor Township for the outstanding work that they continue to do on behalf of all of us.

So, once again, Mr. Chairman, thank you, and I thank the panel.

Mr. COSTELLO. I thank you.

The Chair now recognizes the gentleman from New York, Mr. Hall.

Let me mention that two votes have been called for on the floor. We have about 13 minutes for the votes, so we would ask that you keep it brief.

Mr. HALL. Thank you, Mr. Chairman and Ranking Member Petri. Thank you to our panelists.

Ms. Cox, the ongoing New York regional airspace redesign is an undertaking which has had continuing complaints about both the process used and the conclusions. I am curious if you think it might be wise to stop the continued implementation of that program until a comprehensive review can be put into place to ensure that the redesign serves the purpose that was intended to increase safety and efficiency, to save money, and to improve the act of flying for customers and flight crews.

Should the authorization and implementation of NextGen be up and running before that redesign is finalized?

Ms. COX. Well, the capabilities that are recognized and used in the redesign do not require any new NextGen capabilities to deliver, when fully implemented in 2012, a 20 percent reduction in delays in the New York area airspace.

I understand that this is a very emotional issue, going forward. We believe, if you look at the balance of what is delivered with the New York airspace redesign, that we get improvements not only in reduction and overall noise footprint in the area, but a significant reduction in the overall emissions for the environment there; and certainly an improvement in efficiency and in the convenience for the traveling public that moves through the New York area.

I recently saw a statistic that says either flying to, from or through the New York area, a third of the domestic traffic in the United States goes through there, and a sixth of all international traffic goes through.

Mr. HALL. Great. Well, thank you very much, and I hope you can meet those goals.

Dr. Dillingham mentioned in his testimony, in his written testimony, that there has been some progress made involving the labor unions that work with FAA in the development of NextGen. However, the union officials have expressed concerns that the unions are not involved in selecting subject matter experts.

Dr. Toner, you said that a broad spectrum of representatives on the Federal Advisory Committee included aviation labor. Can you tell me, to what extent are the pilots included, as well as the controllers; and are they having input into the experts that are being brought forth?

Ms. TONER. So we are just beginning the formation discussions for the advisory committee. We are committed to having a broad spectrum of representatives. Labor will be included, but we have not gotten to the point of specific charter or specific membership, and we will be happy to get back to you later as we formulate that.

Mr. HALL. Thank you.

Mr. Chairman, I will submit other questions for the record.

Mr. COSTELLO. The Chair thanks the gentleman, and now recognizes the Ranking Member of the Full Committee, Mr. Mica.

Mr. MICA. Well, thank you.

Ms. Cox and Mr. Sinha, in the best-case scenario, if everything went perfectly in the implementation of NextGen, how many years do you estimate we are looking at?

Ms. Cox.

Ms. COX. Well, the introduction of NextGen is an ongoing, evolutionary process.

Mr. MICA. I know. Again, to have it fully implemented, can you give me the number of years you would estimate?

Ms. COX. We have taken a detailed look at what we can deliver by 2018, so that is 9 years from now.

Mr. MICA. So, in 9 years, you think you could have most of it—90 percent, 80 percent?

Ms. COX. A large percentage of it will be available in 2018 and in modeling the capability that we believe we will have in 2018. And we have modeled just a third of the capabilities that we believe we will introduce by then, and we have seen a 40 percent reduction in delays in those models.

Mr. MICA. Mr. Sinha, what do you think is a best-case scenario?

Mr. SINHA. So let me start out by saying, if we do not do things by 2018, we do not have to worry about 2025, so I think the need and that some of the work we have done——

Mr. MICA. Well, to be fully implemented?

Mr. SINHA. So I think—again, I am not even sure that anybody can really define what "fully implemented NextGen" means, because the capabilities that are going to be evolving——

Mr. MICA. Well, with all the aircraft equipped and with all the technology in place?

Mr. SINHA. I think, if we push hard for it, by around 2018 to 2020, we should be able to implement all of the avionics.

Mr. MICA. So we are looking at about another 10 years?

Mr. SINHA. Right.

Mr. MICA. Okay.

We are probably looking at about $18 billion more in cost, an $18 billion to $20 billion estimate, Ms. Cox?

Ms. COX. That is an estimate.

Mr. MICA. That is good.

Mr. SINHA. It depends on whose cost are you talking about.

Mr. MICA. What do you think in just the total cost to everybody?

Mr. SINHA. The total cost, I believe, would be more in the $20 to $30 billion.

Mr. MICA. Okay, just an estimate.

Now, I was out, and looked at some of the NextGen technology. I met with some of the MITRE folks, and they told me that the efficiencies, if fully implemented, that it would bring into the system would be in single digits—is that correct, Mr. Sinha—as far as increasing capacity and efficiency?

Mr. SINHA. I do not believe that it is in the single digits, but it is not 100 percent.

Mr. MICA. Is it 10 percent? Is it a 20 percent increase in efficiency and capacity?

Mr. SINHA. What analysis we have done seems to indicate it is in the 20 percent range.

Mr. MICA. In the 20 percent range. But if we take 10 years out, we will probably have 40 to 50 percent more traffic, air movement. Is that a guesstimate, Mr. Sinha?

Mr. SINHA. Yes.

Mr. MICA. Thank you.

Ms. Cox?

Ms. COX. I believe that the estimates that we have provided—and I cannot speak for Mr. Sinha, but the 40 percent reduction in delays that I cited takes into account the increased traffic.

Mr. MICA. I am told now it is going to be a little while, a decade, before we get this out there. In the meantime, some simple things, like airspace redesign in the New York airspace, could dramatically improve some of the chronic delays. Is that true, Ms. Cox?

Ms. COX. We believe that, when fully implemented in 2012, the airspace redesign in the New York area will reduce delays by 20 percent.

Mr. MICA. I am told about 80 percent of the chronic delays are now coming from the New York airspace. Is that a guesstimate, Ms. Cox? Or anybody else?

Ms. COX. I think the contributions of the New York airspace are significant to delays across the country.

Mr. MICA. Mr. Dillingham, have you looked at that?

Has anybody?

Mr. Dillingham. No, we have not, Mr. Mica.

Mr. MICA. Then it appears that we have gone about as far as we can go in implementation. Maybe we could do some other things.

I was told by FAA in the past that, for ground stations, we have got about a $1.9 billion contract out. Is there something else that we could do right now, Ms. Cox, that would move the project forward, an expenditure of money or a step by FAA?

Ms. COX. By applying more performance-based navigation capability and by equipage by more operators. Right now, as I mentioned earlier, about 18 percent of our air transport are equipped to fly the required navigation performance procedures that would allow us to deconflict a lot of the——

Mr. MICA. Minor things could be done. Does that take big budget dollars?

Ms. COX. Well, to equip a transport aircraft, yes, it does require a major——

Mr. MICA. This is on the transport aircraft. Now, who should pay for that, the government or the carrier?

Ms. COX. That is a policy decision that is not under my purview.

Mr. MICA. Okay.

Well, one of the things, in conclusion here, is that we still have a question about direction. The FAA, I guess, today was criticized a bit for certain organizational patterns that they have developed. The problem is, we have not done an FAA bill since—I guess the last one was due in September of 2007. We have not had an FAA administrator since September of 2007.

Just a few minutes ago we extended out FAA reauthorization until September. Now, if anybody is responsible for the mess, it is Congress.

The other side took this over. The other side in the Senate blocked the airspace redesign, basically—I believe they have—which accounts for our delays, for our biggest number of delays, something we could do right now. If we have no pattern of organization, certainly that would be set out in an FAA reauthorization, not a bunch of people, without a leader in FAA, making the decisions.

You all agree with that, don't you?

Ms. Cox? You do not want to comment.

Thank you. I yield back.

Mr. COSTELLO. The Chair will have to comment then.

I would say that, one, it is the other body. We passed an FAA reauthorization bill through this Committee in the House.

Secondly, we have not had an FAA administrator. We had an acting administrator under the Bush administration, Mr. Sturgell, and the President of the United States at the time, President Bush, charged the responsibility of moving NextGen forward and put it in the hands of the Secretary of Transportation, the then-Secretary, as Mr. Scovel testified to.

There is one quick question, I think, that the gentlelady from California has, and then we will dismiss the panel.

Ms. RICHARDSON. Thank you, Chairman Costello, for giving me this opportunity to ask a very brief question.

Ms. Cox, do you perceive that the aircraft controllers are part of your stakeholders in implementing NextGen?

If so, are they a part of the RTCA? If not, why?

What do you intend upon doing to incorporate them as stakeholders if you feel that they are? What are you planning on doing to assist them to develop the skills to participate in that process?

We have got votes, so if you could say that, as I did, in 40 seconds or less.

Ms. COX. The labor force are extremely important stakeholders as we move forward. We have employed hundreds of active controllers as we develop the requirements and the concepts that we are moving with.

The RTCA Task Force that you have heard discussed today, NATCA is a member of the task force, and they are participating in that.

As for the governing body, the main advisory committee that is part of the RTCA—that is, the Air Traffic Management Advisory Committee, the ATMAC—the head of NATCA sits on the ATMAC, the main advisory committee, and he also sits on the senior management board for NextGen, the NextGen management board.

Ms. RICHARDSON. Well, the Chairman is going to dismiss this panel, as I understand. I am sure we are going to hear some other perspectives from the next panel. I would just ask that at some point the two of you get together because it does not seem like that connection is clearly being made.

Mr. COSTELLO. The Chair thanks the gentlelady.

As you noted, Mr. Forrey will be on the next panel, and we will ask him, from his perspective, to address the issue as well.

The Chair thanks all of you for being here today and for offering your thoughtful testimony. There are some other questions that we will be submitting to you in writing, and we ask that you reply.

With that, we have about a minute to get to the floor, so the Subcommittee will stand in recess for 20 minutes, and then we will reconvene. I would ask the second panel when they come in the room to be seated so we can begin immediately.

Again, thank you for your testimony.

The Subcommittee stands in recess.

[Recess.]

Mr. COSTELLO. The Subcommittee will come to order.

The Chair would like to welcome the second panel. The first witness on the second panel will be Ms. Marion Blakey, who is the president and chief executive officer, Aerospace Industries Association of America; Mr. Peter Bunce, president and CEO, General Aviation Manufacturers Association; Mr. James May, who is the president and CEO of the Air Transport Association; Captain Rory Kay, executive air safety chairman and United Airlines pilot, ALPA; Mr. Patrick Forrey, who is the president of the National Air Traffic Controllers Association; and Mr. Tom Brantley, who is the president of the Professional Aviation Safety Specialists.

The Chair will ask each witness to summarize their statement, and know that your entire statement will appear in the record.

The Chair now recognizes the former FAA administrator, Ms. Blakey.

TESTIMONY OF MARION C. BLAKEY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA; PETER J. BUNCE, PRESIDENT AND CEO, GENERAL AVIATION MANUFACTURERS ASSOCIATION; JAMES C. MAY, PRESIDENT AND CEO, AIR TRANSPORT ASSOCIATION; CAPTAIN RORY KAY, EXECUTIVE AIR SAFETY CHAIRMAN AND UNITED AIRLINES PILOT, ALPA; PATRICK FORREY, PRESIDENT, NATIONAL AIR TRAFFIC CONTROLLERS ASSOCIATION; AND TOM BRANTLEY, PRESIDENT, PROFESSIONAL AVIATION SAFETY SPECIALISTS

Ms. BLAKEY. Good afternoon, Chairman Costello, Ranking Member Petri. I must tell you that I am delighted to be here before this Committee again. And I thank you for the opportunity to testify.

I am here representing the Aerospace Industries Association and our almost 300 member companies. Our industry is responsible right now for about 2 million high-paying, high-tech jobs in this country, $95 billion in exports, and we are very proud of our positive trade surplus of $57 billion last year, the largest of any manufacturing sector.

It was very good to hear the remarks of the first panel. And I must say, I like levelling up on NextGen. This is quite an opportunity for all of us. And they certainly expressed the kind of support that our industry shares for the NextGen itself.

I would like to make just a few points about NextGen and what we can achieve in the near term with one overall theme: the benefits of NextGen are closer than we think. I spend a lot of time advocating for NextGen. People are always surprised when I tell them that NextGen implementation has already begun. In fact, with 11 ADS-B ground stations installed, commissioned and in South Florida right now, we are well on the way. And I understand that all 793 stations are on schedule and will be installed across the country by 2013.

But there is an issue. Aircraft are not required to be equipped with ADS-B avionics to take full advantage of NextGen's benefits until 2020. So we will have this 7-year period during which we have half of the puzzle in place. The obvious solution is to provide equipage incentives for operators to shrink the 7-year gap and reap the benefits of NextGen as soon as possible. The interactive nature of ADS-B technology means that we do have to have critical mass of operator equipage to realize the system's full benefits for all of us.

Now, we all know the industry came together to request grants for NextGen-enabling avionics equipment in the recovery package. Unfortunately, we weren't persuasive enough at the time. But I have to tell you, I think we will be making a persuasive and compelling case. With the focus coming up in this Congress on environmental legislation, let's also not forget that the environmental gains possible through NextGen are considerable: Continuous Descent Arrivals, Required Navigation Procedures, and Area Navigation Departures and Arrivals, CDAs, RNP, RNAV—we have heard a lot about them all this morning. And they are already being designed, built, and flown throughout the country. They are available and a big part of the efficient technology and management that is going to cut fuel burn and emissions by as much as 15 percent when NextGen is fully implemented.

The manufacturing industry and the government are working hard on many other advances that will contribute to NextGen to reduce carbon emissions: composite materials, alternative fuels, engine technologies, among other steps. They are part of the three pillars of environmental efforts we believe our industry must fully exploit in order to achieve sustainable growth. The three pillars are, one, green R&D and technology development; two, improved air traffic management; three, streamlined operational procedures. And there is a fourth pillar, market measures.

Committees in both the House and the Senate are considering variations on the theme of emissions trading or cap-and-trade. Aviation in Europe is under an emissions trading system slated to go into effect in 3 years. While, as an industry, we do not oppose economic market measures for reducing aviation CO2 emissions, we believe that in today's economic climate, such measures have to be positive, not negative incentives. And in the case of an industry like civil aviation, where we already have a very efficient system and no currently viable commercial alternative energy source today, any economic measure must be global in nature, consensus-based, and developed through a body like the U.N. International Civil Aviation Organization, ICAO.

A final NextGen challenge I would mention is incorporating unmanned aircraft systems into the civil airspace. To allow these valuable assets to be used by domestic agencies, the FAA needs sufficient investment to be able to safely integrate them into the NAS.

We have got to have the foresight to invest in the full slate of NextGen technologies today. That is the point I hope we take away from this hearing. There is a long list of benefits that NextGen can provide, not only near term but immediately. Thank you very much.

Mr. COSTELLO. The Chair thanks you, and now recognizes Mr. Bunce.

Mr. BUNCE. Chairman Costello and Ranking Member Petri, thank you very much for having me here today to talk about what we can do and the commitment of the General Aviation industry toward NextGen, both in the near term and the long term.

First of all, I would be remiss to say that, within that subset that my colleague, Ms. Blakey, talked about, General Aviation supports 1.2 million jobs in this Nation. And when you look at the $150 billion annual contribution, it is important to note that this industry that works for an aviation nation is one of the only key sectors in manufacturing that has that balance of trade surplus. And for General Aviation manufacturers, that ended up being about $5.9 billion last year.

But, with that said, this industry is hurting, hurting big time right now. We have shed about 12,000 jobs just in the last 3 months. And of course, the continuing vilification of the use of business jets because of the misuse by a few CEOs and the painting of the whole industry poorly, I can directly tell you, has impacted jobs. I was just in Wichita yesterday, and the layoffs are a result of orders slowing down. And those orders are slowing down because of this vilification. And we hope that this Committee, being the experts on aviation in this body, can communicate both with the administration and their colleagues to think before some of the statements they make, because it does impact a great, great American industry.

But with all that said, our commitment to modernization is absolute. And our manufacturers are so committed to this that we populate every single one of those advisory committees that was talked about in the last panel. And as we look at how quickly traffic recovered after the recession in the early part of this decade and 9/11, everything recovered within 3 years. So we anticipate that we will be back to those type of same traffic levels very, very soon. So we have to get things going.

Now, one element that is different this time is the fact that this environmental legislation that most likely will go forward and the President's call for the raising of over $600 billion in revenue, it is absolutely critical that that money that is paid, if in fact we do go forward with either a cap-and-trade program or some type of carbon tax, that that money does go back into aviation, because it is only through that influx of money that we can go and accelerate NextGen and be able to reap the environmental benefits, which are truly significant. And we hope that this Committee will be a very, very staunch advocate for being able to capture those dollars.

When we look at also the near term, it is important to still look at what the end state will be. We in industry have some true concerns still that we have not defined what that end state will look like. And if we say that we are going to have full implementation somewhere in the range of 2025, it is absolutely imperative that we still get the controllers and the pilots together and decide what type of architecture is actually going to exist in the end state, because as the FAA says, it takes 10 to 15 years just to lay concrete. If concrete is the issue, and even if we are going to plow a runway and build it right in the middle of two existing runways, we have to know what that end state is going to look like to be able to tell you all what we need to do in this mid-term.

But focusing on the mid-term there and accelerating ADS-B is one of those areas we think that we can see some great benefit. Right now, the 794 stations that are going to be deployed basically lay over the current radar network and give roughly that same type of coverage. If we can expand that, particularly for communities that don't have radar coverage going into their airport, we can provide an incentive for equipage. We also provide incentives by just going and accelerating the ground infrastructure a little earlier.

But coupled with that is going in and incentivizing aircraft to equip. And there are a lot of things that the government can do to be able to go and get the airlines and General Aviation to equip with all of this technology just for ADS-B before that mandatory equipage date of 2020. Because we all know, if we wait that long to equip and if you are not incentivized to do so, none of this can happen. This is bedrock technology.

We also know that to certify the equipment that has to go up there, we need more certification engineers in the FAA. Now we in industry have been asking for that for multiple years. We know you have concerns about certification of different equipment out there. But unless we get more people to certify it, they can't keep up today with what we have asked them to do. We know they will fall behind. Also, on flight standards, we need some more people to be able to go and get these approaches on the books and get them quickly.

We think there is a very strong partnership with third-party entities out there, but we think that we need to work that aggressively to get Oklahoma City manned to the level that they can go and help us populate with the number of RNP and the different procedures that we need out there to be able to go and reap the benefits of NextGen earlier.

And finally, when we talk about just being able to give you a plan if we are able to accelerate any elements of NextGen, we would ask that this Committee tell the FAA that they have got to come back to you with an incentivization plan for equipage, because if we have the FAA reporting to you, we know that the stakeholders will be part of that discussion with the FAA on how we can do that. If we have a plan, we will have it in the file and ready the next time we have an opportunity to accelerate the whole process.

Thank you, Mr. Chairman.

Mr. COSTELLO. We thank you.

And the Chair now recognizes Mr. May.

Mr. MAY. Thank you, Mr. Chairman.

Let me start by associating myself with the remarks of Mr. Bunce on the environment. It would be critical to have revenue flow back into aviation to be able to meet those targets.

You know, we are here today as a major stakeholder in this process talking about near-term achievable goals. And in part, I would like to try and focus on a couple of questions and conversations that were held earlier this morning, first of all with Mr. Boswell. We have a near-term achievable goal. It isn't 2018. It isn't 2025. It isn't 2020. It isn't 30 to plus $40 billion. It is having this Committee and its counterpart committee on the Senate side and the administration declare that it is time for this Nation to establish a real priority for aviation infrastructure in much the same way the Eisenhower administration established a priority and did the funding for the national highway system infrastructure, ground-based infrastructure back in the 1950s.

I think there is a way to do that. I think it can be done at half the cost that we are projecting. I think the benefits are wonderful opportunities for benefits, and we can go through with them. I think there are four or five key foundational technologies that are available to be accelerated today that are in use. It is not new requirements. They are already there. And I think that is what, if you want to try and figure out where this Committee needs to go, where it needs to drive this Nation, then I think it is to establish aviation infrastructure, Next Generation, Now Generation, as the number one priority for this industry.

And we all can come together, whether it is on equipage or ground-based systems, to be able to put that forward. What is at stake? $41 billion a year, which is the cost of air traffic delays. That is 12 for passengers; 10 for the economy; 20 to airlines. Microcosm for our friend from New York; $2.6 billion a year grows into $80 billion if we don't do New York airspace redesign.

So what are we going to get if we just have the status quo? We are going to have the FAA and the Federal Government spend $20 billion, $30 billion. It is going to take them until 2018 or 2020 to get the project done. And we are going to have all these crushing costs of delay come down on top of us that we can't sustain as an industry.

What happens if you accelerate it and change it? You retain thousands of jobs. You improve customer service. You reduce fuel burn and CO_2 emissions. You enhance safety and security. You keep the airlines competitive and the United States competitive as a world market. We reduce, ultimately, FAA operating costs.

So what do you think that plan ought to look like? ADS-B, RNAV/RNP, electronic display upgrades, GBAS, Ground-Based Augmentation Systems, which are a current term, for those who don't follow it, for local area augmentations, what used to be known as LAAS. And then for my friends in the GA community, LPV, which is Localizer Performance with Vertical Guidance. Focus on those five technologies. We have got a lot of the technology available in the planes for some of them today. We can equip the aircraft today very quickly for the remaining technologies.

There is ground system equipment that needs to be put in, and there are systems that need to be accelerated and developed and designed. You can accomplish, if we have the will, if Congress has the will, the administration has the will, you can accomplish all of this in 5 years. It will probably be half the cost of the $20 billion to $30 billion that they are projecting out over a much longer period of time.

Are there going to be some other hurdles to get over? We have talked about them today. Number one, you need to put it into high target areas first, New York, Philadelphia, Los Angeles, et cetera. Number two, you have to establish best-equipped/best-served principles, which is to say, if the airplane is equipped to use this technology they get the advantage over planes that aren't equipped.

There are other challenges we have to meet. Promptly complete airspace redesign. If we don't push it, New York, 5 or 10 years from now, still isn't going to have New York airspace redesign in place.

New separation standards and improved operations procedures. If we don't have a business case, if we don't get reduced separations, if we don't have greater efficiency in the system, then that investment is not worthwhile.

And finally, please, controller acceptance and implementation of new procedures. You got to bring Pat and his guys into the process. We are very strong supporters of that. We can't do New York without his folks.

And so, at the end of the day, my final comment is, if we did this in the 1950s for the highways, why can't we do it now for aviation infrastructure? I think it is a national priority and ought to receive all of your attention. Thanks for your time.

Mr. COSTELLO. The Chair thanks you, Mr. May, and now recognizes Captain Kay.

Mr. KAY. Good morning, Chairman Costello, Ranking Member Petri, and Members of the Subcommittee. I am Captain Rory Kay, executive air safety chairman of the Airline Pilots Association, International. I would like to express my appreciation to the distinguished Members of this Subcommittee for drawing attention to the urgent need to modernize our national airspace system, or NAS, and for highlighting the solutions that exist today that can swiftly make a difference for passengers, shippers, and all who rely on air transportation. It is an honor to represent ALPA's more than 52,000 pilots, who are at work in the cockpit every day.

For decades, ALPA has pushed to modernize the NAS. The need for action has now become critical. The latest technology, which capitalizes on space-based communications, navigation, and surveillance systems, can provide precision and efficiency never before possible. Modernization promises to advance safety, increase capacity, reduce delays, and play an essential role in cutting emissions to help address climate change.

We saw a record number of flight delays last summer. Passengers and shippers all paid the price for a system stretched beyond its limits. Government and industry worked together to solve the immediate problem, but air traffic congestion persists, and an outdated system remains the cause.

A sustained funding source must be central to any discussion of modernizing our airspace. A project of this scale and significance cannot stop and start because of sporadic funding. Modernization will be expensive, and everyone who benefits should pay their fair share.

It will also be a complicated and long-term undertaking. For this reason, it must be done right the first time. We also need to move ahead in a way that reflects two lessons our industry has already learned about airspace modernization. First, we can and we must leverage equipment and technology that is already on the airplane. Airlines have complained for years about sending planes to the boneyard with equipment that could have facilitated more efficient routing but was never fully used. The second lesson is that we do our best work when all stakeholders are involved. A collaborative partnership among government, the operators, and the frontline professionals is essential.

This hearing is focused on how we can make progress now. There is encouraging news. ADS-B promises to increase safety and provide air traffic facilities with greater reach and precision than the current air traffic control radar. The up-to-the-second traffic information could also make a quantum leap in preventing runway incursions.

Both the in and out aspects of the ADS-B technology are necessary to realize the true potential of NextGen, and we must continue our commitment to both. For decades, ground-based technology forced pilots to connect the dots by flying from one navigational aid to the next to reach their destination. The limited number of ground-based aids rarely provided the shortest or most efficient route. RNAV or area navigation technology, allows use of shorter, more direct routes. This can increase efficiency, reduce departure delays, cut taxi time, save fuel, and alleviate congestion.

The FAA has done a good job implementing RNAV procedures here in D.C. and in other parts of the country. However, the technology is too often used only to continue flying traditional procedures. These so-called overlays use new technology to fly old and frequently inefficient paths. It is time to maximize RNAV by leveraging it to design completely new procedures.

Still another example of an opportunity to make progress right now, Required Navigation Performance, or RNP procedures, can allow flights to safely land on runways in worse weather than conventional procedures. Using RNP, Alaska Airlines pilots were able to safely continue more than 900 approaches in 2006 that would otherwise have been diverted due largely to weather.

We are already seeing some benefit from RNAV and RNP, but the potential exists for much more. We urge the FAA to lead the effort toward making the most of all that these technologies offer.

In conclusion, with all of this talk of technology, it is important to remember that a well-trained pilot is the airliner's greatest safety asset. Even with the newest technology and automation, pilots must still have timely, accurate information so that we can react swiftly if a flight doesn't go as planned.

Our partners, the professional air traffic controllers, also need accurate, reliable information on which to base their decisions. No one is more aware of how these new technologies come together with a stressed air transportation system than airline pilots.

And that leads me to one final point. If it doesn't work for pilots when we fly the line, a procedure that may look great on paper will not help us capture the enormous potential of NextGen. Professional airline pilots and controllers must be involved every step of the way. Thank you.

Mr. COSTELLO. Thank you, Captain Kay.

And the Chair now recognizes Mr. Forrey.

Mr. FORREY. Thank you, Chairman Costello and Ranking Member Petri, for the opportunity to testify today.

The FAA's NextGen modernization plans are, in the words of the GAO, a high-risk effort. NextGen is highly complex with many interdependent projects, requiring a large investment of time, money, and other resources.

While we at NATCA believe strongly in the possibility that technology can help us improve the safety, efficiency, capacity, and environmental sustainability of the national airspace system, we also believe there is a right way and a wrong way to develop and transition into new technology. It is imperative, both for the safety of the NAS, and for the investment of taxpayers' dollars, that this project be undertaken in the right way. That means collaboration with all stakeholders.

NATCA has a long history of supporting modernization through collaboration. With the Liaison Program, which was dismantled by the Bush administration, NATCA was instrumental in helping the FAA complete more than 7,000 projects to install and integrate new facilities, systems, and equipment into the NAS, as well as more than 10,000 hardware and software upgrades. At the height of our collaboration, NATCA had representatives on over 70 modernization and procedural development projects.

The participation of NATCA throughout all stages of NextGen's development and implementation is critical to the success of this project. Because NATCA's members have an intimate understanding of frontline air traffic control, they are uniquely qualified to identify and address human factors concerns, provide insight into the needs of the system, evaluate the utility of the FAA's proposed technology, and the usability of the products included under the NextGen umbrella.

Doing so on the front end rather than during implementation will save the agency time, the taxpayers' money and resources, while avoiding potential danger to the integrity of the air traffic control system. Yet the FAA refuses to collaborate with NATCA.

The most recent example of the go-it-alone strategy for NextGen design and implementation is the New York, New Jersey, Philadelphia airspace redesign efforts. The FAA refused to work with NATCA during phase one of the project, dispersal headings for departures, and as a result, the program was implemented with serious flaws. Neither controllers nor pilots received training on the new procedures. The changes were not tested comprehensively. And there were many instances of miscommunication between controllers and pilots.

And rather than learn lessons from phase one, the FAA is set to implement phase two, again, without NATCA involvement. As with all NextGen projects, we wish to be involved so that we can identify and help to proactively mitigate potential glitches and problems rather than allow the system to be put at risk by waiting until after the implementation to address these issues.

Another perfect example of this degenerate operating practice by the FAA can be found in the development and implementation of En Route Automation Modernization. NATCA was recently briefed by the FAA of 109 serious problems with ERAM, a program we have been blocked from collaboration on and which implementation is now delayed again. NATCA is currently attempting to negotiate a formal process for our involvement but continues to get the run-around by the FAA. We have met three times in the past 4 weeks, and still the FAA will not provide a comprehensive proposal for our involvement. We are anxious to begin assessing the state of ERAM, but the FAA refuses to let us in.

. I cannot stress enough that the participation of NATCA throughout all stages of NextGen's development and implementation is crucial to the success of this project. The right way also does not neglect the needs of the existing system. The FAA currently faces a serious air traffic controller staffing crisis, as our most experienced controllers continue the mass exodus that began in the imposed work rules in 2006. We have loss of 46,000 years of experience in the last two-and-a-half years. There is a backlog in training, and trainees are relied upon far too frequently to work traffic. Rampant fatigue in work force is undermining safety throughout the system. Meanwhile, facilities are being allowed to fall apart and in disrepair, putting the health of controllers and other aviation safety professionals at risk.

We are very concerned that the FAA continues to ignore NowGen, choosing to speak only about the technological advances they hope to achieve 15 years down the road. We at NATCA believe in the potential of ADS-B, the technological cornerstone of the FAA's plans for NextGen. We believe that it has the potential to provide more precise surveillance and without the lag time of traditional radar, and we believe that it may be able to provide greater situational awareness to pilots, particularly during periods of inclement weather.

We are concerned that the full capabilities of ADS-B, however, will not work unless they are turning off all the primary radars in the system, contrary to what Ms. Cox said. The ADS-B in will not function. There is not enough frequency space for all the primary radars to work while ADS-B full capability is working. That is a problem they have to fix. And we are concerned that the FAA's plans in requiring a transition to the single-source surveillance systems to provide navigation and surveillance leaves the system unacceptably vulnerable to natural disaster, attack, and/or technology failure.

The FAA is also recklessly, recklessly rushing to consolidate facilities and services without a plan or without consideration of the impact on the integrity, security, and redundancy of the NAS. These actions will leave a geographical area covering hundreds of thousands of miles vulnerable to a single point of failure without a backup.

And lastly, the FAA's NextGen plans have ignored the human factors. Their proposed best-equipped/best-served incentive policy, for example, significantly increases the complexity of air traffic control operations, particularly of concern with such an understaffed and increasingly inexperienced work force. The policy will actually reduce the efficiency of the system and introduce an unnecessarily unsafe risk.

Again, such problems could be mitigated or avoided entirely if the FAA would be willing to have meaningful collaboration with

NATCA. We would like to see the FAA development of this new technology right away, and we would like to be part of the solution to the problem facing today's air traffic control system.

Mr. Chairman, thank you. That concludes my comments. And I am ready to answer any questions.

Mr. COSTELLO. The Chair thanks you, Mr. Forrey, and now recognizes Mr. Brantley.

Mr. BRANTLEY. Chairman Costello, Congressman Petri, and Members of the Subcommittee, on behalf of PASS, I want to thank you for inviting us to present our views on NextGen today. And I feel a little left out, because I can't come here to report any milestones that have been achieved. I can't claim to be forming any committee with a nice sounding acronym. I can come and share some concerns that we have, because frankly, that is all we have to work with right now.

The biggest concern that PASS has with regard to FAA modernization is the change the FAA has made to its certification program. And certification is a process where an FAA technician tests and evaluates pieces of equipment and systems to ensure that they are safely used, that they can provide the service efficiently and effectively. And for years, the criteria that the FAA used was that any system that directly affected the flying public would be certified.

Now, in September of 2007, the agency changed that criteria. And now it is every FAA-owned system that directly affects the flying public will be certified. Coincidentally, a month later, the agency awarded a contract for ADS-B, which, as it turns out, was designed for the system to be entirely owned by the contractor. And since the FAA will not own the hardware, the software, any of the infrastructure, the system will not be certified. And that leaves a huge gap in the current level of integrity within the NAS.

And I want to thank the Chairman, as well as Chairman Oberstar, for the letter that you sent yesterday to the IG asking them to look into it, because we do believe it is a very serious issue.

And you know, one of the things that I guess frustrates me the most with FAA modernization is, as I look at it, the fact that the agency has chosen to prohibit labor from being involved in modernization for 6 years sends a message. It is loud, and it is clear. And we hear it. The message is, when NextGen is deployed, you are not needed; you are not part of the picture. Whether that is the intended message or not, that is the one being sent.

The agency is no longer an agency with a mission; it is an agency with an agenda. The agenda is, or part of it is, to privatize as much of the agency as possible. And that is why I believe the change to certification was made. You know, frankly, if they were required to certify things, that kind of puts it, you know, puts somewhat of a damper on any wholesale either outsourcing or privatization. But by eliminating that road block, even if the road block is there to protect the integrity of the system, that opens that up, and, you know, the sky is the limit now.

As long as any new system is owned privately, then all bets are off, and the agency washes their hands of their responsibilities. And I think that should concern everyone greatly. It sounds like a minor issue, and it is not.

You know, I come to you today, I am the president of the union. I was elected by our members, but I am an FAA systems specialist by trade. And this is what I do. And I will tell you, it disturbs me greatly. And when I talk to the people that we represent, they are very upset because it is selling out the integrity of the NAS. And I don't think we should ever trade the integrity for any political agenda. I want to apologize if I have gotten off track a little, but I will conclude there. And I am willing to answer any questions you may have.

Mr. COSTELLO. The Chair thanks you, Mr. Brantley.

And the Chair would yield time, my time, at this time to the gentleman from Iowa, Mr. Boswell.

Mr. BOSWELL. Well, thank you, Mr. Chairman.

Mr. Brantley, I call it straight talk. Thank you. So don't feel bad.

Mr. Chairman, I think about the stuff we talked about earlier this morning, and talking with Chairman Oberstar and you, and the time we have been spending on this subject and the cost and the need. If I could digress a little bit, it reminds me of a story, a true story, a revival going on back in the Midwest. This actually happened. And they had this revival in the outdoors, in the timber, the woods, and quite a setting. And this old gentleman in the audience or in the congregation kind of got moved by everything, and he wanted to do better. And he got up during the closing testimony, and he said, of all the good things that happened, what he was feeling, and he was aiming to do this, and he was aiming to do that, and he was aiming to do this as he went on to leave the revival. Well, the old minister up front, he got tired of hearing all this constant what he was aiming to do, and he said, John, why don't you just go ahead and pull the trigger and sit down.

Well, we have been giving, Mr. Chairman, advice, and advice, and advice, and advice. And I would like, if we could, just each of you, just what is the next thing we got to do?

Ms. Blakey, you have been in this for a long time. All of you, in fact. We respect you all. What is one, maybe give us two, but what do we need to do today to get off center? Just start down and just go down the line. Give us one item, two at the most.

Ms. BLAKEY. All right. And I want to, by the way, say a good hearing is one where you learn a lot. I not only learned a lot today but also picked up a great story, Congressman. So I appreciate that.

Two things I would point to. We have to stay on track in terms of measurable goals, outcome, a business plan that really does deliver, so that we will see equipage and the necessary measures move forward quickly.

Mr. BOSWELL. How come we don't have a business plan?

Ms. BLAKEY. I think we have much of it. I think that there are more specifics needed. But I do believe incentives for equipage would be an enormous step followed. It is the long pole in the tent. And that is something that Congress can help us with.

And I would also say that more funding for RNP, RNAV; we can use equipment on the planes today if we can get that.

Mr. BUNCE. Sir, it will be very quick. I agree with both points that Ms. Blakey had.

Mr. MAY. Congressman, I think you need to declare the reform of the National Air Traffic Control System, NextGen, a priority equal to that established by President Eisenhower in the 1950s. Put the resources against it, number one. Number two, I think you need to put somebody in charge. Whether it comes from this Committee or it comes from the administration, somebody has to be responsible. And whoever that somebody is has to adopt a basic principle of management, which is lead, follow, or get out of the way. We can do this in 5 years if we really have the will to get it done.

Mr. KAY. The Airline Pilots Association agrees with all of these remarks. It is very important to have a commitment to seeing this through. And the commitment to the funding is absolutely paramount. We want to see the stakeholders collaborate in a consensus-based fashion; everybody is working together, and we want to see an administrator.

Mr. FORREY. Congressman, I think the promise of NextGen as it is today is based on a lot of technology that hasn't been fully developed. Don't know if it even works. To me, I think one of the most important things to do is to identify what our goals are, short-term goals, mid-term goals. I don't think they really have. I think they say they have. And then include all the stakeholders in how you get to that point.

Mr. BRANTLEY. Thank you, Congressman.

I would say that the most important thing that could be done for the FAA today would be to get people in senior management positions who understand the mission of the agency and believe the mission is to protect the safety of the flying public and the entire industry rather than the mission being to modernize. That is something that has to occur as a matter of business. But that is not the objective of the agency.

Mr. BOSWELL. Well, thank you.

My time is up. I want to do one more thing, Mr. Chairman. I.

Appreciate that, though. I think we have heard some pretty straightforward remarks. Thank you.

Mr. COSTELLO. The Chair thanks you and now recognizes the Ranking Member of the Subcommittee, Mr. Petri.

Mr. PETRI. Thank you, Mr. Chairman. Thank all of you for, again, appearing before this Committee or Subcommittee and offering your testimony on NextGen and moving that project forward. I will submit the balance of my questions in writing.

But there a couple I would just like to touch on very briefly. And I wonder, the irreplaceable as it turns out, Ms. Blakey, we were hoping that cannot be said for too much longer, but in any event, I wonder if you could talk about the status of the effort that is going on in Europe that parallels NextGen. I think they call it SESAR. And are they encountering the same difficulties, or are there things we can learn from that? What is going on over there? Is there a danger this can lead them to take a leadership role in aviation, which has been a national asset for us since the Wright Brothers?

Ms. BLAKEY. Well, I appreciate your asking about that, because I am very pleased that we are seeing increasing efforts at ensuring interoperability in what has to be a global system. ICAO has been stepping up. There was a major workshop last fall, or 3-day conference, and there are a number of working groups working on it. And we are seeing a great deal on a bilateral basis between SESAR and the FAA's effort with NextGen.

However, you are pointing to something that I do worry about, funding. Because if we are not stepping up smartly to provide the funding and move ahead quickly, while we are all in agreement on the broad technologies—there is no debate about ADS-B as an example, but the specifics and the companies that provide it and how this moves forward—it is certainly possible to see European companies and others take the leading edge on this. They may and begin to provide much of the specific equipment around the world if we in this country are not providing for our system both the infrastructure and the standards we have to have so our manufacturers can also provide what has always been the gold standard in technology.

Mr. PETRI. Mr. Bunce, one aspect of this I guess is data, communication, as opposed to voice communication. Could you describe that and some of the advantages of this approach?

Mr. BUNCE. Yes, sir. Data communications is the element that we have got some true concerns on. I think we, as industries, we look toward the management of ADS-B in the field, and we have someone, Vinny Capezzuto, we can go to. He is doing a good job managing the program. We know exactly what the expectations are. But to make the end state happen, and again we have got to define what that end state is, but to be able to do these types of approaches that we want to do, to be able to get down from altitude by pulling the power to idle and then do a continuous descent to land and continuous ascent up to altitude, eventually we are going to have to have a capability of data communications from the ground to cockpit that is machine talking to machine. And obviously, the controllers play a huge role in overseeing all of that management.

But we have got some concerns, because that element of NextGen right now is not well defined. And to be able to reap the benefits of NextGen in this term that we are talking about up to 2018, we have to have some of that better defined. And if you look at the timelines that are out there for ADS-B now and how long it is going to take to require mandatory equipage at 2020, we are well behind where we need to be on data communications to be able to make it happen. So being able to do data link is another term that is used. The military has done data link for years and years. They know how to do this very well. It is us being able to get a plan together on how to use it and get buy-in from the controllers and the pilots to be able to figure out just mechanically and logistically how this will work and what is accepted and whether or not this data link is going to simply replace voice in the first stage and then move on to actually do machine-to-machine communications that actually routes and communicates directly with the flight management computer in the airplane. So those are questions that still linger out there.

Mr. PETRI. Thank you.

And Mr. May, you indicated that it would be a nice idea to have target deployment of NextGen in congested areas in your written testimony.

Mr. MAY. Correct.

Mr. PETRI. And I wonder if there are any technical problems that would have to be overcome in order for the FAA to adopt the approach that you advocate.

Mr. MAY. Mr. Petri, I am sure there are some technical problems. There are some operational problems. There are some environmental issues. There are noise issues. But that doesn't relieve the absolute requirement to make this a massive priority for this Nation as well as the FAA.

New York City, the Chairman of the Full Committee talked about this morning, 45 airports; it is the most complicated airspace in the world, there is no question about that. It is going to cost them, according to the Partnership for New York, about $2.6 billion a year, starting this year, for delays. They are the source of, well, over half of the delays that we take in the NAS today. We have to be able to sit down with the city leaders, the Governors, the controllers, the users of the system and the FAA and figure out how do we implement a New York airspace redesign. And that ought to be one of the absolute critical priorities that we have going forward. I don't think there are as many technical issues involved with it as there are operational issues. And people are going to have to realize, at the end of the day, while noise patterns may shift from point A to point B, the overall noise with a good system will come down.

Mr. PETRI. Thank you.

Mr. COSTELLO. The Chair thanks the Ranking Member and now recognizes the gentleman from Michigan, Dr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman.

And I want to follow up on some of Mr. Boswell's comments.

And this is not a comment just on this hearing, but on many hearings we have had. And it always concerns me. We have got a major problem here, something we have to work on together, but every time we have a hearing like this, we get representatives up here, particularly from the unions, who complain, complain, complain, complain. The FAA won't let them in. Won't talk to them. Won't do this, won't do that. Talk to the FAA, and they say, sure, we will be happy to. We have to have a good working relationship. I am not anti-union. I have family members who have been in unions. I have served on negotiating boards before. That is not the point.

But what do you expect to accomplish every time we have a hearing, the unions come in and complain, complain, complain, complain? We don't want complaints. I sit on a lot of Committees, listen to a lot of Federal employees, and they are always talking to me about the problems and what can be done to solve it. If you want to be part of the solution, you really have to become part of the solution.

But I listened to the testimony this morning. It was entirely a litany against the FAA. That doesn't help. If you have problems with them, you work that out around the bargaining table. You work with them. Try to work out agreements. If you can't, you work with the Chairman and so forth. But I am just saying, don't always bring your dirty laundry here and expect us to deal with it and solve it. That is not what we are interested in. We are interested in solutions. We are interested in safety. We are interested in efficiency. And as Mr. May said, we like to lead, follow, or get out of the way. And we prefer leading.

So this is—my dad was a minister, so I get into sermons every once in a while. But if you are serious about working with us and with the FAA, then get down to work and stop the litany of complaints. And I will be happy to tell the FAA the same thing. If they are not cooperating, I am happy to castigate them and say, hey, we have got to work together. This is a complex problem. We are interested in public safety. We are interested in public transportation. We are interested in economy, doing it right, doing it well, and doing it at a reasonable price so the traveling public gets where they want to go. The public doesn't give two bits about ADS-B or who is right in the arguments or what is going to happen. They just want to get there, and they want to get there safely. So end of sermon.

Having said that, I do appreciate the input and the comments. This is a project that is immense. And someone likened it to Eisenhower's program. In many ways, it is.

But you need to have leadership, and you have to work problems out, and you have to lead. That is how we built the Interstate Highway System. It works marvelously. There are lots of participants. Every State has lots of participants; the Federal Government participates.

Work out all of the problems; that is what we have to do here. Stop throwing stones at each other. Whether you are labor management, customers, owners, I do not care.

Now, Mr. Boswell, I am not sure that is what you wanted me to start out to say, but I know you are also a churchgoer, and I know you believe in sermons, too. Let's get to work and let's get the job done, and let's do it right.

Thank you very much.

Mr. COSTELLO. The Chair thanks the gentleman.

I will have some comments.

I recognize the gentleman from Iowa, Mr. Boswell.

Mr. BOSWELL. Well, thank you, Mr. Chairman.

Everybody needs to know that Vernon Ehlers and I—that I think of him as a brother, but sometimes I have to disagree with him, and we still are good friends.

I have spent a lot of hours—well, these people have, too—and I want those controllers down there and those worker bees satisfied and trained and feeling good, and you do, too. So I think that they have to express their feelings, their frustration, and we need to listen. So I do not quite take it that way.

I appreciate, Mr. Brantley, that you did come and give us some plain talk. I think we need to hear it. I think we need to hear it a lot.

Mr. EHLERS. Will the gentleman yield?

Mr. BOSWELL. Of course.

Mr. EHLERS. I do not in any way disagree with that. That is not what I am saying, and I want to make sure you are not misunderstanding me.

I want the controllers at the table. I want them at the table, working with the FAA and with all of the other parties; and they do not have to be at our table here, telling us——

Mr. BOSWELL. Well, reclaiming my time, I think that is good, but I think that we have to hear them here as well. I guess what I am hearing is that they want to be at the table.

Thinking back to something by Captain Kay and Mr. May, I agree that we have got to lead out, but I would like to know, from the people who are driving the machinery, you and Mr. Bunce, those folks who are actually hands-on, is it going to work? We have all seen over the years stuff that really looks good on mock-up or model, but that really does not work.

I would just like to address you, Mr. Captain Kay and Mr. Bunce. Do you think that you have got enough interface with the process of the equipment and the hardware that will go in there? Are you getting enough play in that?

Mr. KAY. The short answer is, yes, I do believe we have. Several pilots and staff members of my association have involvement at several levels of the evolution, research, and execution of this.

It is an incredibly complex project, and it is going to require us all to have a collaborative involvement. So the stakeholder involved is critical, but from what we see, what we have studied and the discussions and meetings we have had, I truly believe that at the end of the day this is going to be an incredibly exciting and performance-enhancing product.

Mr. BOSWELL. Well, thank you. I appreciate that.

Mr. Bunce?

Mr. BUNCE. Sir, I have absolute confidence, from back in my previous life, of being able to fly a fighter with data-link with an airplane 2,000 feet from me in the weather, at night with lights out, and being able to have complete confidence that I can look down at a screen and know exactly where that aircraft is.

I know we can do this, and so our separation criteria right now are established because we have old technology, and we have radars out there that are very old. Because of the ambiguity of where an aircraft can be in each one of those sweeps of the radars, you have to be able to produce a big bubble around that aircraft for its uncertainty.

With this ADS-B, we positively know where that aircraft is. When the pilots know where the other aircraft are in the system, when the controllers have tremendous confidence in the fidelity of the target that they have on their screens, we will be able the do tremendous things.

The other element of that, though, is the physical limitation of the concrete on the ground, but if we can bring aircraft in closer together, maybe we can pave that runway right down the middle of the two parallels that we have today and start staggering approaches in there.

If we give Mr. Forrey's guys the confidence that they are going to have this equipment that really lets them know precisely where aircraft are, and then if we let Alpha's pilots know exactly where other aircraft are in the system and have procedures so that if someone strays for any reason that alerts go off very quickly and procedures are established to compensate for that, we can do tremendous things.

Mr. BOSWELL. So we have got enough involvement. Okay. It was important for me to know that.

Thank you, Mr. Chairman. I yield back.

Mr. COSTELLO. The Chair thanks the gentleman.

Just a few brief comments on points that were brought up by both Dr. Ehlers and by some of our witnesses:

One is that I agree with you, Dr. Ehlers, that in a perfect world everyone would sit down at the table, would listen and would come up with the best product that they possibly could, in this case a project that is very complicated.

The fact is that the current law does not allow for fairness in the bargaining process, and that is one of the reasons why I feel very strongly that we have to change, as we did in H.R. 2881 and in our current bill that, hopefully, we will be taking to the floor here very shortly. You have to level the playing field.

If you have, in this case, the FAA, an agency, and in this case a bargaining unit, NATCA, that are not on this same level playing field and cannot reach an agreement, you have to have someone come in and clear up the logjam. That is why we call in our legislation for binding arbitration; get an arbitrator to come in, to look at both sides of the issue and to decide on every issue who is right and who is wrong, what is fair and what is not fair, and to resolve the matter.

So, you know, the FAA does not come in and complain about the air traffic controllers or members of the bargaining unit, because they do not have to. They are in charge. They walked away from the table. They were able to say, "We had an impasse, and we cannot resolve this."

I say that with absolute confidence because I was in the room, and I tried to help negotiate bringing both parties together. It became very clear what the problem was, and I do not lay that squarely on the back of the administrator at the time, Ms. Blakey—or the Secretary, for that matter. I blame it on the attitude of the White House then toward organized labor and toward bargaining units.

So I would just tell you that we hope, if we pass our legislation, that we can resolve these issues by leveling the playing field. Once there is a level playing field, you might be able to get a reasonable agreement. When there is not, and one side has an absolute advantage over the other, it is going to take a third party to come in; and that is what the legislation would do.

Two, to your point, Ms. Blakey—and I think Mr. May made the point about cap-and-trade. I was in a meeting with the Speaker yesterday on this very issue, and I made it very clear that the administration needs to know that the leadership here in the House and the Senate needs to know that if we are going to go to a cap-and-trade system or a carbon tax or wherever it may be, we are going to have to retain revenue here in the system.

We cannot let this administration or any administration take the revenue from a cap-and-trade system or from a carbon tax and use it for other things, for other priorities. We made that very clear, and it is something that I think has registered, but we have to be vigilant—Chairman Oberstar and myself, Mr. Petri and Mr. Mica—in making sure that that happens and that it stays in the aviation system.

To the point of, this needs to be a priority—as you said, Mr. May, similar to the Federal Highway System under President Eisenhower—we stressed that to the previous administration. We are stressing that to this administration. We hope that they get it, because I believe, based upon all of the hearings that I have been in, all of the discussions, all of the roundtables, that we are not going to get this right or get there when we need to be there unless you have someone who is in charge, who is directing this. It has to come from the White House because you have too many agencies and stakeholders involved to have people having an equal voice, so to speak, as opposed to someone in charge.

So we delivered that message in the last Administration. Regarding this Administration, I not only talked to Secretary LaHood about that, but I have had one conversation with the President about that, that if you are really serious about this, then you need to put somebody in charge and get it done. Do whatever it takes to get it done.

I have to say to both your testimony and, I think, to Ms. Blakey's testimony, too, about the stimulus package or the recovery, that we pushed very hard, as you well know. Frankly, I do not think, as Chairman Oberstar said, that the industry made a convincing argument that now is the time in a recovery package where the administration wanted to see investments now and jobs produced now.

So I think we need to go back. There is some talk of a second stimulus bill. Who knows if it will happen or not, but I think we need to go back and take a look at what we can do in the short term, if there is another opportunity.

It is one thing to say we want to be a part and get a part of the pie or a piece of the pot, and it is another thing to be ready to implement it in a meaningful way in the short term. Because we know what the long-term issues are and some of the challenges, but that is something that I would ask you to think about in the event that we come up with a second stimulus package.

With that, unless Mr. Petri has any comments or closing remarks, I would again thank all of the witnesses for being here. We said when we opened this hearing that this is the first of many hearings. We have had roundtables. We are going to continue them.

Mr. Mica and others have said we have got to get an administrator in place. We hope that that happens sooner rather than later. It was on the fast track for a while, but unfortunately, I think when the names of some of the nominees and others were put forward and then withdrawn for various reasons, the vetting process is taking far longer than it should; and in my opinion, the administration has raised the bar higher than they should have for some of these positions.

We thank you for your testimony. We look forward to continuing to hear from you and in working with you on this enormous task before all of us. Thank you.

The Subcommittee stands adjourned.

[Whereupon, at 1:25 p.m., the Subcommittee was adjourned.]

OPENING STATEMENT OF
THE HONORABLE RUSS CARNAHAN (MO-03)
AVIATION SUBCOMMITTEE
HOUSE TRANSPORTATION AND INFRASTRUCTURE COMMITTEE

Hearing on
ATC Modernization and NextGen: Near-Term Achievable Goals

Wednesday, March 18, 2009, 10:00 a.m.
2167 Rayburn House Office Building

Chairmen Oberstar and Costello, thank you for holding this important hearing on Air Traffic Control Modernization and the Next Generation Air Transportation System. I join with both of you in urging the rapid passage of H.R. 915, the "FAA Reauthorization Act of 2009."

As we have discussed in recent subcommittee hearings, our aviation system will have to accommodate substantial new growth over the next decade. Modernizing our Air Transportation System and implementing the NextGen reforms are essential to manage the increase in passenger travel and to improve the fuel efficiency of our airlines. In addition, the NextGen system promises to facilitate travel between smaller, regional airports, such as Lambert St. Louis Airport just outside the district I represent. Properly implemented, a better system will further ensure the safety of passengers while reducing delays at airports, two causes for which I have long advocated.

However, I do have two concerns that I expect the witnesses will address today.

I echo both Chairman Oberstar and Chairman Costello in regards to workforce issues. With a looming surge in retirements of our most experienced air traffic controllers, guaranteeing adequate training for developmental and junior controllers is essential. At the same time, the ATC and NextGen reforms require the FAA to develop a range of new workforce capabilities and skills. I am interested to know the views of our witnesses concerning the FAA's progress in hiring an operational workforce.

Furthermore, I am concerned about the costs to both industry and the government in implementing NextGen. Previously, both the GAO and the Department of Transportation's Inspector General have labeled the NextGen program as "high-risk," and updating equipment is expected to cost industry between \$14 and \$20 million. I look forward to hearing from the GAO as to whether the FAA can continue these crucial reforms while minimizing costs. As we all know, pilots, air controllers and technicians have the greatest expertise with regards to operating and maintaining our ATC systems. I expect that the views of these important stakeholders have been considered in the planning for ATC modernization and the NextGen system.

In closing, I want to thank our witnesses for joining us today and for offering their testimony. Thank you again, Chairmen, for holding this important hearing.

Russ Carnahan

STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
SUBCOMMITTEE ON AVIATION
HEARING ON
ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS
MARCH 18, 2009

- I welcome everyone to this Subcommittee hearing on Air Traffic Control ("ATC") Modernization and Next Generation Air Transportation System ("NextGen"): Near-Term Achievable Goals which is being conducted as one of several hearings that meet the oversight requirements under clauses 2(n), (o), and (p) of Rule XI of the Rules of the House of Representatives. This is also the first of several hearings that the Aviation Subcommittee will hold this year on NextGen covering a wide range of topics.

- Everyone agrees that our ATC system must be modernized. The total number of passengers carried in U.S. airspace is approximately 740 million a year, and the Federal Aviation

Administration ("FAA") forecasts that airlines are expected to carry more than 1 billion passengers in the next 7-12 years.

- Therefore, let me once again reiterate the importance of getting the FAA reauthorized as quickly as possible. H.R. 915, the "FAA Reauthorization Act of 2009" authorizes $13.4 billion for the FAA's Facilities and Equipment account, the primary vehicle for modernizing the national airspace system ("NAS"). These historic funding levels will accelerate the implementation of NextGen; enable the FAA to replace and repair existing facilities and equipment; and provide for the implementation of high-priority safety-related systems.

- Two years ago, at a hearing on "Airline Delays and Consumer Issues," I called upon government and industry to begin a "frank discussion about what near-term relief can realistically be provided by new technology." Many in the industry have since expressed similar sentiments, given we will be making key transformational investments over the next few years; and industry stakeholders have expressed a desire for more details about the near-term capabilities, benefits and requirements of this new system.

- In response, the FAA updated its NextGen Implementation Plan and published a NextGen Mid-Term Architecture. In addition, the FAA has commissioned RTCA to form a Mid-Term Implementation Task Force that will work with industry to prioritize which NextGen capabilities should be deployed first, and where they should be deployed first, to achieve the greatest benefits.

- Regarding industry investment, it has been estimated that total NextGen-related avionics cost for aircraft operators may be between $14 billion and $20 billion. Near-term NextGen benefits will depend largely on how quickly operators are willing to equip. Industry stakeholders have proposed that the government partially subsidize early NextGen equipage, and the FAA has proposed that operational incentives, such as preferred routes or runway access, be given to operators that equip as soon as possible. I believe that all options should be considered by Congress.

- In addition, concerns have been raised as to whether the FAA has the right in-house personnel, skills, and abilities to ensure NextGen is a success. In September 2008, the National Academy of Public Administration released a report detailing key workforce competencies that the FAA needs to strengthen. In response, the FAA plans to hire between 300 and 400 new NextGen personnel and I am interested in hearing from our witnesses on this point.

- Leadership and overall organizational structure of the NextGen effort is important for successful implementation. To increase the authority and visibility of the FAA's Joint Planning and Development Office ("JPDO"), H.R. 915 elevates the Director of the JPDO to the status of Associate Administrator for NextGen within FAA, reporting directly to the Administrator. I have said numerous times that I was not pleased in May 2008 when FAA's Air Traffic Organization decided to unilaterally change the NextGen organizational structure even though this Committee's intent was made clear in our FAA Reauthorization bill.

- Further, in November 2008, President Bush signed Executive Order 13479, which outlines the functions of the Secretary of Transportation and the Senior Policy Committee in the NextGen effort. I am pleased to see this affirmed the NextGen policies as outlined in "Vision 100." In addition, I firmly believe there needs to be greater White House involvement in any NextGen effort, which will require cooperative relations between multiple government agencies and industry stakeholders.

- In the past, I have stated that the FAA cannot let over reliance on its contractors compromise its objectivity with regard to a contractor's performance or the protection of consumers. To ensure the safety of ATC systems, the FAA maintains a comprehensive certification program for systems used in the NAS. I am concerned about a recent change the FAA made to its certification program requiring that only FAA owned systems need certification. Given that major NextGen acquisitions, such as "ADS-B", will not be owned or operated by the FAA, I am particularly concerned that this policy change could potentially weaken the government's oversight of key systems. Therefore, Chairman Oberstar and I have asked the Department of Transportation Inspector General to review the changes that the FAA has made to its certification program.

- With that, I want to again welcome all of our witnesses today and I look forward to the testimony.

- Before I recognize Mr. Petri for his opening statement, I ask unanimous consent to allow 2 weeks for all Members to revise and extend their remarks and to permit the submission of additional statements and materials by Members and witnesses. Without objection, so ordered.

EB Johnson

Thank you Mr. Chairman.

I ask unanimous consent to include a document into the record regarding Required Navigation Performance procedures recently conducted by Southwest Airlines.

The airline completed RNP (Required Navigation Performance) procedures roundtrip between Dallas Love Field in my district and Houston Hobby—achieving a major milestone in the airline's quest to revolutionize the skies and become the first airline to fly RNP procedures at every airport it serves.

The demo flight by Southwest is the result of two years of hard work and a partnership with the Federal Aviation Administration (FAA) and industry partners.

RNP is satellite-based navigation and is one of the cornerstones for the FAA's Next Generation Air Traffic Control system (NextGen), bringing together the accuracy of GPS (Global Positioning System), the capabilities of advanced aircraft avionics, and new flight procedures.

I thank the Chair and yield back the balance of my time.

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SOUTHWEST AIRLINES CELEBRATES "GREEN TUESDAY" AND ST. PATRICK'S DAY WITH RNP DEMO FLIGHT AND OTHER ENVIRONMENTAL INITIATIVES

Required Navigation Performance Preliminary Data Highlights Potential Emissions Reduction and Fuel Savings

DALLAS—March 17, 2009—Southwest Airlines recently flew RNP (Required Navigation Performance) procedures roundtrip between Dallas Love Field and Houston Hobby—achieving a major milestone in the airline's quest to revolutionize the skies and become the first airline to fly RNP procedures at every airport it serves. The demo flight by Southwest is the result of two years of hard work and a partnership with the Federal Aviation Administration (FAA) and industry partners. RNP is satellite-based navigation and is one of the cornerstones for the FAA's Next Generation Air Traffic Control system (NextGen), bringing together the accuracy of GPS (Global Positioning System), the capabilities of advanced aircraft avionics, and new flight procedures.

"RNP allows aircraft to fly more precise, direct, and accurate paths, reducing emissions and saving on fuel," said Southwest Airlines Executive Vice President and Chief Operating Officer Mike Van de Ven. "This is a milestone in the six-year plan to implement RNP procedures across the Southwest System and assist the FAA with NextGen initiatives."

In support of the FAA's Roadmap for Performance-Based Navigation, Southwest is investing $175 million during this six-year project to implement RNP procedures, retrofit aircraft, and train its Pilots. The initial investment will provide long-term benefits to reduce industry air traffic congestion and increase aircraft efficiencies.

The recent roundtrip RNP demo flight between Dallas Love Field and Houston Hobby yielded the following preliminary data:

- Estimated carbon reduction of 904 pounds of CO_2 per roundtrip flight between Dallas Love Field and Houston Hobby.
- Estimated carbon reduction in one year of flying RNP procedures between Dallas Love Field and Houston Hobby could equal a reduction of approximately 8.42 million pounds of CO_2. This is equivalent to removing 699 passenger cars from the road for one year.*

*Using Environmental Protection Agency's Greenhouse Gas Equivalencies

—more—

2/RNP

- Fuel savings of eight percent, which translates to approximately 43 gallons of fuel per roundtrip flight between Dallas Love Field and Houston Hobby
- Fuel savings in one year of flying RNP procedures between Dallas Love Field and Houston Hobby could equal approximately 400,000 gallons of fuel savings

"The data collected is extremely promising for just one roundtrip flight, and we are excited to implement additional flights at airports across our system," said Jeff Martin, Senior Director of Flight Operations and Southwest's RNP Lead. "This has been a true collaborative effort between nearly every department at Southwest and our many industry partners. We look forward to briefing senior FAA leaders in April."

RNP is just one facet of Southwest Airlines' commitment to efficiency and environmental stewardship. In addition to RNP, Southwest completes each point on its "four-leaf clover" by implementing additional "green" initiatives—reducing fuel and providing enormous environmental savings by avoiding greenhouse gas emissions. Among them:

- **Efficient Flight:** Southwest adjusted flight profile speeds in March 2008 in order to create additional efficiencies and to conserve fuel. From March 2008 through December 2008, the flight profile adjustments saved approximately 13.1 million gallons of fuel without affecting ontime performance, which equates to 125,348 metric tons of CO_2
- **Aircraft Specific Performance Monitoring (APM):** By establishing a specific fuel burn factor for each aircraft through APM, Southwest was able to more accurately gauge fuel needs for each flight. The result of APM is a small but measurable reduction in takeoff weight, which saved 4.4 million gallons of fuel in 2008, which equals 42,102 metric tons of CO_2.
- **Engine Washing:** Using Pratt & Whitney's EcoPower® Engine Wash, Southwest washes eight of its Boeing 737-700 engines each night. This has increased engine efficiency, and, from April to December 2008, saved 1.6 million gallons of fuel and reduced carbon emission by 15,310 metric tons. To view a video of Southwest's engine washing, go to http://www.blogsouthwest.com/video/southwest-airlines-engine-washing.

Environmental Stewardship is a responsibility Southwest takes seriously, and efficient operations are the hallmark of our Company and the foundation of our environmental commitment. Over the decades, Southwest has been at the forefront of such efficiencies as paperless tickets, quick turnarounds, installation of winglets, and, more recently; the installation of fleet-wide advanced avionics. This focus on efficiency not only makes good business sense, it is the right thing to do. For more information on how Southwest Airlines cares for the environment, visit www.southwest.com/cares.

- www.southwest.com -

Michael E. McMahon

The Honorable Michael E. McMahon
Statement and Questions
Aviation Subcommittee
Committee on Transportation and Infrastructure
Air Traffic Control Modernization and NextGen
March 18, 2009

Thank you Chairman Costello and Ranking Member Petri, both for your leadership on this important topic, and for all your hard work – and the dedication of all of our witnesses, and committee staff – in helping to bring our air transportation network into the 21st century. Our current system has served us well, but it needs a major upgrade to secure the safety of the flying public and increase the capacity of our air system.

The planning for NexGen has been years in the making, but we need to make sure that we meet the critical benchmarks in the coming years to ensure a smooth and seamless transition to this new system.

Air travel is critical to support the businesses not only in my district of Staten Island and Brooklyn, NY, but for the entire New York metropolitan region. From the largest corporations, to the mom and pop stores on New Dorp Lane, our businesses need to know that our air system will allow them to reliably access goods and services from across the globe.

It is estimated that over the next 15 years, the number of US flights could triple – from 50,000 to 150,000 flights every 24 hours. Luckily we have the satellite and GPS technology that will allow us to move away from our current radar based system to a far more advanced – and safe -- method of guiding planes to their point of destination.

All we need is the political will to make the necessary investments in our infrastructure – both in renovating and expanding our airports on the ground and retrofitting our planes in the air. And that is what NextGen is really all about.

We all have our horror stories about being stuck on a tarmac for hours or having to suffer through endless flight delays. And if we don't act, those problems will grow and grow – costing our economy millions -- if not billions -- of dollars in lost economic productivity for our nation, not to mention the headaches it will cause for the American public.

We also live in a time of global interconnectedness when international trade and communications have dramatically reshaped the way we live, and America's role in the world. Our nation's air network is perhaps the most critical transportation link not only for our own economy, but to the world's economy.

When we look to countries across the globe we know that China, Japan, and many of our European counterparts are spending billions and billions of dollars upgrading their airports, with some creating first-rate air transportation systems from scratch.

We need to make the necessary investments now to ensure that American air travel remains the envy of the world.

But no matter how much money we invest in technology and infrastructure, we all know that the safety of our air travel network will be determined by the hardworking men and women who sit in the air control towers, or fly the planes, or work as the crew maintaining our aircraft or serving the public as flight attendants.

It is their experience, their training that is so critical to keeping air travel the safest form of travel in the world. And as we begin to implement NextGen, we need to engage – and I mean seriously engage -- the expertise of the working men and women on the ground who know the flight patterns, who know how long it takes to direct planes on the ground, and who know every aspect of how our planes operate.

Harry E. Mitchell

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Aviation
3/18/09

--Thank you Mr. Chairman.

--I believe it is absolutely critical to modernize our nation's aviation system and do what is necessary to increase capacity.

---The U.S. air transportation system handles approximately 50,000 flights a day. It has been estimated, however, that by 2025 we will need to accommodate somewhere between 100,000 to 150,000 a day.

--NextGen will certainly play an important role in getting us there.

--In the Phoenix metropolitan area, however, we will also need continued investment in Phoenix-Mesa Gateway Airport.

--The FAA has already warned that Phoenix is one of eight metropolitan areas that will need additional capacity by 2025, beyond all improvements that are already planned.

--Phoenix Sky Harbor Airport is already the nation's 8th busiest airport, and increasingly we will need Gateway as a compliment to Sky Harbor.

--Our local leaders know this, and that's why the mayors of Mesa, Phoenix, Gilbert and Queen Creek, as well as the governor of the Gila River Indian Community, are all part of the Williams Gateway Airport Authority.

--Increasing capacity, however, is only part of the benefit. Gateway has the potential to become a key economic engine for our region. While still in an early stage of development, it has already established an impressive track record of job creation and economic growth. According to a recent study by Arizona State University, Gateway is now supporting more than 4500 jobs in its service area and having an economic impact of nearly $500 million.

--I look forward to hearing from today's witnesses.

-- At this time, I yield back.

OPENING STATEMENT OF
THE HONORABLE JAMES L. OBERSTAR
SUBCOMMITTEE ON AVIATION
AIR TRAFFIC CONTROL MODERNIZATION AND THE NEXT GENERATION AIR TRANSPORTATION SYSTEM: NEAR-TERM ACHIEVABLE GOALS
MARCH 18, 2009

I want to thank Chairman Costello for calling today's hearing on "Air Traffic Control ("ATC") Modernization and the Next Generation Air Transportation System ("NextGen"): Near-Term Achievable Goals." This hearing is being conducted as one of several hearings that meet the oversight requirements under clauses 2(n), (o), and (p) of Rule XI of the Rules of the House of Representatives. In the summer of 2007, the United States was suffering terrible airline delays - over a quarter of all flights were delayed, cancelled or diverted. At that time, we were also in the heat of a protracted debate over the Bush Administration's extremely controversial financing plan - a plan, which I believe, was less about actually financing ATC modernization than fundamentally restructuring how the FAA did business, making it less accountable to Congress and the American public. At the time I said that the Bush Administration had "oversold" NextGen in order to sell its financing plan. Others within the industry have made similar criticisms: that the NextGen vision had become unclear regarding the tangible near-term benefits it would provide.

Today's hearing is an opportunity for the Obama Administration to set its own expectations for NextGen, and hopefully to do what Chairman Costello counseled two years ago, namely, commence a "frank discussion about what near-term relief can realistically be provided by" NextGen. To that end, I am pleased to see that the FAA appears to be shifting its attention to the near-term and is refining its NextGen benchmarks for the next five to eight years. Moreover, the FAA has commissioned a NextGen Mid-Term Implementation Task Force to develop a consensus plan with industry about what capabilities and requirements are most needed between now and 2018. For its part, Congress must pass a reauthorization bill with robust funding for FAA capital accounts **this year**. H.R. 915, the "Federal Aviation Administration Reauthorization Act of 2009" provides historic funding levels for FAA capital accounts that will accelerate the implementation of NextGen.

Today's hearing is also an opportunity for the industry to set some expectations. In the NextGen environment, the aircraft itself will be a part of the infrastructure. How quickly NextGen benefits accrue may depend largely on the willingness of aircraft operators to equip their aircraft in advance of regulatory mandates. Preliminary estimates indicate that the total cost of NextGen avionics for civil operators could range between $14 billion to $20 billion. For NextGen to be successful, government must synchronize its investments with industry, and where possible, help industry make the "business" case for the costs that it will be asked to incur.

Earlier this year, a coalition of industry stakeholders argued that $4 billion should be included in the "American Recovery and Reinvestment Act of 2009" (the

"Recovery Act") to accelerate NextGen avionics equipage. There is a precedent for this approach. The FAA purchased ADS-B avionics for operators in Alaska as part of the Capstone initiative, which provided a base of properly equipped aircraft and allowed the FAA to examine the costs and benefits of the new technology. The FAA has proposed "best equipped, best served" operational incentives, whereby operators who equip their aircraft as soon as possible would receive benefits, such as preferred airspace, routings, or runway access. However, the President of the air traffic controllers union will testify today that this approach has serious operational and workforce implications. There is a plausible case to be made that that such subsidies or incentives, if properly structured and implemented, might be helpful in advancing NextGen, but I believe that the issue requires careful examination. We will continue the dialogue with the FAA and industry on this issue.

While technologies, policies and procedures are important, as we saw in January with US Airways Flight 1549, so often it is actually <u>people</u> that make the difference. The controller in the tower, the pilot in the cockpit, the airline dispatcher with the right skills and training are the determinants of safety today and will be tomorrow in the success or failure of NextGen. The FAA has been hiring thousands of air traffic controllers to stay ahead of retirements, and is increasingly sending <u>developmental</u> controllers directly to busy facilities to begin their on-the-job training. With fewer fully certified controllers and greater on-the-job training demands, controllers may be working more overtime hours. As attrition increases, the FAA must address human factors issues in ATC: fatigue. Moreover, as new NextGen technologies and procedures are introduced, the FAA must provide training for all of its controllers on new equipment and procedures while maintaining their existing skills.

The FAA must also obtain the correct skill mix within its acquisition workforce to successfully manage the implementation of NextGen. In September 2008, the National Academy of Public Administration issued a report that cited key workforce competencies such as software development and contract administration that the FAA must strengthen in order to execute NextGen. In response, the FAA plans to fill between 300 and 400 NextGen positions over the next two years to address some of its skill deficiencies. This Committee will vigorously monitor the FAA's progress in strengthening its acquisition workforce.

Mr. Chairman, you and I both observed that the Bush Administration appeared to delegate an enormous amount of responsibility to the private sector for the development and implementation of NextGen. This was evident in the service contract acquisition strategy it adopted for ADS-B, whereby a consortium led by ITT will build the ADS-B ground stations and own and operate the equipment. That practice became an Achilles heal in the IBM-FAA era – an excessive reliance on contractors that led to the FAA's loss of objectivity, undermining its ability to evaluate critically how the system was performing. We couldn't tell where FAA left off and

IBM began – and vice versa – and FAA became the apologist for its supplier/contractor. Inspector General Scovel has expressed similar concerns, testifying before this Subcommittee that, "FAA could find itself in a situation where it knows very little about the system that is expected to be the cornerstone of NextGen." That's not a prediction – that is a re-statement of recent history.

To ensure the safety of ATC systems, the FAA maintains a comprehensive certification program for systems used in the national airspace system. But I understand that the FAA has changed its certification program to fit its service contract acquisition model, effectively prohibiting the FAA certification of systems and services unless they are owned or maintained by the FAA. These changes could further reduce the FAA's assessment of the quality and performance of key NextGen systems such as ADS-B. That is why, earlier this week we asked the Inspector General to assess these changes to the FAA's certification program as well as the implications of allowing the private sector to assume the responsibility for determining the operational suitability of systems under its control.

Thank you again, Mr. Chairman, for holding this hearing. I look forward to hearing from our witnesses.

Congresswoman Laura Richardson
Transportation and Infrastructure
Subcommittee on Aviation Hearing on
"Air Traffic Control Modernization and the NextGen System: Near Term Goals"
Wednesday, March 18, 2009
2167 Rayburn House Office Building-10:00 A.M.

3/18/09

Mr. Chairman, I want to thank you and Ranking Member Petri for holding this hearing on the progress and goals of the NextGen system.

Like most Members, I fly home each week after the voting calendar is completed. I land at LAX, one of the nations busiest airports, and an economic engine for not only Los Angeles County but the State as well. As this Subcommittee is aware, there have been an alarming number of runway incursions that have occurred this past decade at LAX, 55 since 2001. This number is so alarming that the LA City Council called on the federal government to hire more air traffic controllers.

This is a short-term solution, however. It is a fact that the current structure and technology cannot handle the workload if air traffic expands as predicted. We need to improve the system from the ground up, as NextGen seeks to do. It goes without saying that we must maintain the confidence of the American people in our air traffic system and only the seamless implementation of NextGen will allow for that.

Aside from the obvious safety issues, the stability of our national economy also depends upon a safe, reliable air traffic system. According to the FAA, independent economic studies have estimated that if indirect and secondary impacts are included, such as visitor expenditures and other economic activity generated by aviation, the industry contributes $640 billion to the U.S. economy—or 5.4% of U.S. GDP—and over 9 million jobs.

There is no doubt that the stakes are high and I am therefore pleased that this Committee has undertaken such careful oversight. It is also important to note that we have already begun to address this issue legislatively through the FAA Reauthorization Bill, which includes language to engage the air traffic controllers themselves in the creation and implementation of the system and technology. The end product must be user-friendly and geared towards the controller to be successful. At the end of the day, it is the responsibility of well-trained controllers to operate the equipment and land planes safely.

I look forward to working with each Member of this Subcommittee to oversee NextGen and keep America as the aviation leader worldwide.

Thank you, Mr. Chairman.

House Transportation and Infrastructure, Subcommittee on Aviation

Hearing on ATC Modernization and NextGen: Near-Term Achievable Goals

Testimony by Marion C. Blakey, President and CEO

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Chairman Costello, Mr. Petri, members of the committee – good morning. It is a pleasure and an honor to be able to testify before this committee once again. I represent the Aerospace Industries Association (AIA) – we are an association of nearly 300 aerospace manufacturing companies and the 657,000 highly-skilled employees who make the aircraft that fly in our airspace system every day as well as the avionics and air navigation equipment that allow them to do that safely. I'm especially happy to come before you to talk about a subject that today enjoys almost universal support – the Next Generation Air Transportation System. You and I remember when it was N-GATS. Now, of course, it is simply...NextGen.

You know, it's been said that in this town where you stand on an issue depends on where you sit. Well, when it comes to NextGen, I may have changed seats, but my views on NextGen haven't changed. Our national airspace system needs NextGen as much today as it did when I was at the Federal Aviation Administration (FAA). In fact, we need it even more. Because NextGen isn't *just* about reducing delays – although it will certainly do that. And it isn't *just* about improving civil aviation's environmental stewardship – although that too will be a welcome benefit of NextGen's implementation. It isn't even about the added margin of safety NextGen technology will bring to our complex system of communication, navigation and surveillance. NextGen is no single thing...it's all of these things. And I would like to explain why we believe it is critical and why the benefits of NextGen may be closer than we think. NextGen is critical to our economy now. To delay or fail to implement the NextGen system risks the U.S. aerospace industry's position as the last U.S.-dominated manufacturing sector, exporting nearly $94 billion annually. It has the potential to cost the nation about $35 billion in annual economic loss by 2014, and approximately $52 billion in annual economic loss by 2024 just in unmet demand.[i] If aviation growth is constrained, job growth suffers. Employment trends in aviation-related industries indicate a possible loss of as many as two million new jobs every five years.[ii] Only through NextGen will the U.S. retain its global aeronautics leadership, which affects not only aviation but numerous other industries and businesses as well because of aviation's extensive ripple effect throughout the economy.

Environmental Benefits of NextGen
Addressing climate change is high on everyone's agenda, including those of us in aerospace. We at AIA see NextGen and environmental improvement as inseparable. Delays in today's

air traffic control system result in millions of gallons of fuel wasted annually. For instance, more than 4.3 million hours of delays in 2007[iii] consumed an additional 740 million gallons of jet fuel, costing carriers more than $1.6 billion. This produced approximately 7.1 million metric tons of carbon dioxide[iv]. The cost to the airlines and the cost to the environment are simply unacceptable, especially when we all know they can be significantly reduced. And consider, too, that these are unnecessary costs to consumers. Its simple math, a reduction in fuel consumed equals a reduction in environmental impact. Manufacturers are designing and building 21st century aircraft. However our air traffic system has not moved into the 21st century -- it is virtually the same system in which the noisier, dirtier aircraft of the 60s flew.

NextGen transformation is key to amplifying aviation's progress in reducing noise and emissions concerns, which are major issues in local communities. NextGen will build on aviation's progress in reducing CO_2, which is particularly challenging given projected traffic growth and global concern about aviation's effect on the environment. Innovative engine design, airframes, avionics and materials have all resulted in a 75 percent reduction of noise and 70 percent improvement in civil aviation fuel efficiency since the late 60s. These technological advances have brought the aerospace industry a long way, and we are accelerating our programs

One such program is the Pratt & Whitney PurePower PW1000G engine family. Scheduled to enter service in 2013 these engines are slated to substantially decrease fuel burn, reduce CO_2 emissions, and cut NOx emissions in half.[v]

Another example is the dramatic developments in the area of sustainable biofuel. In the span of three short years, Boeing has teamed up on various alternative biofuel feasibility projects with General Electric, Rolls Royce, Pratt & Whitney, Honeywell, Virgin Atlantic, Continental Airlines, JAL and Air New Zealand.

NextGen is <u>Now</u>

NextGen's new operational procedures and technologies will reduce flight time and delays, resulting in lower fuel burn, fewer emissions and less noise. For example, use of high precision avionics-supported area navigation arrivals and departures (RNP and RNAV) could save 2 million tons of carbon dioxide at the top 10 U.S. airport communities annually.[vi] Further efficiencies can be realized through the adoption of new arrival procedures (continuous descent or profile descents) which can save 3.75 million tons of carbon dioxide annually at these same locations.

These environmental benefits are not limited to approaches and departures. Serving as the new en route automation system, enabling NextGen capabilities to be implemented, Lockheed Martin's En Route Automation Modernization (ERAM) system will enable aircraft operations to reduce San Francisco to New York-JFK flight times by 3 percent. This will save about 6 million tons of carbon dioxide emissions annually.[vii] My friends in the airline industry can go into the details, but these are big savings. When translated into dollars, they can make a huge difference to an industry struggling through difficult times. NextGen can do this, but not without the resolve of this committee, the FAA and the entire civil aviation community. As you know, FAA recently announced the activation of two ERAM sites within the next month. FAA's ERAM site in Salt Lake City is expected to begin controlling live traffic within the next month with Seattle coming on line shortly there after. Both deployments are being rolled out a full four months ahead of schedule. Once the system has been evaluated at these sites, it will be deployed to the remaining 18 centers nationwide. ERAM, touted as FAA's largest and most complex project ever, is presently operating on budget and on schedule.

We are experiencing the safest period in aviation history, because significant improvements continue to decrease the number of serious aviation accidents. Accidents, although rare, are still a reality, and we will strive for continual improvement. We have had more than four decades to refine our 60s-era, radar-based air traffic control system. It has served us well but it has reached its limits. NextGen provides 21st-century transformational technological improvements that can't be grafted into our current air traffic control system.

NextGen capabilities will include, for example, Trajectory-Based Operations (TBO), Closely Spaced Parallel Operations (CSPO) and a myriad of new technological initiatives. One of the foundations of these new capabilities is Automatic Dependent Surveillance-Broadcast (ADS-B), providing pilots and controllers with better situational awareness allowing them to detect and avoid other aircraft, substantially reducing runway incursions and enhancing overall traffic flow efficiencies; all with increased safety. ADS-B and other NextGen-enabling improvements have already helped reduce the accident rate in southwest Alaska by 47 percent. Additionally, FAA activated the first 11 sites of the national system late last year in South Florida. The FAA and ITT expect to extend this capability by installing ADS-B ground equipment across the entire U.S. by 2013.

Due to the performance of the ERAM and other deployment projects, in 2008 the General Accounting Office removed FAA modernization from the list "high-risk" federal programs. Further, the Office of Management and Budget (OMB) required project management tool – called the Earned Value Management (EVM) system (for federal contracts of $10 million or more) has scored the ITT ADS-B contract .97 out of a possible 1.0 for deployment of ground infrastructure and an above perfect score of 1.04 for being under budget.

While these new capabilities will enhance safety, their accuracy will also allow closer separation of aircraft. This will increase system capacity, maintain safety, and deliver economic benefits. These economic benefits are critical for operator investment in NextGen avionics equipment. ADS-B can also provide surveillance to areas without radar coverage such as the Gulf of Mexico, safely reducing aircraft separation over the Gulf from 100 miles to a standard 10-mile en route separation.

I also want to draw attention to the growth of the use of unmanned systems for civil missions and the importance of their integration in the NextGen system. Even now, unmanned aircraft systems (UAS) are being used by Customs and Border Protection for surveillance and border patrol. They have the potential to support first responders in disaster relief; provide important weather data; and are a cost-effective solution for local law enforcement in a variety of missions. AIA is encouraged by the FAA's efforts to provide a means to operate these aircraft in the National Airspace System (NAS), while working to establish safety and operating standards. If the FAA hopes to meet current and projected demand for more routine military training missions as these aircraft return from Iraq and Afghanistan, and support other government agencies in their missions, adequate certification resources must be made available. With the projected demand in UAS services in the coming years, AIA encourages Congress to place more emphasis on this important issue.

How Best to Accelerate NextGen

Most of us have lived through the roller coaster ride of the last few years of attempting to obtain stable and sufficient FAA funding – it reminds me of that curse, "May you live in interesting times." I would add, "may you come together in interesting times to overcome the obstacles and the inertia of the past."

FAA projects NextGen will be fully operational in 2025, but we know the system will be evolving after that as well. I believe we can do much better than 2025, but even under an accelerated schedule, NextGen is a multi-year, multi-billion dollar, nationwide transformation. It is not something that can be accomplished in 90 days at a time. Yet, that is how we've treated the FAA's funding and expenditure authority for almost two years. As FAA is dependent on periodic legislation to modify, sustain and improve this essential program, the start-stop process of funding and authorization is impairing the ability to rebuild our aviation infrastructure.

The Funding Dynamic

Since the current reauthorization expired at the end of FY07, FAA has been funded by a series of continuing resolutions and extensions. FAA is a 44,000-employee organization responsible for a multi-billion dollar operation that touches virtually every part of our nation's commercial economy. If FAA were a private entity, it would be a Fortune 500 company, yet we expect it to sustain excellence and global leadership without long-term authority, confidence, or stability in its programs and funding.

Despite this committee's efforts, the absence of a new FAA authorization has delayed vitally important progress. Much of what is needed for NextGen falls under the category of "new starts" which, as you well know, are prohibited under funding extensions. A large number of FAA NextGen pre-implementation issues – including development and acquisition decisions, have been adversely affected. Failure to fund these NextGen development and application programs as a national priority has a disastrous domino effect on near-, mid-, and long-term NextGen efforts. We can not continue this. We have to accept the responsibility of providing cutting-edge air transportation system services on a schedule that is not constantly sabotaged by funding battles. And underlying this is a basic question: will the U.S. commit to retaining its global leadership position in civil aviation, or will it cede the "gold standard" in aerospace technology development and deployment to the EU, or Australia or Canada?

This is not just jingoistic rhetoric. It is critically important that we keep pace with the rest of the world in our modernization efforts to maintain any hope of creating a globally harmonized air traffic system. Whoever sets the standards for equipment and procedures will define the global system. If we want to maintain a leadership position in this market, we need to be in the vanguard of air transportation system modernization. And let's not forget that although NextGen has entered the implementation phase, delayed funding of NextGen R&D will push the timeline further to the right while the European system – SESAR – and others are moving ahead smartly.

This delay in development and deployment of NextGen is harmful for two simple economic reasons. Every year that R&D work is delayed, the costs of the work increase. Additionally, every year that NextGen is delayed, our economy is denied the benefits of an improved ATC system — and that costs more in fuel, delays, environmental benefits, etc. Perhaps it's ironic, but the cost of promptly and fully funding NextGen is far less than the cost of delay.

The Equipage Equation
Operator equipage has always been considered the "long pole in the tent" with regard to getting NextGen fully implemented. I think it is a shame that we obligated billions of dollars in last month's recovery package toward national infrastructure priorities, but, outside of money for airports, we spent virtually nothing on the global transportation infrastructure of the 21st Century – air transportation modernization. I think we missed an opportunity that we will all regret. Equipage is crucial to realizing the benefits of NextGen. If the commercial fleet has less than the critical amount of requisite avionics, implementation will not succeed.

We need a two-pronged strategy with regard to user equipage. First, we need to make the purchase and installation of the avionics economically viable in these difficult economic times. Second, we need to define NextGen's economic and environmental benefits in a way that makes the equipment purchase defensible to corporate boards and shareholders. The government should not mandate the purchase of new equipment if it is not prepared to identify and commit to its benefits at a point in time.

It is important to note that NextGen progress has expansive ramifications for our national economic growth, job creation, and environmental benefits. Aviation is the glue that holds the high-value global economy together. It has been described as the physical internet. More than surface or water transportation, civil aviation has a tremendous ripple effect on our economy. For every dollar invested or job created in aviation, 2.6 to 4 more are created. Aviation carries only two percent of the world's goods – but 40 percent of the value.

FAA and industry are presented with significant funding challenges. But government, industry, and many lawmakers are united on one issue – increased funding of FAA from the General Fund is needed to cover FAA operations and to pay for NextGen. While the recently approved omnibus bill increases the general fund allocation from 18 percent to 24.6 percent that is just enough to pay current FAA expenses. What is required is a general fund contribution well above 25 percent that supports full NextGen implementation.

The important point is that NextGen cannot, must not, be deferred – it has to be developed and implemented concurrently with full funding of FAA's present operational and capital needs. In this time of limited resources, both the private and public sectors must be extremely judicious in our expenditures, but we need to act boldly. There is no doubt of the public benefit that will be gained, and the boost to economic and job growth, that will come from timely and full funding of FAA and NextGen needs.

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[i] JPDO.
[ii] AIA projected estimates based on industry forecasts, incorporating lower commercial airline employment expectations.
[iii] Delay measurement excludes padding of block times to increase on-time performance; ibid, p. 3.
[iv] *Your Flight Has been Delayed Again*, emissions during taxi and flight time, p. 5.
[v] CAEP 6 effective January 1, 2008
[vi] Energy & Environmental Benefits, New Procedures Significantly Reduce Noise & Emissions, Honeywell.
[vii] Energy & Environmental Benefits, New Procedures Significantly Reduce Noise & Emissions, Honeywell.

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STATEMENT OF TOM BRANTLEY
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PROFESSIONAL AVIATION SAFETY SPECIALISTS, AFL-CIO

BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE – SUBCOMMITTEE ON AVIATION

ON
ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS

MARCH 18, 2009

Chairman Costello, Congressman Petri and members of the subcommittee, thank you for inviting PASS to testify today on air traffic control (ATC) modernization and the Next Generation Air Transportation System (NextGen). The Professional Aviation Safety Specialists, AFL-CIO (PASS) represents approximately 11,000 FAA and Department of Defense employees in seven separate bargaining units throughout the United States and in several foreign countries. The largest PASS bargaining unit is the Air Traffic Organization (ATO) Technical Operations unit, consisting of technical employees (systems specialists, electronics technicians and computer specialists) who install, maintain, repair and certify the radar, navigation and communication systems making up the air traffic control system.

By introducing new technologies through NextGen, the FAA intends to move from a ground-based air traffic control system to a satellite-based system, which the FAA contends is vital to meeting future demand. PASS and the employees we represent welcome modernization of the system and advancements in technology, as long as it is accomplished in a manner that preserves the safety and integrity of the system. PASS has concerns that as the FAA moves into new territory, it is disregarding several key issues that have the potential to impact the successful implementation of NextGen. Among these concerns are recent changes the FAA has made to its time-tested certification policy, involvement of stakeholders in modernization efforts, and the staffing and training of the FAA technical workforce.

Automatic Dependent Surveillance–Broadcast (ADS-B)

According to the FAA, the Automatic Dependent Surveillance–Broadcast (ADS-B) system is a "crucial component" of NextGen designed to "improve the safety, capacity and efficiency of the national airspace system."[1] ADS-B is supposed to provide surveillance and situational awareness simultaneously to pilots and air traffic control facilities. ADS-B can be a very useful tool for maintaining proper separation of aircraft while allowing more efficient use of our nation's airways. However, the aviation industry will only realize the benefits of ADS-B if the system is developed and implemented with a primary focus on safety.

Unfortunately, in PASS's view, the approach being used by the FAA to deploy ADS-B is flawed because it dismisses decades of responsibly ensuring the safety of the flying public and has the potential to negatively impact aviation safety. ADS-B will be entirely owned by a private corporation, which is a significant change from past practices. The Department of Transportation Inspector General (IG) has expressed concern that as a result the FAA "could find itself in a situation where it knows very little about the system that is expected to be the foundation of NextGen" and encouraged the agency to "take steps to ensure it effectively addresses this risk."[2] Additionally, one must question the prudence of placing the heart of our air traffic control system in the hands of the private sector after watching the collapse and resulting bailouts of so many corporations in the past year. Aviation safety should never be at risk of being adversely affected by catastrophic economic upheavals.

[1] Federal Aviation Administration, "Fact Sheet: Surveillance and Broadcast Services," February 5, 2008.
[2] Department of Transportation Inspector General, *Challenges Facing the Implementation of FAA's Automatic Dependent Surveillance–Broadcast Program*, CC-2007-100 (Washington, D.C.: October 17, 2007), pp. 2–3.

Elimination of Certification

Certification is the process in which a certificated FAA technician checks and tests systems or pieces of equipment on a periodic basis in order to ensure that they can safely remain in, or be returned to service and not negatively impact any aspect of the National Airspace System (NAS). The FAA's certification process has been successful for decades and is a key element in maintaining the safest and most efficient air transportation system in the world.

Despite the success of its certification program, the agency is making radical changes to its policy that PASS and the FAA technicians it represents believe will impact the safety of our aviation system. For years, the criteria established by FAA policy for determining which NAS systems and services require certification stated, "NAS systems, subsystems, and services directly affecting the flying public shall be certified."[3] However, in drastic change to its policy, effective September 28, 2007, just a few weeks before the agency awarded ITT a contract to develop and deploy ADS-B, the agency changed its policy to read, "*FAA owned* NAS systems, subsystems, and services directly affecting the flying public shall be certified" (emphasis added).[4] In other words, the FAA has not only changed its criteria to allow systems and services to be deployed without requiring certification, it has changed the policy to actually *prohibit* certification of systems it does not own.

FAA policy has always maintained that certification of NAS systems, subsystems and services directly affecting the flying public must be certified when they meet ***any one*** of the following criteria:

> (1) Provide moment-by-moment positional information to pilots or air traffic control operations personnel during aircraft operations.
>
> (2) Provide necessary communication or communication control among pilots and air traffic control operations personnel during the above aircraft operations.
>
> (3) Provide decision support information that directly affects aircraft heading, altitude, routing, control, or conflict awareness.
>
> (4) Provide essential meteorological information for takeoff and landing aircraft at airports.
>
> (5) Provide short term, long term, continuous, and conditioned power to NAS systems requiring certification located at a Service Delivery Point (SDP).[5]

ADS-B meets criteria 1 through 4, which in the past would have required the system and services to be certified by an FAA technician. By altering its policy to specify that only *FAA owned* system, subsystems and services shall be certified, the FAA abandons its ability to provide the highest level of safety oversight to the flying American public. In fact, this change goes against the very definition of certification contained in FAA Order 6000.15:

[3] FAA Order 6000.15D – *General Maintenance Handbook for National Airspace System (NAS) Facilities*, dated July 23, 2004.
[4] FAA Order 6000.15E – *General Maintenance Handbook for National Airspace System (NAS) Facilities*, dated September 28, 2007.
[5] Id.

> Certification is a quality control method used by the ATO to ensure NAS facilities are providing their advertised service. The ATO employee's independent discretionary judgment about the provision of advertised services, the need to separate profit motivations from operational decisions, and the desire to minimize liability, make the regulatory function of certification and oversight of the NAS an inherently governmental function.[6]

It must be emphasized that the change in certification policy would apply not only to ADS-B but also to any system that is not owned by the FAA. In other words, certification for systems not owned or maintained by the FAA will be totally eliminated and there will be no way to independently determine if the systems are safe. The current strategy for developing and deploying ADS-B will leave the FAA without the capability to ensure that the safety of the flying public comes first, rather than the corporate bottom line. The contractors and subcontractors of ADS-B will no doubt be concerned about the safety of the system, but they are, after all, corporations focused primarily on a business strategy designed to maximize profits.

It is the job of the FAA to ensure that aviation safety is never given second billing. FAA employees possess detailed knowledge of the intricacies associated with all NAS systems and operations and are uniquely qualified to deal specifically with equipment or system failures and the complex intricacies associated with such a vast network. Furthermore, if FAA employees are certifying ADS-B, they will be knowledgeable in the operations of the technology and able to provide assistance in the case the vendors are changed. This is also extremely important when considering that while ITT is the primary ADS-B contractor, there is also a team of several other vendors. If the agency is completely reliant on the contractor, any problem with any vendor could result in a disruption to ADS-B service. With a knowledgeable and adequate FAA technical workforce, there would indeed be more of a safeguard in place to protect against service disruptions.

According to a 1991 memo from the FAA's own general counsel, certification is an "inherently governmental function which cannot be performed by a contractor."[7] Since the process of certification is considered to be an inherently governmental function and vital to the oversight of the system, why is the FAA eliminating it? PASS believes that the FAA is using the deployment of new technologies, such as ADS-B, and the removal of certification as a way to begin the process of privatizing the NAS. Therefore, there will be *no oversight* provided by the federal government and the FAA will entrust responsibility for the safe operation of ADS-B and other systems not owned by the agency entirely to private contractors.

While the FAA transitions to NextGen, it is critical that new and current systems are properly maintained and certified, *especially* if the FAA does not own or maintain the system. Toward this effort, the FAA must ensure that products and systems obtained through a third party are held to the same certification standards as FAA systems and equipment. As such, PASS proposes that language be added to the FAA reauthorization legislation making it clear that the FAA will

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[6] Id.

[7] Manager, General Law Branch, AGC-110, memorandum to Manager, Maintenance Engineering Division, ASM-100, "Contractor Certification of Navigational Systems in National Airspace System (NAS)," June 18, 1991.

make no distinction between public or privately owned equipment, systems or services used in the NAS when determining certification requirements.

Staffing and Training of the Technical Workforce

PASS believes that insufficient technical staffing continues to be a major problem at numerous facilities throughout the country, and an increasing attrition rate among the most experienced technical personnel in these safety-sensitive positions is worsening the critical staffing crisis. For the vast majority of time over the past several years, the FAA has been below its required minimum safe number of 6,100 technical employees. In fact, some facilities are staffed at less than half of what the facility's workload generates. The technical workforce understaffing is further exacerbated by the agency's inability to accurately determine the right number of employees and job skills needed to safely and efficiently maintain the NAS. Currently, the FAA does not have a staffing standard or model that can accurately determine the number of trained FAA technicians needed to maintain the legacy systems of today and the NextGen of tomorrow.

The argument has been made on several occasions that the FAA must continue to maintain existing systems as it transitions to NextGen. The GAO has noted that "more and longer unscheduled outages of existing ATC equipment and ancillary support systems indicate more frequent system failures."[8] In fact, in a 2007 report, the GAO focused on the duration of unscheduled outages, citing an increase from an average of 21 hours in 2001 to about 40 hours in 2006 as a potential sign that "maintenance and troubleshooting activities are requiring more effort and longer periods of time."[9] Most recently, the GAO emphasized that it will be critical for the FAA to ensure the safety and efficiency of the legacy ATC systems and recommended implementing a "robust preventive and regular maintenance strategy and to support the skilled personnel that will be required to implement the strategy."[10]

PASS is aware that a continued debate over the number of employees that the FAA needs to maintain the NAS safely and efficiently diverts attention away from more critical issues that must be addressed as the agency moves forward. For that reason, PASS is strongly in favor of requiring the FAA to develop and use a staffing model that takes into account the agency's current and future needs with regard to technical staffing. Establishing and implementing such a model would ensure that the FAA's request for technical staffing and training is based on the agency's actual needs rather than budgetary goals set by the Office of Management Budget.

PASS supports language included in the FAA Reauthorization Act of 2009 (H.R. 915) that directs the Government Accountability Office (GAO) to conduct a study of technical training and the National Academy of Sciences to examine the staffing needs of the technical workforce. In today's changing aviation environment, it is critical that there is a staffing standard in place

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[8] Government Accountability Office, *FAA Reauthorization Issues are Critical to System Transformation and Operations*, GAO-09-377T (Washington, D.C.: February 11, 2009), p. 1.

[9] Government Accountability Office, *Next Generation Air Transportation System. Progress and Challenges in Planning and Implementing the Transformation of the National Airspace System*, GAO-07-649T (Washington, D.C.: March 22, 2007), pp. 10 – 11.

[10] Government Accountability Office, *FAA Reauthorization Issues are Critical to System Transformation and Operations*, GAO-09-377T (Washington, D.C.: February 11, 2009), p. 2.

for the FAA technical workforce and that the FAA is required to abide by that standard to help ensure that it has an adequate number of professionally trained technical employees to maintain both the current and future ATC system.

Involvement in FAA Modernization

In the past, PASS was actively involved in many of the FAA's efforts to develop and modernize the NAS. The input provided by PASS bargaining unit members was invaluable, resulting in safer systems, smoother deployment and less cost. For example, PASS members were extensively involved in the development and deployment of the Standard Terminal Automation Replacement System (STARS). In 1996, the STARS program was introduced as a way to standardize air traffic control equipment by replacing older systems and controller displays with the updated systems designed to provide such benefits as high-resolution color displays and multi-radar tracking. PASS participated from the beginning with the STARS program and was an integral part of identifying major issues that would have rendered the system unusable if it had been deployed as the agency had planned. PASS involvement included a human factors study that identified 52 individual issues, all of which have since been incorporated into the final version of the system. PASS played a critical role in ensuring security of the system by insisting on the use of passwords, login screens, aural alarms[11] and the capability to load the software onsite. In addition, PASS was pivotal in designing a method to train employees with the prerequisite skills and STARS-specific training while also ensuring current onsite systems were fully supported during installation and testing.

Another collaborative effort between PASS and the FAA involved the Display System Replacement (DSR), which was scheduled to replace display channels and workstations in the late 1990s into the early 2000s. For example, the FAA agreed with a PASS recommendation that the video and power modules needed to be reconfigured for the DSR to facilitate troubleshooting and reduce cable and connector failures. Technicians, working with FAA experts, developed a new design for all 20 air route traffic control centers at considerable savings. With PASS's assistance, the DSR project was successfully implemented on time and within cost.

Despite the obvious benefits of involving the employees who use and operate the systems in the development of those systems, about six years ago the FAA abruptly eliminated PASS's participation. The major problems associated with the FAA's implementation of the FAA Telecommunications Infrastructure (FTI) highlight the costly inefficiencies of allowing the FAA to move forward without technician involvement through PASS. As the primary voice/data transport system for the FAA's modernization efforts, FTI is the basis of the communications infrastructure for NextGen. FTI, currently contracted with Harris Corporation, is envisioned to provide complete telecommunications service and support for the NAS. When completed, FTI will consist of approximately 25,000 telecommunications services at over 4,400 FAA sites.

Technicians represented by PASS identified numerous problems associated with implementation of FTI, including many delays, contractor errors and outages over the past couple of years. With these delays and numerous issues, the costs associated with the program have grown

[11] As originally procured by the FAA, STARS had no audible alarms to indicate a malfunction with the system.

considerably—a major concern since FTI was originally hailed as a cost-saving initiative. In a 2008 report, the Department of Transportation Inspector General (IG) expressed concern because the "FAA's last program baseline reduced the number of services planned but still increased the overall program cost estimated by more than $100 million. As costs escalate, FTI cost savings have eroded, with none achieved in FY 2007."[12] PASS believes that many of these problems could have been avoided if technicians had been involved in the development and deployment of the system. However, PASS liaisons were summarily removed from the project and PASS was informed that its support on this program was not needed. In fact, PASS was told that the FAA program manager did not want people on the team who would point out potential problems.

Implementation of additional NextGen systems must include stakeholder participation—especially FAA technicians who are extremely knowledgeable of every aspect of the NAS and how each system affects every other system. At a 2008 hearing before the House Committee on Science and Technology, the GAO emphasized the importance of involving FAA stakeholders, such as FAA technicians, in the implementation of any new project, stressing that stakeholders will play a key role in implementing NextGen. The GAO specifically stated that FAA technicians are not playing a large enough role. "Although air traffic controllers and technicians will be responsible for a major part of the installation, operations, and maintenance of the systems that NextGen will comprise, our work has shown that these stakeholders have not fully participated in the development of NextGen. Insufficient participation on the part of these employees could delay the certification and integration of new systems and result in increased costs, as we have seen in previous ATC [air traffic control] modernization efforts." [13]

PASS acknowledges that the FAA's decision to halt the collaborative efforts with its unions regarding FAA modernization was a direct result of the agency's unfortunate labor-relations policy under the previous administration. It is now time for the FAA to move forward and seek meaningful assistance from its unions and work together to successfully modernize the NAS. PASS appreciates the efforts of this subcommittee to address this issue by including language in H.R. 915 requiring the FAA to collaborate with its unions in the planning, development and deployment of air traffic control modernization projects.

Air Traffic Control Facility Conditions

As the FAA works to modernize the NAS, it is critical that there is a stable air traffic control infrastructure in place. To move forward with NextGen plans without first ensuring a solid infrastructure will only increase the likelihood of problems and dangerous working conditions in the future. For many years, the FAA has neglected its infrastructure, specifically the buildings and facilities that house NAS equipment and systems and the employees who operate and maintain the equipment and systems. Since the condition of the infrastructure has always been a low priority for the agency, employees work in conditions that are unsafe, sometimes significantly interfering with their ability to perform their jobs as effectively and efficiently as necessary to ensure the integrity of the aviation system. Leaking roofs, deteriorating walls and

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[12] Department of Transportation Inspector General, *FAA's Progress and Challenges in Meeting FTI Transition Goals*, AV-2008-089 (Washington, D.C.: September 30, 2008), p. iii.
[13] Government Accountability Office, *Next Generation Air Transportation System: Status of Key Issues Associated with the Transition to NextGen*, GAO-08-1154T (Washington, D.C.: September 11, 2008), p. 7.

ceilings, and obsolete air conditioning systems are among the varied problems technicians encounter everyday—problems that potentially endanger the lives of these employees and the operations of the NAS.

The IG has indicated its concern with the FAA's maintenance of aging ATC facilities in several reports. Most recently, the IG has identified that many FAA ATC facilities have exceeded their useful lives and their physical conditions continue to deteriorate. In fact, while the average facility has an expected useful life of approximately 25 to 30 years, 59 percent of FAA facilities are over 30 years old.[14] During visits to a number of FAA facilities, the IG noticed clear structural deficiencies and maintenance-related issues, including water leaks, tower cab window condensation, deterioration due to poor design and general disrepair. "While the deficiencies we observed pose no immediate risk to the operations of the NAS, they could affect operations in the long term if they are not addressed."[15]

The FAA must make improving FAA air traffic control facilities and working conditions a priority in order to ensure successful modernization of the system. PASS supports language included in H.R. 915 directing the FAA to create a task force on air traffic control facility conditions and that employees who work at field facilities will be included. The FAA should ensure that the NAS infrastructure is stable and secure in order to allow these workers to fulfill their very important responsibility of protecting the safety and efficiency of this country's aviation system.

Conclusion: Roadblocks to Success

The FAA is approaching NextGen implementation with ambitious plans to modernize the NAS and PASS is eager to be part of this process. The FAA must examine the multiple obstacles that stand in the way of NextGen success, including maintaining its time-tested certification practices, inadequate staffing levels in the technical workforce and a lack of a staffing model to determine the appropriate level of technical staff needed. It is PASS's hope that the union will be able to collaborate with the agency to address these and other issues in order to ensure the success of NextGen. However, in order to move forward, the issue regarding the dismal state of labor-management relations at the FAA must be also be addressed.

Over the past several years, labor-management relations within the FAA have been in a state of serious disrepair. This has resulted in low employee morale, difficult working conditions and overwhelming tension between labor and management—all of which threaten the productivity of FAA employees and the efficiency of the aviation system. Despite PASS's recent efforts to restart negotiations, contract negotiations are at impasse with four of PASS's five bargaining units, representing 3,500 employees in the Flight Standards, Aviation System Standards, Aviation Registry and Manufacturing Inspector District Office bargaining units. Negotiations over new contracts for these employees have been at impasse for *over six years*. In PASS's fifth and largest bargaining unit, Technical Operations, the FAA showed little interest in reaching a mutual agreement with PASS. As a result, when the agency's final proposal was submitted for a

[14] Department of Transportation Inspector General, *FAA's Management and Maintenance of Air Traffic Control Facilities*, AV-2009-012 (Washington, D.C.: December 15, 2008), p. 1.
[15] Id., p. v.

membership vote, it was rejected by 98 percent of the employees. It is unclear when the negotiations process will begin again due to pending legal proceedings initiated and unnecessarily prolonged by the FAA.

PASS firmly believes that establishing a fair contract negotiations process at the FAA is the first and most important step on the road to successful NextGen implementation. PASS appreciates the many efforts of this subcommittee regarding this issue and supports the language in H.R. 915 that clarifies that the Federal Service Impasses Panel (FSIP) has jurisdiction over the FAA and that binding arbitration before an impartial board of experienced arbitrators is the preferred method of resolving bargaining impasses such as those currently facing PASS and other FAA unions. Rectifying the contracts negotiations process at the FAA will go a long way toward improving labor-management relations, ensuring that the FAA has the very best men and women working together to protect the safety of the aviation system and tackle the challenges associated with modernizing the system.

Testimony of Peter J. Bunce
President & CEO, General Aviation Manufacturers Association, (202) 393-1500
Air Traffic Control Modernization and NextGen: Near-Term Achievable Goals
Rayburn HOB Room 2167
March 18, 2009

Introduction

Chairman Costello, Ranking Member Petri, distinguished members of the Subcommittee; my name is Pete Bunce and I am the President and CEO of the General Aviation Manufacturers Association (GAMA). GAMA's sixty-seven member companies are the world's leading manufacturers of general aviation airplanes, engines, avionics, and components. Our member companies also operate aircraft fleets, airport fixed-based operations, pilot training and maintenance facilities worldwide. On behalf of our members, I appreciate your convening this important hearing and providing me the opportunity to testify before the Subcommittee about air traffic control modernization and NextGen

As the committee knows, general aviation (GA) is an essential part of our transportation system that is especially critical for individuals and businesses that need to travel and move goods quickly and efficiently in today's just-in-time environment. General aviation is also an important contributor to the U.S. economy, supporting over 1.2 million jobs, providing $150 billion[1] in economic activity and, in 2008, generating over $5.9 billion[2] in exports of domestically manufactured airplanes. We are one of the few remaining manufacturing industries that still provide a significant trade surplus for the United States.

As you are aware, our industry, like others, is struggling in today's difficult economic situation. Due to the economic downturn, the credit crunch, and other factors, our industry has seen more than 12,000 layoffs over the last six months and significant future layoffs have been announced. We are deeply saddened by this and are committed to remaining competitive and building a better future for our companies and their employees. Our companies have always believed in driving innovation regardless of the state of the economy and we will continue to develop new products to take full advantage of the economic recovery when it comes.

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[1] General Aviation Contribution to the US Economy, Merge Global 2006.
[2] 2008 General Aviation Statistical Databook and Industry Outlook, GAMA 2009.

Similarly, it is imperative that the FAA continue to move forward on air traffic control modernization during this challenging time. It is our firm belief that modernization will bring substantial benefits to our economy and the environment.

This hearing today is an important step in this process and I will outline in my testimony the direction we think NextGen should take over the next few years; the benchmarks our members think are important to measure progress; opportunities available to accelerate the program so as to reap benefits earlier; and ways to ensure adequate staffing at the FAA to support NextGen implementation.

General Support of NextGen

GAMA has long supported air traffic control modernization and the NextGen program. We were a member of the Commission on the Future of the United States Aerospace Industry that recommended the creation of the NextGen program and we strongly supported the Vision 100 Century of Aviation Reauthorization Act which contained many of the Commission's recommendations. We continue today to actively engage and provide guidance to the FAA through the NextGen Institute Management Council and the Air Traffic Management Advisory Committee as well as targeted FAA activities such as the ADS-B Aviation Rulemaking Committee.

Providing a forum for industry involvement in air traffic control modernization is imperative for its success. GAMA has asked the FAA to properly focus its advisory groups to best leverage government and industry resources which will help move the NextGen program forward. We are pleased to see the FAA take initial steps to better leverage industry through the creation of the RTCA NextGen Implementation Task Force launched last month, but more needs to be done. Industry resources are not being used effectively today.

The entire aviation industry believes that air traffic control modernization is a critical way to improve on an already enviable record of continuous improvement in aircraft efficiency that has dramatically reduced emissions over the past few decades and further enhance the environmental performance of the aviation industry. Industry has joined together and introduced a set of principles for aviation and the environment and point to NextGen as a primary means of improving environmental performance. I have included a copy of the industry's environmental principles and would ask for it to be part of the record of this hearing.

We are also pleased that general aviation has been the proving ground for technologies that are now the center pieces of NextGen. GAMA supported the deployment of civil Global Positioning System (GPS) in the early 1990s and advocated for the Wide Area Augmentation System (WAAS) that enhances the precision of GPS. General aviation was also the test bed for the Alaska CAPSTONE program that provided the standards being established for ADS-B.

Our members have also created many new technologies that are finding a home within NextGen including Enhanced Flight Vision Systems (EFVS), Synthetic Vision Systems (SVS), and moving map technologies. We hope the Committee will continue to value general aviation not only as a critical form of transportation but as an opportunity to develop and demonstrate new technology.

GAMA's Expectation of Mid-Term (2018) NextGen Environment

GAMA believes that the FAA must remain focused on the long-term goal of a complete transformation of the National Airspace System (NAS) by 2025.

At the same time, we believe significant focus and effort must placed on the mid-term timeframe of 2018[3] because as technologies mature opportunities to start providing capacity, efficiency and safety benefits will present themselves. As such, the aviation industry is starting to develop a clearer expectation of a mid-term system capability that is built around performance based navigation, Automatic Dependent Surveillance Broadcast (ADS-B), and initial data communications capabilities.

Performance based NAVIGATION, commonly known as area navigation (RNAV) and required navigation performance (RNP), allows the operator as well as the FAA to know more precisely an airplane's location within the national airspace system. As a result, the FAA can build more efficient procedures and, by leveraging ADS-B, enhance capacity within the current airspace system because airplanes will be able to fly closer together and more efficiently without compromising safety.

To fully realize performance based navigation, two critical steps must be taken jointly by FAA and industry:

- Development of air traffic procedures that are not just overlays of existing procedures, but new procedures that delivers improved performance at new airports and runways.

- Modernization of airplane Flight Management Systems (FMS) with increased use of satellite-based position information. For many aircraft this will involve the installation or upgrade of their GPS and adding a display capability.

These two steps have been underway for many years and are straight forward initiatives. For the FAA further acceleration in procedure development is needed. For operators significant investments to upgrade onboard avionics are required. These technologies, however, are mature and are already being deployed by airlines and general aviation operators.

[3] The FAA's NextGen Implementation Plan identifies the "mid-term" as the 2012 through 2018 timeframe.

We also support using third parties to design and execute new flight procedures. We know the Chairman has asked for the DOT Inspector General to look at the use of these third party developers and we believe this review will show the advantages of using these third parties to further our efforts in modernization. GAMA would be glad to arrange further briefings on this issue for the Subcommittee to discuss the importance of continuing this program along with increased FAA resources.

Automatic Dependent SURVEILLANCE Broadcast (ADS-B) has received most of the attention over the past two years as a result of the FAA awarding the ground infrastructure service contract to ITT and the active rulemaking program with its proposal for mandated equipage by 2020. There is also significant work underway to define all the underlying requirements for ADS-B and its integration with the rest of the NextGen environment.

GAMA supports ADS-B and has been involved with the ADS-B Aviation Rulemaking Committee (ARC) over the past couple of years. The FAA's approach of mandating ADS-B "Out" first while vigorously undertaking work to provide structure, requirements, operational procedures and benefits around the future use of ADS-B "In" is the right one. GAMA expects the FAA to release the final rule and requirements for ADS-B "Out" by April 2010 and, in the interim, we are working with the FAA to further vet ADS-B "In" and its use in the national airspace system.

It is critical that the FAA continue to move forward with the ADS-B program or the United States will lose its international leadership. Today the FAA is coordinating closely with Eurocontrol, the European Aviation Safety Agency, and other international partners such as Canada, Australia, and China to ensure parallel efforts remain coordinated. The United States' foreign partners are moving forward with their programs with a European proposal requiring 100 percent equipage by 2015 and Canadian airspace requirements across Hudson Bay introduced over the next couple of years and offering enhanced services for equipped aircraft. It is imperative that the FAA program move forward on schedule for technology harmonization efforts.

As has been seen in the navigation domain, procedure development is critical to the successful use of the surveillance technology. ADS-B will also require a suite of procedures to enable the advanced airspace operations. GAMA encourages the FAA to fund and accelerate the development of these advanced procedures so that benefits will align with the proposed equipage.

Data COMMUNICATIONS is the area within air traffic control modernization where industry has asked more questions than it has received answers from FAA regarding the agency's plan. While industry is comfortable with the direction of the performance based navigation and Automatic Dependent Surveillance Broadcast programs, the same is not true for the data communications program.

The FAA is still primarily working inside the agency with limited stakeholder input to define the role of Data Communications in NextGen. Last year, the agency issued a Request for Information (RFI), the results of which are still being considered by the FAA. We understand the FAA is planning an approach very similar to the ADS-B program where data communications will be contracted to outside service providers.[4] GAMA believes the agency should be more public about its plans for the communications component of NextGen. We continue to encourage the FAA to develop a plan for initial data communications capabilities for 2018 that will integrate with the long-term plan for navigation and surveillance that is consistent with global standards to ensure interoperability.

Opportunities to Accelerate and Enhance Benefits of ATC Modernization

I have described the mid-term state of 2018 and would now like to discuss the opportunities that GAMA sees for accelerating and enhancing the benefits of air traffic control modernization including earlier deployment of technologies. This description of the mid-term should not be taken as accepting incremental improvement to the NAS. Instead GAMA believes it is imperative that we continue to push toward a transformed air traffic control system that leverages integration of modern technologies and new operational concepts.

As Clay Jones, Chairman, President and CEO of Rockwell Collins, testified before you a couple of weeks ago, NextGen is not a mere "modernization program" but a transformation of air traffic control that will replace our current outdated system with one capable of accommodating future growth without costing the American economy tens of billions of dollars per year in lost productivity and unnecessary energy consumption resulting from flight delays and inefficient air traffic management.

When fully implemented, NextGen – with its network-enabled, satellite-based ground infrastructure and cockpit equipment – will safely and efficiently handle more than twice the air traffic we have today with less delay and far greater fuel efficiency. Those who believe that this expansion in capacity is unnecessary due to recent drops in global traffic, need only be reminded that following 9/11 – when we saw a 10.4 percent drop in system revenue passenger miles – traffic quickly recovered. In fact, by 2004 it was on par with 2001 activity levels.

GAMA believes that there are several opportunities for Congress to provide leadership and assist in accelerating air traffic control modernization and NextGen implementation over the next several years. These opportunities include expanding and accelerating the benefits of ADS-B, enhancing the FAA's ability to place into service and take advantage of existing and emerging technologies, and providing direct financial incentives for operators to equip early with proven technologies. Importantly, Congress must also demand that FAA provide more definition and clarify around the 2025 end-state operating environment.

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[4] Initial Program Requirements for Data Communications, FAA April 28, 2008.

Funding to Accelerate ADS-B Deployment

The FAA's plan for deployment of ADS-B ground infrastructure calls for the deployment of 794 ground stations between FY2010 and FY2013 to match surveillance provided by the current radar coverage. This will cost the FAA $207 million plus a service contract over the next several decades.

There are two ways to incentivize early equipage in this area. First, Congress could encourage the wider deployment of ADS-B ground stations beyond the 794 stations. This would expand benefits to smaller communities and airspace that are outside current radar coverage. The direct benefits to these airports and surrounding airspace are improved access during adverse weather conditions and capacity enhancements for these airports when operations under visual flight conditions are not possible. This will enhance safety in the aviation system.

In this scenario, the number of stations needed would depend on the requested enhancement in service. Expanding the coverage of ADS-B is one of the recommendations made by industry to the FAA through the ADS-B ARC.[5]

Congress could also provide the FAA with an additional $250 million to accelerate the completion date of the planned deployment of 794 stations by two years and have the ground infrastructure operational in 2012.

In short, GAMA believes there is an opportunity to direct the FAA to use additional funds to expand services beyond current radar coverage by deploying more ground stations and to accelerate the schedule for ground infrastructure deployment.

Funding for Aircraft Avionics Certification and Installation

The FAA's certification resources have been stretched thin during the past five years as a result of the pace of new programs and increased safety oversight at the agency.

GAMA believes that the impediment to moving forward with the certification of new equipment such as ADS-B and performance based navigation is a lack of certification personnel within the FAA's aircraft certification office (AIR). GAMA urges the committee to work to ensure that the AIR has the funding necessary to support 1,243 full time equivalent staff[6] (FTE) that we believe is the minimum needed for current activity. Additional personnel will be needed to support NextGen in subsequent years.

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[5] Optimizing the Benefits of Automatic Dependent Surveillance—Broadcast, Report from ADS-B Aviation Rulemaking Committee, October 3, 2007. Recommendation Number 4.

[6] The 1,243 FTE accommodates the FY04 FTE level and also incorporate 77 additional personnel that have since been moved from the F&E account to AIR.

GAMA is pleased with language included in the Manager's Amendment to H.R. 915 which aims to "increase the number of safety critical positions in the Flight Standards Service and Aircraft Certification Service." Additional personnel should be directed toward both operational safety oversight and deployment of safety enhancing NextGen technology in the National Airspace System.

Funding for Procedure Development and Operational Approvals

The FAA Flight Standards Service (AFS) staff serves an important role in the authorization of equipment installed on aircraft. The role of Flight Standards is two-fold:

- To take advantage of NextGen equipage the FAA must ensure that the procedures are developed and published for use of performance based navigation and ADS-B. The work to develop and certify these procedures is done by the FAA's Flight Standards staff. Flight Standards over the past several years has produced 1,445 WAAS Localizer Performance with Vertical guidance (LPV) approaches[7] which have allowed the introduction of performance based navigation for light GA.

- The Flight Standards staff also provide direct oversight of operators who want to obtain "Letters of Authorization" to fly performance based procedures. This staff, which is employed around the country in local FAA offices, will play an ever growing role as NextGen is deployed and it will be essential that staffing levels are properly considered.

GAMA recommends that the Committee ensure the FAA has the appropriate staffing levels within Flight Standards to support the expansion of procedures to allow operators to take advantage of these procedures effectively during the next several years. GAMA also believes it is important to continue to move forward with third party procedure development to further augment the FAA's capabilities.

Industry Incentives for Equipping

GAMA believes that there are opportunities for targeted financial incentives for NextGen equipment that could encourage both general aviation and the airlines to equip prior to a mandate. The concept of operational credits and equipment investment credits is endorsed by the Government Accountability Office which has stated in testimony before this Committee that the "FAA will need to work with the stakeholders to explore a range of potential options available to provide incentives to aircraft operators to purchase equipment and to suppliers to develop that equipment. [...including] operational credits, or equipment investment credits that financially support equipment implementation for a limited initial set of aircraft operators."[8]

[7] FAA Instrument Flight Procedure (IFP) Inventory Summary website at http://avn.faa.gov
[8] GAO-09-377T FAA Reauthorization Issues are Critical to System Transformation and Operations.

Mr. Chairman, we stand by our recommendation during your recent FAA reauthorization hearing that Congress authorize and appropriate three billion general fund dollars over the next four years to fund equipage of ADS-B. This funding will allow the vast majority of the commercial and GA fleet to be equipped with this important technology at a far earlier date than the current 2020 FAA rule would promote. When tied to the earlier ground equipage date, this acceleration would also allow for increased federal savings through the closure of a number of radar sites and stimulate employment activity at avionics manufacturers and repair and maintenance depots around the country.

We have seen success in the past in programs such as CAPSTONE[9] where the government purchased equipment for a core group of operators that resulted in broader voluntary equipage after the benefits had been identified. The ADS-B ARC provides additional recommendations to the FAA about opportunities for financial incentives for ADS-B equipage which are applicable for other technologies as well.[10]

The opportunities identified by the ADS-B ARC include:

- Establishment of investment tax credits for equipment purchase
- Establishment of grant programs for the FAA for both research and program deployment
- Reducing the aviation excise tax rate for those operators equipped
- Creating a mechanism for interest free loans for operators to acquire equipment before a mandate
- Ensuring the continuation of the research and development tax credit[11]
- Purchase of the equipment for operators (e.g. CAPSTONE)

The broader aviation industry recently proposed an increase in the General Fund contribution to the FAA's budget to 25 percent. GAMA believes that using general revenue is one immediate way for accelerating mature NextGen equipage such as ADS-B.

In addition, GAMA encourages to the Subcommittee to require the FAA to develop and submit a plan to you that evaluates various options for how to incentivize industry to equip, the benefits of this equipage, and what the priorities for equipage should be.

Conclusion

Over the next several years we have an opportunity to move modernization forward as we shift from planning to implementation. GAMA encourages Congress to move forward with the

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[9] The Capstone program relies on ADS-B to provide position information and weather to aircraft flying in Alaska.
[10] Optimizing the Benefits of Automatic Dependent Surveillance—Broadcast, Report from ADS-B Aviation Rulemaking Committee, October 3, 2007. Recommendation Number 1.
[11] The existing research and development tax credit is scheduled to expire on December 31, 2009.

reauthorization of the FAA and ensure it provides the FAA with proper direction and the necessary tools to advance deployment of NextGen:

- Accelerating and expanding ADS-B ground stations
- Adequately staffing FAA's offices of aircraft certification and flight standards
- Incentivizing operators to equip with mature technology earlier by enhancing and delivering the benefits of NextGen sooner
- Requiring the FAA to develop a plan outlining the benefits and resources needed to support government funding to incentivizing early equipage of aircraft

Mr. Chairman, thank you for your leadership on this issue and for inviting me to testify before the subcommittee. There are many challenges ahead for us on the modernization front, but by moving forward with the program we will start seeing quantifiable benefits for the environment, for capacity, and for safety.

Thank you and I would be glad to answer any question that you may have.

Attachment

Aviation and Climate Change
The View of Aviation Industry Stakeholders

Aviation and Climate Change
The Views of Aviation Industry Stakeholders
February, 2009

Introduction and Background

The aviation industry constitutes one of the most dynamic, forward-looking, and innovative sectors of our nation's economy. Commercial and general aviation are a vital part of the transportation infrastructure, providing mobility to citizens, facilitating commerce and helping to maintain the United States' global economic leadership. Aviation is a source of many working-family jobs and provides vital links to thousands of communities. Aviation represents approximately 5.6 percent of the nation's GDP, contributing over $1.2 trillion annually to the economy and providing 11 million jobs.[1]

Aviation has established an outstanding track record in reducing its environmental impact through a combination of regulatory and market forces. We are committed to doing our part to mitigate aviation's contribution to climate change in a context of continued growth and vitality for the industry. The undersigned stakeholders, representing hundreds of manufacturers and airports, thousands of commercial and private operators, and millions of employees, work hard to connect our world and are committed to working just as hard to protect our planet.

Aviation has worked on limiting emissions associated with climate change for decades. Because of our aggressive pursuit of greater fuel efficiency, greenhouse gas (GHG) emissions from aviation constitute only a very small part of total U.S. GHGs, less than 3 percent.[2]

Over the past four decades, we have improved aircraft fuel efficiency by over 70 percent[3], resulting in tremendous GHG savings. During this time, passenger and cargo traffic increased over six fold, making our industry an extremely GHG-efficient economic driver.[4] This improvement has been driven by our industry's market demand for efficiency. Given the significance of fuel costs to the economic viability of our industry, our economic and environmental goals converge. Nonetheless, we also recognize that we have an obligation to further limit aviation's greenhouse gas footprint even as aviation grows to meet rising demand for transportation around the world.

[1] FAA, "The Economic Impact of Civil Aviation on the U.S. Economy," (October 2008). Available at: http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf

[2] This figure includes all U.S. aviation, commercial aviation, general aviation, and the military. U.S. Environmental Protection Agency, *Inventory of Greenhouse Gas Emissions and Sinks· 1990-2006* (April 15, 2008).

[3] International Civil Aviation Organization, *Environmental Report 2007*, page 107.

[4] Our environmental improvements have not only been in the emissions area. Over the same time period we reduced the number of people impacted by aircraft noise by 95%, and reduced oxides of nitrogen emissions substantially – Report to the U.S. Congress: *"Aviation and the Environment - A National Vision Statement, Framework for Goals and Recommended Actions."* (2005).

This paper does not advocate for or against particular legislative, regulatory or other solutions. Rather it offers a constructive set of principles to frame the discussion of policy tools to address aviation and climate change. These principles represent the shared vision of the labor, manufacturing, operator and service sectors representing every kind of airplane, airport, service provider, and worker in the industry.

It is clear that to further reduce aviation's impact on climate change requires a partnership between the industry, labor and government. The principles outlined below illustrate a broad consensus that is also reflected in much of the environment work at the International Civil Aviation Organization (ICAO) - that solutions lay in four main areas: technology, infrastructure, operations, and economic measures.

General Guiding Principles: The public policy debate over aviation and climate change should be guided by the following overarching principles:

Cost-benefit analysis is vital. Any proposed measures to address aviation's impact on the environment should include a rigorous analysis of the expected benefits weighed against the cost to the economy, industry, jobs, communities, and the transportation infrastructure, and should take account of the costs and benefits of intermodal substitution. Likewise, they should address possible tradeoffs between environmental effects, such as between emissions and noise.

A central framework. The federal government has exclusive jurisdiction over U.S. aircraft regulations. This process should continue to be informed by U.S. participation in international aviation standards and recommended practices set by ICAO. It is critical that this international approach and federal pre-emption be maintained in aviation regulatory matters, as it would be impracticable to subject aircraft to different environmental rules in different jurisdictions. This is why the Federal Aviation Administration (FAA) and Environmental Protection Agency (EPA) retain authority over aviation environmental regulations, and why local limits on airport access such as noise restrictions can be implemented only if they meet strict federal criteria consistent with ICAO standards.

The international dimension. Aviation is a global industry and requires global solutions. This is especially true with climate change, since GHG emissions are long lasting and ubiquitous. Any environmental measures affecting aviation should be in conformity with the policies being developed cooperatively by the 190 contracting states of the Chicago Convention through ICAO, including the prohibition against taxing fuel used in international operations. The integrity of the international aviation system is based on the establishment of limits on the ability of any one country to impact the flying rights of another country. The European Union's (EU) unilateral decision to subject non-EU aviation to its Emissions Trading Scheme (ETS) puts this principle at risk and preempts the international treaty rights of other countries.

Need for a comprehensive energy policy. Climate change policy must be developed in the context of a comprehensive national energy policy that expands environmentally responsible access to domestic energy supply, accelerates development of alternative fuels and promotes conservation and efficiency.

Debate based on facts and science. The public policy debate over aviation and the environment should be informed by science and facts. Aircraft release only one of the six GHGs currently covered by international climate treaties, carbon dioxide (CO_2) The U.N. Intergovernmental Panel on Climate Change (IPCC) has confirmed that we know a lot about CO_2 effects from the multitude of industrial sources in the world, making that the appropriate focus for industry action. But more needs to be known about the effects of water vapor from aviation and of oxides of nitrogen released at altitude. What is known about the atmospheric effects of aviation is the result of the only IPCC industry-specific study, *Aviation and the Global Atmosphere*[5], in which the aviation industry played a critical role in providing guidance, data and technical expertise. The aviation industry is strongly supportive of continued research to improve scientific understanding of the effects of non-carbon aviation GHGs and the nature of the nitrogen cycle.

Specific Design Principles: Any initiatives or measures to address aviation and climate change should be based on the following principles:

Air traffic control modernization. The most effective action our nation can take today to reduce aviation's GHG emissions is to modernize the country's antiquated air traffic control (ATC) system. The IPCC estimated in 1999 that *"improvements in air traffic management could help to improve overall fuel efficiency by 6-12%."*[6] The Congress should move forward promptly to renew this vital component of the nation's infrastructure and should facilitate acquisition of the necessary equipment by operators for the existing fleet of airplanes so they can operate in a modernized airspace. This is an inherently federal responsibility essential for reducing greenhouse gas emissions.

Technology and research. As noted, we have improved the fuel efficiency of aircraft by over 70 percent over the last four decades and are committed to continuing this trend. New commercial aircraft like the Boeing 787 and new-design business jets, for example, offer double-digit improvements in fuel efficiency over previous generation airplanes. We are also adding aerodynamic improvements such as winglets to the existing fleet wherever we can. These improvements have been driven by customer demand and market forces, not by regulation. In 2001, a report by ICAO's Committee on Aviation Environmental Protection (CAEP) said that market forces made irrelevant the need for any emissions standards for aviation fuel. In fact, during the same period in which jet engine fuel efficiency improved by 70 percent without government carbon emission standards, federal emission standards for the auto industry only produced about a 15 percent improvement.[7] Further research and development is also necessary to transform the air transportation system. The aviation manufacturing industry is committed to continuing to bring to market more efficient products. Long-term reductions in GHG emissions, however, will depend on new technologies not yet developed. Only the government can provide the necessary level of participation to support and co-finance pre-competitive environmental research and development programs through system demonstration. This type of research has been done in the past by the FAA and the National Aeronautics and Space Administration (NASA). The federal government should restore and significantly increase funding for aeronautics research at the FAA and NASA.

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[5] Intergovernmental Panel on Climate Change (IPCC), *Aviation and the Global Atmosphere*, 1999. Note that the IPCC confirmed its aviation-specific findings again in its Fourth Assessment Report in 2007.
[6] Intergovernmental Panel on Climate Change (IPCC), *Aviation and the Global Atmosphere*, 1999.
[7] ICAO Committee on Aviation Environmental Protection Fifth Meeting, *Working Paper CAEP/5-WP/86*, Section 1.1.6.1, page 1-2.

Environmentally friendly alternative aviation fuels. As an industry, we are driving the research, development and deployment of commercially viable, sustainable alternative jet fuels. Most notably in this regard, our industry has worked with the FAA, the Air Force, the Department of Defense, other government agencies, academia, and fuel producers through the Commercial Aviation Alternative Fuels Initiative (CAAFI) to generate and execute roadmaps to develop, certify and commercially implement such fuels within the next few years. We are committed to ensuring that these fuels are more sustainable on a lifecycle basis than today's jet fuels and that feedstocks used will not compete with food uses. In addition, the general aviation industry, working with fuel producers and the FAA, is committed to the development and deployment of an unleaded aviation gasoline to replace the low-lead fuel used today.

Operational measures. Commercial airlines, their pilots, and general aviation operators have incorporated technological improvements, reduced aircraft weight, modernized their fleets, and improved the efficiency of their operations at every stage of flight and on the ground. The U.S. airlines have committed to a further 30 percent improvement in fuel efficiency between 2005 and 2025. Fuel and emissions saving procedures have already been developed that allow pilots to descend from cruise altitude more efficiently through continuous descent approaches (CDAs) and to navigate more precisely through required navigation procedures (RNP). While many of these procedures are now in use in high density traffic areas, widespread use depends upon the sorely-needed modernized ATC system.

Ground infrastructure investment. Congestion in many parts of the country's aviation system is caused not just by an outdated air traffic control system, but also by constraints on the ground due to inadequate airport infrastructure at our busiest airports. Additional airport infrastructure is needed to ensure that airplanes spend less time circling in congested airspace, get on the ground more quickly and to improve ground movement efficiency. In addition to infrastructure improvements that reduce congestion, many airports are instituting a broad array of measures to reduce the GHG emissions associated with airport operations and facilities, including incorporating energy-efficient and green building concepts, recycling, converting to low emission vehicle fleets, and providing aircraft emission reducing services at gates. Recognition of, and broad support for, continued implementation of such GHG emission-reducing measures are necessary.

Economic measures. Economic measures in the form of positive incentives can further enhance the industry's efforts and augment the gains achieved through regulations and market forces. Measures that impose fees, charges or taxes, whether directly or indirectly are unnecessary and counterproductive in light of industry initiatives. Should any climate measures raise revenues, however, those revenues should be reinvested into aviation to support initiatives that directly reduce aviation's greenhouse gas footprint and for research into technologies that are directly applicable to improving aviation's GHG emissions.

Signatories, February 23, 2009

1. Aerospace Industries Association (AIA)
2. Air Carrier Association of America (ACAA)
3. Aircraft Owners and Pilots Association (AOPA)
4. Air Line Pilots Association, International (ALPA)
5. Airport Consultants Council (ACC)
6. Airports Council International – North America (ACI-NA)
7. Air Traffic Control Association (ATCA)
8. Air Transport Association (ATA)
9. American Association of Airport Executives (AAAE)
10. Cargo Airline Association (CAA)
11. Experimental Aircraft Association (EAA)
12. General Aviation Manufacturers Association (GAMA)
13. Helicopter Association International (HAI)
14. International Air Transport Association (IATA)
15. National Agricultural Aviation Association (NAAA)
16. National Air Carrier Association (NACA)
17. National Air Traffic Controllers Association (NATCA)
18. National Air Transportation Association (NATA)
19. National Association of State Aviation Officials (NASAO)
20. National Business Aviation Association (NBAA)
21. Regional Airline Association (RAA)

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

Victoria Cox
Senior Vice President for NextGen and Operations Planning

Vicki Cox was named the Air Traffic Organization's Senior Vice President for NextGen and Operations Planning in May 2008. She will serve as the FAA's focal point for the Next Generation Air Transportation System (NextGen), working across all lines of business to lead the transformation of the national airspace system using state of the art technologies to meet changing aviation demands.

Cox previously served as the ATO's Vice President for Operations Planning since 2006, focusing on moving NextGen forward. She joined the FAA in 2003 as Program Director of the Aviation Research Division, where she made an immediate impact working on the Program Assessment Rating Tool (PART) that the Office of Management and Budget requires to assess and improve program performance. Cox then moved to director of Flight Services Finance and Planning before heading the ATO's International Office.

Prior to joining the FAA, Cox worked for the Department of Defense where she served as Director of International Technology Programs in the Office of the Director of Defense Research and Engineering. She has an extensive research and development and program management background, having supported the Deputy Undersecretary of Defense for Science and Technology as the DOD Laboratory Liaison to the Office of the Secretary of Defense. She also worked as a Program Manager for a number of ballistic missile defense technology programs for the U.S. Air Force.

A physicist, Cox served as Chief of Physics and Scientific Director of the European Office of Aerospace Research and Development in London. She also worked as a scientist responsible for thermal vacuum conditioning and testing of the Hubble Telescope for NASA.

Cox graduated from Converse College and received a Master's degree from East Carolina University. She has a certificate in U.S. National Security Policy from Georgetown University and is a DOD Level III Certified Acquisition Professional in Systems Planning, Research, Development and Engineering. She also earned her private pilot's license in 1985.

U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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April 2, 2009

Ms. Victoria Cox
Senior Vice President for NextGen
and Operations Planning Services
Air Traffic Organization
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Cox:

On March 18, 2009, the Subcommittee on Aviation held a hearing on **"ATC Modernization and NextGen: Near-Term Achievable Goals."**

Attached are questions to answer for the record. I would appreciate receiving your written response to these questions within 14 days so that they may be made a part of the hearing record.

Sincerely,

Jerry F. Costello

Jerry F. Costello
Chairman
Subcommittee on Aviation

JFC:pk
Attachment

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON
ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS
QUESTIONS FOR THE RECORD
TO:

MS. VICTORIA COX
SENIOR VICE PRESIDENT FOR NEXTGEN AND OPERATIONS PLANNING SERVICES
AIR TRAFFIC ORGANIZATION
FEDERAL AVIATION ADMINISTRATION

1) Ms. Cox, the FAA currently publishes on average a minimum of 50 Area Navigation ("RNAV") and 50 Required Navigation Performance ("RNP") procedures each year. Section 511 of S.1300 (from the 110th Congress), "The Aviation Investment and Modernization Act of 2007," would have required the FAA to set a target of achieving a minimum of 200 RNP procedures each year through 2012.

a) What are the FAA's NextGen goals for RNAV/RNP and is it necessary for the FAA to publish 200 RNP procedures each year to meet those goals?

b) Are there practical limitations that might prevent the FAA from publishing 200 RNP procedures each year? If so, please explain.

2) Ms. Cox, the FAA has signed agreements with two private vendors (Naverus and Jeppesen) to develop and implement RNAV/RNP procedures. Please explain what authority the FAA currently has with regard to using private vendors to develop and implement RNAV/RNP procedures.

a) Section 410 of the Bush Administration's FAA Reauthorization proposal – "The Next Generation Air Transportation System Financing Reform Act of 2007" (proposed during the 110th Congress) - would have expanded the FAA's authority to delegate to non-government third parties the ability to design aircraft operating procedures. Please describe how Section 410 would have expanded the FAA's current authority.

b) Section 511 of S.1300, "The Aviation Investment and Modernization Act of 2007" (from the 110th Congress) authorized the FAA to provide third parties the ability to design, flight check, and implement RNP approach procedures. Please describe how Section 511 would have expanded the FAA's current authority?

c) Would expanding the FAA's authority to delegate the implementation of approach procedures, as proposed in both "The Next Generation Air Transportation System Financing Reform Act of 2007" and "The Aviation Investment and Modernization Act of 2007," accelerate the deployment of these procedures? If so, please explain?

d) Does FAA plan to rely on third party resources to supplement the development and implementation of RNAV/RNP procedures, thus increasing FAA's yearly goals for RNAV/RNP procedure deployment? If so, please explain.

3) Ms. Cox, what are the various offices within the FAA that are involved with the development, deployment and implementation of RNAV/RNP procedures? Would you please explain the roles and responsibilities of each of these offices?

4) Ms. Cox, please explain the difference between "public use" and "special use" RNAV/RNP procedures?

5) Ms. Cox, please describe each of the specific steps necessary to implement both "public use" and "special use" procedures, and please emphasize how these steps may differ?

6) Ms. Cox, Southwest Airlines is working to accelerate the deployment of "special use" RNAV/RNP procedures. Please explain what Southwest Airlines is doing and also the FAA's role in overseeing this effort? Does the FAA have any concerns about Southwest's approach? If so, please explain.

7) Ms. Cox, "The NextGen Implementation Plan for 2009" lists avionics equipage that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, the most ready for immediate deployment and why?

8) Ms. Cox, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage, which technologies hold the most immediate potential for accelerating NextGen benefits?

9) Ms. Cox, how much was spent on the Capstone project? How much was spent specifically on aircraft equipage and how many aircraft were equipped?

10) Ms. Cox, with regard to the Capstone project, how did the FAA structure the equipage of participating aircraft? In other words, did the FAA purchase the equipment and give it to aircraft operators or did the FAA provide grants to aircraft operators to purchase equipment? Was Capstone equipage funded from the Facilities and Equipment account? Was there a cost sharing arrangement with aircraft operators, and if so, please explain.

11) Ms. Cox, in September 2008, the National Academy of Public Administration issued a report that cited key workforce competencies such as software development and contract administration that the FAA must strengthen to execute NextGen. What is FAA's plan for obtaining the skill set needed to implement NextGen?

12) Ms. Cox, the FAA has proposed giving operational preferences for aircraft that equip with NextGen avionics as soon as possible. How would this "best equipped - best served" concept work in practice?

13) Ms. Cox, the President of the National Air Traffic Controllers Association stated in his written testimony that a "best equipped - best served" policy has "serious implications for safe and efficient operations and for the workload and complexity for air traffic controllers." What steps are being taken to address the concerns raised by air traffic controllers over this proposed policy?

14) Ms. Cox, the RTCA Task Force recommendations are to be reported in August. What is FAA doing to be prepared to implement the recommendations?

15) Ms. Cox, the European Commission recently issued a proposed rule mandating ADS-B "Out" equipage by 2015. What, if anything, must the FAA do to harmonize its proposed ADS-B equipage mandate with the European proposal? How, if at all, might the European proposal affect our own NextGen efforts?

16) Ms. Cox, the FAA is working with aircraft operators to ascertain what NextGen benefits might be derived by 2018. In your written testimony you state that NextGen benefits are integrally linked to how quickly the airlines equip their aircraft. If that is the case, why not set earlier mandates for aircraft to equip with NextGen technologies like the Europeans have with ADS-B "Out"?

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON
"ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS"

RESPONSES TO
QUESTIONS FOR THE RECORD FROM
CHAIRMAN COSTELLO TO:
MS. VICTORIA COX
NEXTGEN AND OPERATIONS PLANNING SERVICES
AIR TRAFFIC ORGANIZATION
FEDERAL AVIATION ADMINISTRATION

Q1. Ms. Cox, the FAA currently publishes on average a minimum of 50 Area Navigation (RNAV) and 50 Required Navigation Performance (RNP) procedures each year. Section 511 of S.1300 (from the 110th Congress), "The Aviation Investment and Modernization Act of 2007," would have required the FAA to set a target of achieving a minimum of 200 RNP procedures each year through 2012.

a) What are the FAA's NextGen goals for RNAV/RNP and is it necessary for the FAA to publish 200 RNP procedures each year to meet those goals?

A1a. The NextGen goals for Area Navigation (RNAV) and Required Navigation Performance (RNP) include:

- Publish 50 RNAV/RNP Standard Instrument Departures (SIDs) and Standard Terminal Arrivals (STARs) per year
- Publish 50 RNP Authorization Required approach procedures per year, and
- Publish 50 RNAV routes per year

Based on our established goals and year-to-year accomplishments, we do not see a need to implement 200 Required Navigation Performance (RNP) procedures per year to achieve NextGen goals.

We believe a requirement to produce 200 RNP approaches per year may have unintended consequences and may actually slow the achievement of NextGen benefits. The FAA believes it needs to take a strategic approach to RNP procedures development and any corresponding airspace redesign work that is required to deploy those procedures. This approach will maximize the benefits achieved by promoting more efficient routes and use of the available airspace. An unintended consequence of mandating production of routes may be the promulgation of "overlay" routes, which can be more quickly deployed, but that may not provide the efficiency improvements that could be gained with alternative route structures.

b) Are there practical limitations that might prevent the FAA from publishing 200 RNP procedures each year? If so, please explain.

A1b. The FAA has the potential to develop 200 RNP procedures per year, however to accomplish this, the procedures would most likely be direct overlays of existing flight procedures and would provide little to no benefit to industry. Industry stakeholders have clearly identified a need for FAA to develop procedures that provide measurable benefits in lieu of duplicating or overlaying existing capabilities.

There are practical limitations to developing 200 RNP procedures that are anything other than direct overlays. Processing time for individual procedures is dependent on the complexity of the airspace, interactions with other procedures, environmental requirements, and the amount of coordination required between aviation customers, air traffic facilities, and other major stakeholders, such as the airport authority, Flight Standards, and ATO Technical Operations for each route or procedure. Additionally, congested airspace as found in nearly all major metropolitan areas, involves complex design requirements with stringent development criteria to include computer modeling, human factors studies, and actual flight and simulator trials. Some of the resources required for these collaborative development processes are beyond FAA control. Our goal is to develop safe, repeatable, flyable procedures that enhance operations and which integrate airspace redesign and environmental requirements.

Q2. Ms. Cox, the FAA has signed agreements with two private vendors (Naverus and Jeppesen) to develop and implement RNAV/RNP procedures. Please explain what authority the FAA currently has with regard to using private vendors to develop and implement RNAV/RNP procedures.

A2. Currently, we have two Other Transaction Agreements (OTAs) in place with Naverus and Jeppesen that will authorize them to do procedure development, flight validation, and maintenance of Public (14 CFR Part 97) RNP Special Aircraft and Aircrew Authorization Required (RNP SAAAR) instrument procedures only. OTA is the only avenue to allow these functions by third parties. A change to 14 CFR Part 183 must be accomplished to allow further use of third parties via designation authority. Both vendors are going through a qualification process in tandem with the development of FAA Flight Standards oversight documents. The OTAs were put in place at the request of industry to allow third-party vendors the ability to perform these functions. The intention was that industry or the international community would be interested in hiring these FAA-qualified vendors to perform procedure development activities in both the US National Airspace System (NAS) and international locations where existing infrastructure is lacking or does not create complex integration and implementation issues. At such locations, the introduction of RNAV/RNP procedures dramatically increases safety of flight for United States flagship carriers and passengers. We expect FAA resources to be adequate for meeting NextGen goals; however, we will continue to evaluate the roles, costs, and potential benefits of third-party participation.

a) Section 410 of the Bush Administration's FAA Reauthorization proposal – "The Next Generation Air Transportation System Financing Reform Act of 2007" (proposed during the 110th Congress) – would have expanded the FAA's authority to delegate to non-government third parties the ability to design aircraft operating procedures. Please describe how Section 410 would have expanded the FAA's current authority.

A2a. Section 410 would have expanded FAA's ability to designate the third-party vendor provision beyond originally designated or established capabilities. This includes flight procedure development, flight validation, and maintenance authorizations to qualified third party vendors. Section 410 would have enabled third parties to become designated instrument flight procedure developers for all public procedures developed under 14 CFR Part 97.

b) **Section 511 of S.1300, "The Aviation Investment and Modernization Act of 2007," (from the 110th Congress) authorized the FAA to provide third parties the ability to design, flight check, and implement RNP approach procedures. Please describe how Section 511 would have expanded the FAA's current authority.**

A2b. Section 511 would have required FAA to set a target of achieving a minimum of 200 Required Navigation Performance approach procedures per fiscal year through FY2012 but does not expand FAA's authority to allow third-parties to design, flight validate, and implement RNP approach procedures. This would require a change to 14 CFR Part 183. With a change to Part 183, a designee program may be set in place.

c) **Would expanding the FAA's authority to delegate the implementation of approach procedures, as proposed in both "The Next Generation Air Transportation System Financing Reform Act of 2007" and "The Aviation Investment and Modernization Act of 2007," accelerate the deployment of these procedures? If so, please explain.**

A2c. The expanded authority proposed in "The Next Generation Air Transportation System Financing Reform Act of 2007" does not necessarily lead to the increased production numbers proposed in "The Aviation Investment and Modernization Act of 2007." FAA has the production capacity to meet demand and can reallocate resources to meet increased production goals, if needed. Consequently, FAA does not currently plan to use third-party procedure developers for general production needs. However, as we have indicated, this does not preclude the use of qualified third-party procedure developers for specific RNP SAAAR projects based on a future needs. FAA perceives that there will be an ongoing requirement for substantial involvement and oversight of instrument flight procedures developed in collaboration with third-party procedure developers.

d) **Does FAA plan to rely on third party resources to supplement the development and implementation of RNAV/RNP procedures, thus increasing FAA's yearly goals for RNAV/RNP procedure deployment? If so, please explain.**

A2d. FAA has no specific plan to rely on third-party resources to supplement development and implementation of agency-sponsored RNAV/RNP procedures. However, this does not preclude the use of qualified third-party procedure developers for specific projects based on a future contractual relationship with FAA. We recognize that third-party partnerships can provide valuable expertise, capabilities, and resources that may complement FAA's goals for implementing RNAV and RNP procedures in the near-term and through the far-term in support of

NextGen. FAA is committed to implementing procedures that provide measurable benefits and to avoiding duplication of existing capabilities to meet production goals.

Q3. Ms. Cox, what are the various offices within the FAA that are involved with the development, deployment, and implementation of RNAV/RNP procedures? Would you please explain the roles and responsibilities of each of these offices?

A3. The various offices within the FAA that are involved with the development, deployment, and implementation of RNAV/RNP procedures are listed below:

Aviation Flight Standards Service (AFS)

- Develops and establishes criteria for civil and military terminal instrument procedures for issuance in the FAA Handbook 8260.3, United States Standard for Terminal Instrument Procedures (TERPS), and related FAA 8260-series orders
- Develops rules, standards, policies, and criteria governing the operational aspects of en route, terminal, and instrument flight procedures (except air traffic control procedures)
- AFS performs operational evaluations, including flight simulation, flight simulator, and in-flight testing of standards and criteria
- Assesses the impact on safety using tools such as ASAT and Collision Risk Model (CRM) and provides radar separation analysis tools
- Responsible for all the oversight of flight inspection policy and all instrument flight procedure development

Aircraft Certification (AIR)

- Administers safety standards governing the design, production, and airworthiness of civil aeronautical products
- Oversees design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards
- Provides a safety performance management system to ensure continued operational safety of aircraft
- Works with aviation authorities, manufacturers, and other stakeholders to help them successfully improve the safety of the international air transportation system
- Headquarters offices and the directorates share responsibility for the design and production approval, airworthiness certification, and continued airworthiness programs of all U.S. civil aviation products

RNAV/RNP Group (AJR-37)

- Serves as the lead office for implementation and integration of RNAV and RNP routes and procedures into the air traffic environment
- Coordinates policy and implementation activities with industry and FAA (Flight Standards, Aircraft Certification, Aviation System Standards, ATO Service Centers and facilities)
- Provides guidance for and expedites the development of performance-based navigation (PBN) criteria and standards and implements airspace and procedure improvements

- Collaborates with the U.S. and international aviation communities – government and industry – as a leader in developing PBN concepts, technical standards, operator requirements, and implementation processes to enhance safety, increase capacity, improve efficiency, and reduce the environmental impact of aviation
- Provides technical and operational guidance to the ATC facilities, Service Areas, Airspace design teams, and regions. This group also develops and maintains processes and tools to aid the field with RNAV/RNP procedure design

Aviation System Standards (AJW-2)

- Ensures the standard development, evaluation, and certification of airspace systems, procedures, and equipment
- Designs and develops instrument flight procedures (IFPs), publishes aeronautical charts and digital products for air carrier and general aviation pilots for use throughout the United States and around the world
- Provides aircraft maintenance and engineering services, operates a fleet of flight inspection aircraft for airborne evaluation of IFPs and electronic navigational signals

Air Traffic Safety Oversight Service (AOV)

- Audits the oversight and safety function of Air Traffic Organization operations.
- Audits the oversight and safety function
- Establishes safety standards and provides independent oversight of the Air Traffic Organization – the provider of air traffic services in the United States
- Accomplishes safety oversight in a variety of ways including:
    - Developing and amending regulations and guidance for regulatory oversight and credentialing functions
    - Participating in the development and harmonization of air traffic control international standards
    - Providing regulatory oversight of the Air Traffic Organization Safety Management System
- Many of these tasks are carried out through:
    - Auditing
    - Surveillance
    - Investigations and Inspections
    - Cooperation with other FAA safety services

Field Facilities (Tower, TRACON, Centers)

- Responsible for procedure design evaluations for airspace and procedures usage, letters of agreement, video map updates, automation coding and controller familiarization and training in accordance with the 18-step RNAV implementation process
- Responsible for designing and using the procedures operationally

Q4. Ms. Cox, please explain the difference between "public use" and "special use" RNAV/RNP procedures.

A4. Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures are instrument approach procedures (IAP) that can be developed and published as either public or special. "Specials" are not for public use and are issued on a case by case basis to specific operators.

Public use RNAV/RNP IAPs are developed using United States Standard for Terminal Instrument Approach Procedures (TERPs). They are published in the Federal Register, in accordance with 14 CFR Part 97. These IAPs are available for use by appropriately qualified pilots operating properly equipped and airworthy aircraft in accordance with operating rules and procedures acceptable by FAA. These procedures are approved by the FAA's Flight Standards Service.

Special use RNAV/RNP IAPs can be developed using standard TERPs criteria, or special criteria approved by FAA to fill a specific need. FAA authorizes only certain organizations, companies, airlines, and/or individual pilots to use a special IAP. Additional crew training and/or aircraft equipment or performance also may be required. IAPs that service private use airports or heliports are generally specials. A special IAP can be developed by FAA or private proponent(s) and are approved or disapproved by FAA's Flight Technologies and Procedures Division Standards Service (AFS-400).

Q5. Ms. Cox, please describe each of the specific steps necessary to implement both "public use" and "special use" procedures, and please emphasize how these steps may differ.

A5. Public use IAPs are produced under the authority of 14 CFR Part 97 and are developed by FAA using standard TERPs guidelines. These procedures are sent to the National Flight Data Center (NFDC) for inclusion in a transmittal letter that is published in the Federal Register. Additionally, the National Aeronautical Charting Office (NACO) publishes these procedures as a standard instrument approach chart. These procedures are approved by the FAA's Flight Standards Service.

A special use IAP can be developed by FAA or a private proponent and is approved by FAA's Flight Technologies and Procedures Division Standards Service (AFS-400). The Special IAP is forwarded through the Regional All Weather Operations (AWO) Branch to the appropriate Flight Standards District Office (FSDO) or Certificate Management Office (CMO) for issuance to the specific operators. These procedures are not included under 14 CFR Part 97, or listed on the Federal Register.

Q6. Ms. Cox, Southwest Airlines is working to accelerate the deployment of "special use" RNAV/RNP procedures. Please explain what Southwest Airlines is doing and also the FAA's role in overseeing this effort. Does the FAA have any concerns about Southwest's approach? If so, please explain.

A6. Southwest Airlines (SWA) has gained support as an "early adopter" of NextGen using RNP. SWA has indicated their commitment to invest $175 million to implement RNP. In some cases, they are utilizing the services of Naverus, a company formed by former Alaska Airlines technical pilots who pioneered RNP procedures, to design non-public RNP approach, departure, and en route instrument procedures, working closely with the FAA.

The airports where Southwest is starting to develop these RNP procedures are Dallas Love Field, and Houston Hobby Airport. The carrier plans to use Special IAP - customized approaches tailored to their Boeing 737 aircraft, rather than the Public (14 CFR Part 97) approaches some appropriately equipped airlines could utilize. Note: presently only the FAA can produce Public IAP. Southwest Airlines envisions that these customized RNP approaches will provide a much shorter track over the ground to the runway than radar vectors and already developed FAA area navigation (RNAV) public procedures. Optimized routes without a distance reduction can also provide fuel savings.

Major tasks associated with this effort include equipage of the SWA fleet, development of RNP procedures, training for pilots and integration into the ATC environment. The early adoption demo between Dallas Love and Houston Hobby will remain within environmental constraints of the recently completed Houston Area Airspace redesign, apply current aircraft separation standards, and avoid preferential routing or treatment that will adversely impact other carriers.

FAA's Southwest Region, Air Traffic Organizations (ATO, AJW, AJR), Central Service Area, Airports Division, affected Air Traffic Facilities, Regional Environmental Office, HQ, and Regional Flight Standards Offices are closely overseeing and monitoring the work, coordination, design, and implementation of this project into the National Airspace System. Flight Standards Service will provide final processing and oversight of the procedures as they are presented and the project progresses.

The FAA is satisfied with the progress of Southwest Airlines NextGen RNP Project in Texas, but remains focused on watch items including the safety risk review, procedure development, integration into the ATC environment and providing support for the associated environmental review process.

The primary concern we have is that the proposed operations for the Dallas/Houston project are exclusive to SWA, developed with proprietary criteria that may not conform to common flight tracks or other instrument operations at the affected airports. This increases the probability that these special operations may either be terminated or the aircraft vectored for merging and sequencing with other traffic.

Q7. Ms. Cox, "The NextGen Implementation Plan for 2009" lists avionics equipage that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, the most ready for immediate deployment and why?

A7. Appendix A of, "The NextGen Implementation Plan for 2009" indicates that avionics for RNAV / RNP, Data Communications, Displays, and Automatic Dependent Surveillance – Broadcast (ADS-B) are targets for mid-term NextGen operations. Of these, the most mature technologies are:

1. Performance Based Navigation (PBN): RNAV/RNP,
2. Automatic Dependent Surveillance – Broadcast (ADS-B), and
3. Displays (required to support both PBN and ADS-B In technologies)

The following paragraphs provide detailed information on the maturity of two key technologies and how each can be used in the near future to obtain NextGen benefits.

Global Navigation Satellite System (GNSS) positioning/navigation engines aboard aircraft are the enablers for NextGen. These navigation engines enable area navigation (RNAV) and Required Navigation Performance (RNP) technologies that are already in use to establish more efficient routes and procedures throughout the National Airspace System (NAS). This same navigation engine information is processed through various avionics and flight management systems to provide Automatic Dependent Surveillance – Broadcast (ADS-B) surveillance that can be used by pilots (ADS-B "in") and controllers (ADS-B "out").

Performance Based Navigation (PBN): RNAV/RNP

Today, the NAS cannot make the most effective and widespread use of these systems because there is a mixed capability environment in current aircraft. Nearly 100% of air carriers are equipped to perform RNAV at the top 35 airports. Equipage for RNP routes stands at about 60% of the existing air transport fleet. Further investment in RNP/RNAV infrastructure could result in gains in flight efficiency and reductions in noise and environmental impact (due to reduced fuel burn). Standardization of existing equipment with future implementations of RNAV/RNP and ADS-B can increase benefits by providing for a wider and more consistent use of key applications of these technologies.

Automatic Dependent Surveillance – Broadcast (ADS-B): ADS-B Out and ADS-B In

ADS-B "out"[1] is well defined by the FAA with planned operational use for air traffic separation services. The FAA plans to mandate ADS-B "Out" by rule in 2010 with compliance required by 2020. The aviation community--consisting of avionics manufacturers, aircraft manufacturers, airlines, and the Department of Defense (DoD)--commented and provided input on the Notice of Proposed Rulemaking (NPRM) through

[1] ADS-B Out is defined as the transmission of the aircraft position into a unique digital code and combines it with other data from the aircraft's flight-management system – the type of aircraft, its speed, its flight number, and whether it is turning, climbing or descending. The code containing all of this data is automatically broadcast from the aircraft's transponders once a second.

the Aviation Rulemaking Committee (ARC). ADS-B out provides immediate benefits in non radar airspace and supplements the availability of air traffic separation services in existing radar airspace. The DoD and FAA could potentially benefit from this acceleration of equipage through enabling shared use of Special Use Airspace (SUA).

ADS-B "in" has multiple functions. The first function is the ability for aircraft to receive traffic and weather information on a cockpit display within a specific ADS-B service volume from the ground infrastructure. Currently, this is being used operationally in the NAS and the FAA is moving forward with confidence for nationwide deployment. Additional information to the cockpit, including traffic, weather, and flight information can be employed to accrue additional safety benefits (reduction in fatal accident rate), increased efficiency of flight (including fuel savings), and an increase in capacity of the NAS. Inclusion of avionics into the cockpit also provides a notional opportunity for industry to develop additional services.

Aircraft-to-aircraft applications of ADS-B in are expected to be completed by FY 2010 and will align with FY 2009 airline orders of ADS-B "in" avionics (receivers and cockpit displays). As noted in the ARC report published in September 2008, the ARC recommends that the FAA, in partnership with industry, consider establishing a program for ADS-B "in" by 2012. The ARC further recommends that this program defines how to proceed with ADS-B "in" beyond the voluntary equipage concept in the current NPRM. Finally, the ARC recommends that the final rule preamble be modified to include the intention to move towards and encourage ADS-B "in" in the future. The ARC report recommendation emphasizes their understanding that ADS-B "in" has high value benefits.

Q8: Ms. Cox, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage, which technologies hold the most immediate potential for accelerating NextGen benefits?

A8. As described in Question 7, the technologies that hold the most immediate potential for accelerating NextGen benefits are Performance Based Navigation and ADS-B.

Q9. Ms. Cox, how much was spent on the Capstone Project? How much was spent specifically on aircraft equipage and how many aircraft were equipped?

A9. The Capstone Project ran from 1999 – 2007 and cost approximately $145.5 million. These costs included purchasing and installation of avionics, purchasing and installation of Ground Based Tranceivers (GBTs), Automated Weather Observing System (AWOS) and Remote Communications Outlets (RCOs) in both Bethel, Alaska and Southeast Alaska.

Additionally, this funding was also used to develop Traffic Information Service – Broadcast (TIS-B), Flight Information Service – Broadcast (FIS-B) products, Operational Flight Monitoring Systems and upgrading the Micro En Route Automated Radar Tracking System (MEARTS). The MEARTS had to be updated in order to display the ADS-B data and have controllers use it for separation services. The Capstone Project also conducted operational evaluations of Wide Area Multilateration in Juneau and vehicle ADS-B systems.

The FAA spent approximately $26.6 million on avionics for aircraft operating in the Yukon Kuskokwim Delta in Western Alaska and in Juneau in Southeastern Alaska. A total of 390 aircraft in Alaska were equipped through the FAA's Capstone Project. These costs included avionics suites from both Garmin and Chelton. In addition, the agency paid for simulators for training, installation of multi function displays, transponders, GPS and Wide Area Augmentation Systems (WAAS). Currently there are 361of the 390 ADS-B equipped aircraft still operating today. The 29 aircraft that are no longer operational could be attributed to different factors, such as the aircraft has been sold or the owner changed the equipment out.

Q10. Ms. Cox, with regard to the Capstone project, how did the FAA structure the equipage of participating aircraft? In other words, did the FAA purchase the equipment and give it to aircraft operators or did the FAA provide grants to aircraft operators to purchase equipment? Was Capstone equipage funded from the Facilities and Equipment account? Was there a cost sharing arrangement with aircraft operators, and if so, please explain.

A10. The FAA purchased, installed and maintained the avionics for aircraft in Alaska, in exchange for aircraft operators' participation in the program. There were not any grants administered and it was completely federally funded through the Facilities and Equipment account. There were not any cost share agreements set up for this activity.

Under the Capstone Project, aircraft owners entered into a written agreement with the FAA for avionics to be installed in their aircraft with no charge to them. At the end of the program (2007), the agreement stipulated that the FAA would either remove the avionics at the governments' cost or the aircraft owner could purchase the equipment at a depreciated cost (determined by the FAA). All the participants opted to retain the equipment and the FAA turned the avionics equipment over to them. The transfer of the ownership of the equipment was completed in December 2008. Therefore, starting in January 2009, the aircraft owners are fully responsible for the operations and maintenance of the equipment.

Q11. Ms Cox, in September 2008, the National Academy of Public Administration issued a report that cited key workforce competencies such as software development and contract administration that the FAA must strengthen to execute NextGen. What is FAA's plan for obtaining the skill set needed to implement NextGen?

A11. The ATO is currently developing a five-year Acquisition Workforce Plan covering FY 2009 through FY 2014. The plan will address current views of the workforce and future demand, challenges, competency requirements, staffing/hiring plans, and strategies to address workforce gaps/needs. A cross-organization, executive-level Acquisition Workforce Council is leading this work. Strategies include targeted outreach and recruitment for key disciplines, at senior, mid, and entry levels (including expansion of student and "co-op" and intern programs); integrated career development and certification programs; and leveraging HR flexibilities to attract, hire, and retain talent. The plan is scheduled to be published in September 2009 and updated annually.

Q12. Ms. Cox, the FAA has proposed giving operational preferences for aircraft that equip with NextGen avionics as soon as possible. How would this "best equipped - best served" concept work in practice?

A12. The FAA supports a mixed-equipage environment in today's National Airspace System. In the 2009 NextGen Implementation Plan, the FAA proposed moving to a "best equipped-best served" policy to accelerate NextGen benefits and avionics equipage rates. The specific details for implementing and operating under this principle still must be defined. In addition, the FAA has asked the RTCA NextGen Implementation Task Force to help implement this new policy. The Task Force will recommend ways to effectively implement "best equipped-best served" to maintain safety and also meet the needs of the aviation community. The Task Force's final report is due in August 2009.

Q13. Ms Cox, the President of the National Air Traffic Controllers Association stated in his written testimony that a "best equipped – best served" policy has "serious implications for safe and efficient operations and for workload and complexity for air traffic controllers." What steps are being taken to address the concerns raised by air traffic controllers over this proposed policy.

A13. Safety remains the top concern of the FAA. FAA requires a rigorous safety assessment and approval process before any new systems or processes are implemented into the national airspace system. As such, specific implementations of the "best-equipped – best served" will go through a careful and thorough review and the appropriate procedures and training will be developed and implemented to ensure continued safe operations of the NAS.

Q14. Ms. Cox, the RTCA Task Force recommendations are to be reported in August. What is FAA doing to be prepared to implement the recommendations?

A14. The FAA is monitoring the work of the RTCA Task Force closely. FAA executives co-chair the two working groups in the Task Force. The Task Force final report is due in August 2009. In addition, the FAA is preparing the cross-agency coordination effort that will be needed to respond to the priorities highlighted by the Task Force report. The work of the Task Force will be analyzed and appropriate adjustments will be made to NextGen plans after the consensus recommendations of the Task Force are fully considered.

Q15. Ms. Cox, the European Commission recently issued a proposed rulemaking mandating ADS-B "Out" equipage by 2015. What, if anything, must the FAA do to harmonize its proposed ADS-B equipage mandate with the European proposal? How, if at all, might the European proposal affect our own NextGen efforts?

A15. The Surveillance and Broadcast Service (SBS) program office relies on a governance structure that ties the FAA, industry, and international community closely together. In an effort to synchronize the FAA's plans with that of the international community, the SBS program office actively participates in RTCA Special Committee 186 (SC-186), which among other things, manages the Requirements Focus Group (RFG). The RFG, a joint RTCA[2] / EUROCAE[3] Working Group, is focused on avionics requirements development and standardization, as well as current/future services and applications for ADS-B.

To date, the RFG has produced the specifications for the following ADS-B applications:

- Safety, Performance and Interoperability Requirements Document for the ADS-B Non-Radar-Airspace (ADS-B NRA) Application (RTCA/DO-303 and EUROCAE ED-126)
- Safety, Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application (RTCA/DO-312 and EUROCAE ED-159)
- Safety, Performance and Interoperability Requirements Document for the Enhanced Visual Separation on Approach (ATSA-VSA) Application (RTCA/DO-314 and EUROCAE ED-160)

Furthermore, this group is close to finalizing the documentation for using ADS-B to provide air traffic services in radar areas (ADS-B RAD). These detailed performance requirements were analyzed by the ADS-B Aviation Rulemaking Committee (ARC) and included in their recommendations to the FAA regarding performance requirements for the final rule.

In addition, the ADS-B Program Managers of AirServices Australia, the FAA, Nav Canada and Eurocontrol hold periodic coordination meetings to ensure that ADS-B implementation is globally interoperable. Over the past three years the group has met on five occasions. At recent meetings, the respective regulatory branches of each organization have also been invited to participate to exchange information on their specific approaches in the various continents.

[2] RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance, and air traffic management (CNS/ATM) system issues. RTCA functions as a Federal Advisory Committee. Its recommendations are used by the FAA as the basis for policy, program, and regulatory decisions and by the private sector as the basis for development, investment and other business decisions.

[3] EUROCAE was created to provide a regular forum in Europe where administrations, airlines, and industry could meet to discuss technical problems. The main European administrations, aircraft manufacturers, equipment manufacturers and service providers are members of EUROCAE, and they actively participate in the Working Groups which prepare technical specifications.

The proposed European mandate is complementary to the U.S. proposal and will positively impact the U.S. fleet equipage. Any U.S. aircraft flying in European airspace will need to comply with the proposed European mandate compliance date of 2015, five years earlier than required for operating in U.S. airspace. However, it is important to note that the total aircraft population in Europe is significantly smaller than that of the United States, affording the Europeans to have the shorter compliance period.

In the future, the United States and the international community will need to coordinate on the requirements standardization and applications for ADS-B In.

Q16. Ms. Cox, the FAA is working with aircraft operators to ascertain what NextGen benefits might be derived by 2018. In your written testimony you state that NextGen benefits are integrally linked to how quickly the airlines equip their aircraft. If that is the case, why not set earlier mandates for aircraft to equip with NextGen technologies like the Europeans have with ADS-B Out?

A16. Based on the planned issuance of the ADS-B final rule, aircraft could equip over a ten year period (from 2010 – 2020). Air Transport usually conducts an upgrade cycle to aircraft every seven years. Based on feedback from the aviation community, it was considered reasonable to provide a time period that would naturally accommodate the seven year maintenance cycle plus provide general aviation enough time to comply with the rule. It is anticipated that approximately 185,000 general aviation aircraft will need to meet the rule compliance date (2020) over the ten year period.

In September 2008, the Aviation Rulemaking Committee (ARC)[4] submitted a series of recommendations relating to the ADS-B Notice of Proposed Rulemaking (NPRM). Through its iterative process, the ARC considered whether the FAA should mandate equipment meeting interim ADS–B Out standards, 3 years earlier (2017) than the NPRM proposed compliance date, to achieve early benefits in certain airspace. The ARC could not reach consensus on this approach, however, continued to emphasize its support for ADS–B Out implementation in the NAS by 2020.

In summary, the required equipage date was designed to give aircraft owners / operators time to equip with proper avionics. This compliance date was based on:

- Recommendations from the user community
- Amount of aircraft (air transport and general aviation) that are in service today
- The length of time the aircraft would be pulled out of service

4 Members of the ARC include: Joint Planning and Development Office, Air Transport Association of America, Inc., National Business Aviation Association, Inc, Cessna Aircraft Company, Alaska Airlines, Airbus, Air Line Pilots Association, International Air Transport Association, Regional Airline Association, Massachusetts Institute of Technology, Rockwell Collins, General Aviation Manufacturers Association, NESC, Aircraft Owners and Pilots Association, Project Management Enterprises, Inc., Aviation Communication and Surveillance Systems, MITRE/CAASD, Boeing, Garmin, Department of Defense, and National Air Traffic Controllers Association

U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

James L. Oberstar
Chairman

David Heymsfeld, Chief of Staff
Ward W. McCarragher, Chief Counsel

John L. Mica
Ranking Republican Member

James W. Coon II, Republican Chief of Staff

March 19, 2009

Ms. Victoria Cox
Senior Vice President for NextGen
and Operations Planning Services
Air Traffic Organization
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Cox:

On March 18, 2009, the Subcommittee on Aviation held a hearing on **"ATC Modernization and NextGen: Near-Term Achievable Goals."**

Attached are questions to answer for the record submitted by Rep. Michael E. McMahon. I would appreciate receiving your written response to these questions within 14 days so that they may be made a part of the hearing record.

Sincerely,

Jerry F. Costello
Chairman
Subcommittee on Aviation

JFC:pk
Attachment

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON
"ATC MODERNIZATION AND NEXTGEN:
NEAR-TERM ACHIEVABLE GOALS"

QUESTIONS FOR THE RECORD
TO:

MS. VICTORIA COX
SENIOR VICE PRESIDENT
NEXTGEN AND OPERATIONS PLANNING SERVICES
AIR TRAFFIC ORGANIZATION
FEDERAL AVIATION ADMINISTRATION

Last year, the FAA implemented Phase I of the NY-NJ-Philadelphia airspace redesign effort, which included new dispersal headings for departures. It is my understanding that these new procedures were implemented without input from system users and with no input from air traffic controllers. I further understand that these efforts were plagued by several serious inadequacies, including a lack of published procedures, incomplete testing, insufficient training for both controllers and pilots, and frequent miscommunication between controllers and pilots - and confusion in the sky is not good for anyone, especially passengers.

My fear is that the FAA is going to roll out Phase II of the redesign without first having learned the lessons of Phase I. Can you tell me, Mrs. Cox, if the Agency has a timeline for when it plans to rollout Phase II? At what level do you plan to involve the air traffic controller workforce?

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON
"ATC MODERNIZATION AND NEXTGEN:
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My fear is that the FAA is going to roll out Phase II of the redesign without first having learned the lessons of Phase I. Can you tell me, Mrs. Cox, if the Agency has a timeline for when it plans to rollout Phase II? At what level do you plan to involve the air traffic controller workforce?

The Air Traffic Organization's Office of Operations is responsible for the oversight of New York/New Jersey/Philadelphia Metropolitan Area Airspace Redesign. According to that office's information, NATCA leadership has publicly stated they were not involved in airspace development. Controllers were involved in all stages of development including the application of departure dispersal headings. Controllers did not participate in the noise mitigation phase of the project, which adjusted the designed headings to provide noise relief and they did not participate in the four-stage implementation plan development.

A determination was made at the initial implementation meeting that a formal published procedure prior to implementation was not necessary because an assignment of departure headings by Air Traffic Control personnel is a common and safe practice throughout the system. Furthermore, every tower in the Federal Aviation Administration has been authorized to use diverging headings on successive departures to establish initial separation and expedite the flow of traffic.

The dispersal headings at Newark were implemented on December 19, 2007, on a limited basis. To remove any potential concerns identified by Air Traffic Control personnel, on

February 27, 2008, we published a Notice to Airmen (NOTAM) that advised the pilot to expect "headings as assigned."

FAA provided adequate training to all air traffic controllers on the new headings and facility management met with the airport's major customers to brief on departure dispersal headings.

A normal procedure for an Air Traffic Controller is to clarify ATC clearances when questioned by a pilot.

FAA reviewed approximately 35 hours of local control voice recordings at Newark Tower and verified there was an occasional requirement to restate the assigned heading issued by Air Traffic Control. The review demonstrated no indication of flight crew confusion, just clarification of clearance. Since February 15, 2009, there have been no events of required clarification.

Dispersal headings were created to mitigate noise and because we remained well within the allotted Newark Airspace for runway 22 departures, testing was not required.

Adaptive management is being used to address concerns that were experienced in Stage 1 of our Project. As we develop the remaining stages of this project radar, controllers are participants in the Human-In-The-Loop (HITL) simulations that are being used to design sectors and reduce complexity.

Stage 2 of our Project commenced on April 1, 2008 with the planning and design phase. In accordance with the existing contract between the National Air Traffic Controllers Association (NATCA), AFL-CIO and the FAA, dated June 5, 2006, we will comply with Article 44, (Temporary Assignments Away from the Facility) and Article 48 (Technological / Procedural Changes) for the implementation of the different stages of this Project.

We will continue to explore effective ways to involve "front-line" personnel in all stages of implementation of this very important project.

U.S. House of Representatives
Committee on Transportation and Infrastructure

James L. Oberstar
Chairman

Washington, DC 20515

John L. Mica
Ranking Republican Member

David Heymsfeld, Chief of Staff
Ward W. McCarragher, Chief Counsel

March 24, 2009

James W. Coon II, Republican Chief of Staff

Ms. Victoria Cox
Senior Vice President for NextGen and Operations Planning Services
Air Traffic Organization
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Ms. Cox:

On March 18, 2009, you appeared as a witness before the Subcommittee on Aviation hearing on NextGen. I thank you for your participation and ask that you provide written responses to the Committee on the following questions-for-the-record:

- To incentivize equipage, the FAA has adopted a "best-equipped, best-served" priority policy. Some have raised concerns that this mixed environment of service priority could complicate an already complex national airspace system. How is the FAA addressing these concerns?

- What is the status of the efforts underway at the RTCA to develop a consensus blueprint for the mid-term NextGen Architecture?

- What is the level of coordination between the Senior Policy Committee Staff Director, the JPDO Director, and the Senior Vice President for NextGen? Is there an established meeting schedule to make sure all managing entities are all on the same page?

- Improvements to airport ground infrastructure and surface management must keep pace with airside capacity improvements to avoid bottlenecks. How is the FAA planning to address surface management issues at the nation's airports?

Ms. Victoria Cox
March 19, 2009
Page Two

- Equipage is an important component of NextGen. Right now the economic conditions and financial pressures on Canadian air carriers are similar to those on U.S. carriers. Yet, in Canada, carriers have said they would be responsible for equipage if NAV CANADA deployed the system. The financial pay back for those who do equip will be fuel and time savings due to more direct routing and optimum altitudes. Would this model work in the United States? If not, why not?

Thank you for your kind attention to this letter and please contact Holly Woodruff Lyons or Bailey Edwards at (202) 226-3220 if you have any questions.

Sincerely,

Thomas E. Petri
Ranking Republican Member
Subcommittee on Aviation

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON
"ATC MODERNIZATION AND NEXTGEN:
NEAR-TERM ACHIEVABLE GOALS"

RESPONSES TO
QUESTIONS FOR THE RECORD
FROM REP. PETRI TO:
MS. VICTORIA COX
NEXTGEN AND OPERATIONS PLANNING SERVICES
AIR TRAFFIC ORGANIZATION
FEDERAL AVIATION ADMINISTRATION

QUESTION: To incentivize equipage, the FAA has adopted a "best-equipped, best-served" priority policy. Some have raised concerns that this mixed environment of service priority could complicate an already complex national airspace system. How is the FAA addressing these concerns?

RESPONSE:

The FAA currently supports a mixed-equipage environment in today's National Airspace System. In the 2009 NextGen Implementation Plan, the FAA proposed moving to a "best equipped-best served" policy to accelerate NextGen benefits and avionics equipage rates. The specific details for implementing and operating under this principle are not yet defined. Safety remains the top concern of the FAA. FAA requires a rigorous safety assessment and approval process before any new systems or processes are implemented into the National Airspace System. As such, specific implementations of the "best-equipped – best served" will go through a careful and thorough review and the appropriate procedures and training will be developed and implemented to ensure continued safe operations of the NAS.

Because of the significance of "best-equipped – best served" to operators, the FAA believes that we must work closely with the aviation community to implement the principle in the most effective manner to address their wide-ranging needs. Therefore, the FAA has requested that the RTCA initiate a NextGen Implementation Task Force with the intent to establish a new level of engagement and collaboration between the FAA and the aviation community to resolve critical NextGen issues. The FAA has requested that the Task Force provide recommendations on:

- strategies and means to maximize NextGen benefits,
- strategies to encourage equipage, and
- policies and other means to implement the governing principles (including "best-equipped – best served") outlined in the NextGen Implementation Plan.

Interim results from the Task Force are on track to be presented by June 30, with the final recommendations delivered to the FAA by August 31.

<u>QUESTION:</u> What is the status of the efforts underway at the RTCA to develop a consensus blueprint for the mid-term NextGen Architecture?

<u>RESPONSE:</u>

The detailed technical work of the FAA's mid-term architecture is beyond the scope of the RTCA NextGen Implementation Task Force. The FAA has requested that the Task Force provide recommendations on:

- strategies and means to maximize NextGen benefits,
- strategies to encourage equipage, and
- policies and other means to implement the governing principles (including "best-equipped – best served") outlined in the NextGen Implementation Plan.

However, the FAA fully expects that if the task force is successful in providing consensus recommendations to the FAA by its August 2009 deadline, that we will make appropriate adjustments to our mid-term enterprise architecture for its January 2010 update.

The most recent annual update of the Enterprise Architecture (EA) Roadmaps was published in January 2009 on schedule. As part of this year's roadmap updates, several new initiatives were undertaken to enhance the usability and effectiveness of the roadmaps and to support the definition of the mid-term architecture. The current mid-term architecture provides a comprehensive view of the capabilities and functions, and the associated projects necessary to realize the NextGen benefits, including the critical capabilities to be realized in the mid-term. Furthermore the mid-term architecture integrates key supporting activities such as research and development, prototypes and demonstrations, international initiatives, and other activities into the EA roadmaps. This provides greater insight into schedule dependencies, policy issues, transition readiness criteria and associated risks, and identified any gaps between these supporting activities and agency projects and programs that need to be addressed to reduce implementation risk for NextGen. We also ensured that we fully captured all legacy systems in the EA so that we could properly identify convergence strategies as we migrate from the current portfolio of systems to NextGen.

Finally, the mid-term architecture provides new roadmaps that were developed to provide greater visibility into key areas of the NextGen mid-term architecture such as airspace design and procedures, service oriented architecture, network-centric capability and interoperability, as well as to identify impacts on personnel, and information security. These new architecture "views" were aligned with existing EA products to provide a more complete definition of the mid-term architecture. These initiatives taken together provide the basis for a complete definition of the mid-term architecture and enhanced insight into the evolution of NAS changes necessary to realize NextGen.

QUESTION: What is the level of coordination between the Senior Policy Committee Staff Director, the JPDO Director, and the Senior Vice President for NextGen? Is there an established meeting schedule to make sure all managing entities are all on the same page?

RESPONSE:

We agree that close communications are needed between the Senior Policy Committee Staff Director, the JPDO Director, and the Senior Vice President for NextGen as we collectively work to implement the new SPC support office within the Department of Transportation. Rather than a regularly scheduled meeting, however, we these individuals have been meeting on an issue-driven basis. As a result, the Staff Director, the JPDO Director and the Senior Vice President for NextGen have met together about every 2-3 weeks since the establishment of the Staff Director position at the Department of Transportation in January.

QUESTION: Improvements to airport ground infrastructure and surface management must keep pace with airside capacity improvements to avoid bottlenecks. How is the FAA planning to address surface management issues at the nation's airports?

RESPONSE:

FAA continues to build on its success in upgrading our nation's airport infrastructure. Significant capacity improvements have been made at 18 of the busiest airports in the last nine years including fifteen new runways, two end-around taxiways, one runway extension, and one airfield reconfiguration. Also, two of the three projects in Phase 1 of Chicago O'Hare's reconfiguration have been completed, with the third project scheduled to be completed in 2012. This required constant coordination and cooperation within FAA and with industry. We anticipate that coordination and cooperation will continue as we move forward with NextGen Implementation. For example, over the next three years we expect Chicago O'Hare to complete Phase 1 of their modernization plan, Boston Logan to open a new center taxiway, and Charlotte to open a new runway.

NextGen will provide a safer, more efficient operational environment on the airfield. Pilots, controllers, and ground support personnel will have greater situational awareness as a result of enhanced surface management that will be built upon the capabilities of new and evolving technologies, such as Airport Surface Detection Equipment, Model X (ASDE-X) and Automatic Dependent Surveillance-Broadcast (ADS-B). The new surface management technologies will help increase efficiency and reduce the likelihood of ground incidents or accidents. We are currently testing advanced surface flow management concepts at both JFK and Memphis With plans to expand our field trials to Orlando.

Increased flexibility in terminal design and access should increase efficiency and allow landside facilities to adequately keep pace with airside capacity improvements. While terminal design and access are primarily local planning issues/responsibilities, the FAA has sponsored a significant amount of research on design and access through the Airport Cooperative Research Program (ACRP). Guidance prepared as a result of this research provides up-to-date information and recommendations for airport operators, planners, and other stakeholders as airports prepare for NextGen. This will help airports reduce potential landside bottlenecks that could occur as improvements, such as new runways, are made to airside infrastructure. In addition, FAA continues to work with Airport Sponsors on their Airport Master Plan.

<u>QUESTION:</u> Equipage is an important component of NEXTGEN. Right now the economic conditions and financial pressures on Canadian air carriers are similar to those on U.S. carriers. Yet in Canada, carriers have said they would be responsible for equipage if NAV CANADA deployed the system. The financial pay back for those who do equip will be fuel and time savings due to more direct routing and optimum altitudes. Would this model work in the United States? If not, why not?

<u>RESPONSE:</u>

The FAA firmly believes that NextGen capabilities will provide significant benefits for operators. We also believe that achieving meaningful levels of aircraft avionics equipage is critical for NextGen success. However, investment in aircraft equipage is a business decision for each operator. The FAA has requested that the RTCA NextGen Implementation Task Force, which includes members from the commercial aviation industry, provide recommendations on strategies to encourage NextGen equipage as well as recommendations on how to best implement the governing principles for accelerating NextGen avionics equipage that FAA put forward in the January 2009 NextGen Implementation Plan. The Task Force will also look at strategies and means to maximize benefits, which the industry points to as the linchpin for successful development of strong business cases for equipage investment.

United States Government Accountability Office

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Testimony

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NEXT GENERATION AIR TRANSPORTATION SYSTEM

Status of Transformation and Issues Associated with Midterm Implementation of Capabilities

Statement of Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

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GAO-09-479T

March 18, 2009

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Highlights

Highlights of GAO-09-479T, a testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

NEXT GENERATION AIR TRANSPORTATION SYSTEM

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Why GAO Did This Study

To prepare for forecasted air traffic growth, the Federal Aviation Administration (FAA), including its Joint Planning and Development Office (JPDO) and Air Traffic Organization (ATO), is planning for and implementing the Next Generation Air Transportation System (NextGen) in partnership with other federal agencies and the aviation industry. NextGen will transform the current radar-based air traffic control system into a more automated, aircraft-centered, satellite-based system. GAO's previous work has identified issues related to the usefulness of NextGen planning documents, FAA's organizational structure to manage the transition to NextGen, and FAA's workforce to oversee and implement NextGen. Recently, the focus of NextGen planning and implementation has shifted to capabilities that can be achieved in the midterm, defined as 2012 through 2018.

GAO's testimony focuses on (1) JPDO's and ATO's progress in planning and implementing NextGen, (2) ongoing efforts to implement midterm capabilities to address capacity constraints and delays, (3) the potential impact on NextGen of organizational changes and human capital issues, and (4) research and development and facilities maintenance and reconfiguration challenges going forward. GAO's testimony updates prior GAO work with FAA data and interviews with agency and union officials and industry stakeholders, including airline, aircraft, and avionics manufacturer representatives.

To view the full product, click on GAO-09-479T
For more information, contact Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov

What GAO Found

JPDO and ATO have made progress in planning for and developing NextGen. JPDO has continued to update its basic planning documents, and in January 2009, ATO released the current version of its NextGen Implementation Plan, which focuses on the midterm implementation of capabilities. Recent versions of NextGen planning documents have partially addressed some of GAO's concerns about their usefulness, but industry stakeholders continue to express frustration that the documents lack any specific timelines or commitments. In addition to these planning efforts, FAA has continued to plan and conduct several demonstrations of some key NextGen technologies.

To help address current congestion and delays, industry stakeholders have frequently suggested that FAA focus on maximizing what can be done with existing, proven capabilities and existing infrastructure. Partly to help accelerate the implementation of capabilities in the midterm, FAA has created a NextGen Midterm Implementation Task Force, which is to report its recommendations to FAA in August 2009. The task force plans to identify and prioritize capabilities that can be implemented in the midterm and potentially be deployed regionally to address key bottlenecks. Essential to the mid- and long-term success of these efforts is persuading the airlines to make costly investments in NextGen equipment—a step they are reluctant to take without clearly demonstrated benefits. Incentives that could encourage such investments include operational preferences—such as preferred airspace, routings, or runway access—and equipment investment tax credits. FAA will also have to validate, certify, and issue rules for these capabilities.

Recent changes in the management structure for NextGen, though designed to address industry stakeholders' and others' concerns about fragmentation of authority and lack of accountability, have not fully addressed these issues and have raised further questions about parties' roles and responsibilities. Additionally, human capital issues remain to be resolved, including the degree to which key stakeholders, such as controllers and technicians, are involved in NextGen efforts and whether FAA is able to acquire the systems engineering, contract management, leadership, and other skills needed for NextGen. FAA plans to fill 378 NextGen positions in fiscal years 2009 and 2010.

Going forward, FAA faces challenges in addressing ongoing research needs, reconfiguring and maintaining existing facilities, and enhancing the physical capacity of airports. For NextGen, research on the environmental impact of aviation, human factors, and weather will be critical. Air traffic facilities will also have to be reconfigured to support NextGen, and existing facilities require maintenance to ensure safety and reliability. FAA is currently reviewing its facility needs. Finally, even with the efficiencies anticipated from implementing NextGen, FAA has determined that it will need additional airport and runway capacity. Efforts to develop new infrastructure will require significant advance planning and cost and safety analyses.

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to testify before you this morning on efforts to transform the nation's current air traffic control (ATC) system to the Next Generation Air Transportation System (NextGen). Currently, the U.S. air transportation system handles about 50,000 flights over a 24-hour period. By 2025, air traffic is projected to increase to about 80,000 flights every 24 hours. Today's U.S. air transportation system will not be able to meet these air traffic demands. In fact, as we all know, today's system is straining to meet current demands. For example, in 2008, almost one in four flights either arrived late or was canceled, and the average flight delay increased despite a 6 percent decline in the total number of operations. The transformation to NextGen, together with other ongoing ATC modernization efforts, promises to enhance the capacity and efficiency of our air transportation system while maintaining safety and minimizing the environmental impact of air transportation.

In Vision 100,[1] enacted in 2003, Congress directed the Secretary of Transportation to establish the Joint Planning and Development Office (JPDO) to plan and coordinate the transition to NextGen in collaboration with other federal agencies[2] and the aviation industry. NextGen will transform the current radar-based ATC system into a more automated, aircraft-centered, satellite-based system, and will shift the operating paradigm from air traffic control to air traffic management. NextGen encompasses five major transformational programs—Automatic Dependent Surveillance Broadcast (ADS-B), System-Wide Information Management (SWIM), NextGen Data Communications (DataComm), NextGen Network Enabled Weather (NNEW), and National Airspace Voice

[1]Vision 100—Century of Aviation Reauthorization Act (Pub. L. No. 108-176, 117 Stat. 2490 (2003).

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

Switch (NVS).[3] JPDO—located organizationally within the Federal Aviation Administration (FAA)—is responsible for NextGen planning and coordination. FAA's Air Traffic Organization (ATO), headed by its Chief Operating Officer (COO), is responsible for implementing the transition to NextGen. At the same time, FAA is planning and implementing other capabilities that have not been designated specifically as NextGen efforts but are also expected to enhance the capacity and efficiency of the air transportation system. FAA plans to implement these capabilities in the midterm, defined as 2012 through 2018, and eventually to integrate them with NextGen transformational programs.

My testimony this morning addresses (1) JPDO's and ATO's progress in planning and implementing NextGen, (2) ongoing efforts to implement midterm capabilities to address capacity constraints and delays and issues related to these efforts, (3) the potential impact of recent organizational changes and key human capital issues on ongoing efforts to plan and implement NextGen, and (4) research and development needs and facilities maintenance and reconfiguration challenges going forward. My statement is based on recent related GAO reports and testimonies, updated with more recent FAA data, and our discussions with selected senior FAA officials, officials of the National Air Traffic Controller Association (NATCA) and the Professional Aviation Safety Specialists (PASS) unions, and aviation industry stakeholders, including the Air Transport Association, which represents U.S. airlines, and aircraft and avionics industry representatives. This work was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the work to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence

[3] *ADS-B* is a satellite navigation system that is designed, along with other navigation technologies, to enable more precise control of aircraft during en route flight, approach, and descent. *SWIM* is an information management architecture for the national airspace system, acting as its "World Wide Web." SWIM will manage surveillance, weather, and flight data, as well as aeronautical and system status information, and will provide the information securely to users. *DataComm* provides a digital communications link for two-way exchanges between controllers and flight crews for air traffic control clearances, instructions, advisories, flight crew requests, and reports. *NNEW* will serve as the core of the NextGen weather support services and provide a common weather picture across the national airspace system. *NVS* will replace existing switches and provide the foundation for all air/ground and ground/ground voice communications in the future air traffic control environment.

obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

JPDO and ATO Have Issued Key NextGen Plans, and FAA Has Made Some Progress in Developing and Demonstrating NextGen Technologies

Since 2003, JPDO and ATO have made progress in planning for and implementing NextGen. In accordance with Vision 100, JPDO created a multi-agency research and development plan for the transition to NextGen. This plan consists of three basic documents—a Concept of Operations, an Enterprise Architecture, and an Integrated Work Plan.[4] Collectively, these three documents form a basis for interagency and industry planning and coordination. JPDO views these plans as iterative and intends to issue further versions as NextGen technologies are developed and implemented. As NextGen progressed from the planning to the implementation phase, ATO produced its NextGen Implementation Plan, which addresses the more detailed level of planning and activities necessary to achieve NextGen capabilities. According to ATO, it and JPDO have worked to align and ensure linkages between these planning documents. The current version of the NextGen Implementation Plan, released in January 2009, focuses on the midterm (2012 though 2018) implementation of NextGen capabilities.

In a previous testimony,[5] we raised some concerns about the usefulness of the NextGen planning documents, and we still have some concerns. For example, we reported that the planning documents lacked the type of specific information that industry stakeholders need for their own planning purposes, such as a catalog of critical needs, clearly defined and prioritized intermediate objectives, and a structured plan for achieving tangible results. Recent versions of NextGen planning documents have partially addressed some of these concerns, but industry stakeholders continue to express frustration that the planning documents lack any specific timelines or commitments. A senior FAA official has acknowledged that FAA will face ongoing challenges in attempting to

[4]The Concept of Operations describes how the NextGen system is envisioned to operate in 2025 and beyond and identifies key research and policy issues. The Enterprise Architecture is a technical description of the NextGen system, akin to blueprints for a building; it is meant to provide a common tool for planning and understanding the complex, interrelated systems that will make up NextGen. JPDO's Integrated Work Plan is akin to a project plan and is meant to describe the capabilities needed to transition to NextGen from the current system and provide the research, policy, regulation, and acquisition timelines necessary to achieve NextGen by 2025.

[5]GAO, *Next Generation Air Transportation System: Status of Key Issues Associated with the Transition to NextGen*, GAO-08-1154T (Washington, D.C. Sept. 11, 2008).

communicate effectively with industry and other stakeholders to ensure that they fully understand the content and objectives of the initiative and remain engaged and committed to its planning and implementation.

Beyond these planning efforts, FAA has continued to move forward in planning and conducting demonstrations of some key NextGen technologies. For example, a recently announced demonstration with US Airways and Aviation Communications and Surveillance Systems at the Philadelphia International Airport will test ADS-B technology that allows an aircraft with the necessary avionics to transmit its own position as well as to receive information from other similarly equipped aircraft. FAA is providing $6 million to purchase the necessary avionics equipment for the aircraft involved in the demonstration. FAA has also initiated projects to demonstrate the benefits of integrating NextGen capabilities. For example, in December 2008, FAA signed a memorandum of agreement with NetJets—an Ohio-based air service provider with a fleet of 600 aircraft. In this demonstration, FAA will test a number of NextGen technologies and procedures including ADS-B. The company will provide real-time data, allowing FAA to validate performance requirements. This demonstration will help FAA identify the costs and benefits associated with NextGen implementation.

Industry Stakeholders Seek More Rapid Midterm Implementation of Existing Capabilities, but Progress Depends Both on Airlines' Investments and on FAA's Validation, Certification, and Rulemaking

To help address current congestion and delays, many stakeholders have suggested that FAA focus on maximizing what can be done with existing, proven capabilities and existing infrastructure. For example, industry stakeholders highlighted "off-the-shelf" technologies, including Traffic Management Advisor (TMA), Traffic Flow Management (TFM), and User Request Evaluation Tool (URET), as well as performance-based navigation[6] and tailored arrival procedures. Such technologies and procedures are being implemented in airports now and, according to these stakeholders, could be implemented more widely and used more effectively to address capacity constraints. For example, TMA—a decision-support tool that helps controllers manage air traffic flows more efficiently—has been used at some airports to increase capacity. However, according to one stakeholder, some airports equipped with TMA are not using it to its fullest extent to increase capacity. Industry stakeholders also maintain that using existing performance-based navigation procedures during low-visibility conditions—when the required distances separating aircraft are normally increased for safety reasons—would enable greater use of closely spaced parallel runways, thereby increasing capacity.

In part to help accelerate the implementation of existing capabilities in the midterm—including technologies that are part of NextGen's five transformational programs such as ADS-B—FAA has created a NextGen Midterm Implementation Task Force through RTCA.[7] According to the NextGen Implementation Plan, the task force will focus on maximizing the benefits of midterm NextGen operational capabilities and addressing business and investment-related issues associated with implementing these capabilities. A member of the task force indicated that it will be identifying a handful of capabilities that can be implemented in the midterm and prioritizing them according to their relative net benefits. Furthermore, the task force will be examining the potential for deploying capabilities regionally to address key bottlenecks in the national air transportation system before deploying them nationally. Current plans call

[6]Performance-based navigation, which includes Area Navigation (RNAV) and Required Navigation Performance (RNP), is a framework for defining navigation performance requirements ("navigation specifications") that can be applied to an air traffic route, an instrument procedure, or a defined airspace. Performance-based navigation provides a basis for the design and implementation of automated flight paths.

[7]RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations on communications, navigation, surveillance, and air traffic management (CNS/ATM) system issues. RTCA functions as a Federal Advisory Committee. FAA uses its recommendations as a basis for policy, program, and regulatory decisions.

for the task force to provide final conclusions and recommendations to FAA in August 2009.

Midterm Implementation Depends on Airlines' Acquisition of Existing Capabilities

Implementing these capabilities in the midterm, as well as over the long term, depends not only on FAA, but also on aircraft operators, who must acquire the necessary equipment. For example, aircraft must be equipped with appropriate technology to use ADS-B. Some airlines have purchased some of the necessary technology, but over all, airlines are waiting for FAA to specify requirements and address funding concerns. In addition, industry stakeholders have expressed concerns about the progress made by FAA in adequately explaining and demonstrating the benefits of equipping aircraft with advanced avionics equipment, which comes at a significant cost to the aviation industry. For example, one industry stakeholder told us that, without an explicit FAA commitment to reduce separation standards—a key benefit of deploying aircraft with ADS-B equipment—the industry has little incentive to voluntarily purchase the equipment. One objective of the new NextGen Midterm Implementation Task Force is to help operators identify the benefits of acquiring NextGen-compatible equipment sooner rather than later.

A range of potential requirements and incentives could encourage aircraft operators to purchase equipment. These could include mandated deadlines or operational preferences—such as preferred airspace, routings, or runway access. Industry stakeholders have expressed concerns that the array of operational benefits available to early equippers has yet to be identified and defined, and have also questioned the extent to which such preferences would result in tangible benefits. Another proposed option would combine mandated deadlines and operational preferences with equipment investment tax credits that would financially support equipment implementation for a limited initial set of aircraft operators. The credits would provide a competitive advantage for early equippers. Airlines that continue to delay equipage will become more and more disadvantaged, thus providing an incentive for these airlines to equip.

Midterm Implementation Also Depends on FAA's Validation, Certification, and Rulemaking Efforts

Before midterm NextGen implementation can occur, FAA must validate and certify[8] technologies and issue rules for the use of procedures. FAA has made some progress in this area, including developing specifications for performance-based navigation procedures at selected airports, but much remains to be done. We and others have previously expressed concerns about the time and human resources required for these efforts and have identified them as a significant risk to the timely and cost-effective implementation of NextGen.[9] In recent interviews, stakeholders have expressed similar concerns about the midterm implementation of existing or off-the-shelf technologies and capabilities. For example, an avionics manufacturer, an aircraft manufacturer, and an airline association we interviewed all cited the time it takes to develop rules for new procedures and the problems that result from deploying equipment before rules are finalized. Any activities needed to implement new policies and procedures, such as the expanded use of performance-based navigation procedures; to demonstrate new capabilities, such as the use of closely spaced parallel runways; to set parameters for the certification of new systems, such as ADS-B; and to develop new technologies will take time and be a priority in the mid- and long-term planning for NextGen. Just as important, the time required to complete such activities will have to be balanced against the need to ensure the reliability and safety of procedures and systems before they are used in the national airspace system.

[8]Validation is the process through which a technology is shown to operate in a real-life environment with a desired level of confidence. Certification is a form of FAA approval for the use of a technology, such as aircraft equipment, in the national airspace system.

[9]After studying the lead time required to prototype, validate, and certify new technologies, we concluded that neither JPDO nor FAA had sufficient resources to complete these types of tasks, and could not develop them internally without causing significant delays to NextGen-related capabilities. See GAO, *Response to Questions for the Record; Hearing on the Future of Air Traffic Control Modernization*, GAO-07-928R (Washington, D.C.: May 30, 2007). We discuss the human capital element of this challenge in greater detail later in this testimony.

Resolving NextGen Management Issues, Involving Stakeholders, and Acquiring Expertise Will Be Critical to NextGen's Success

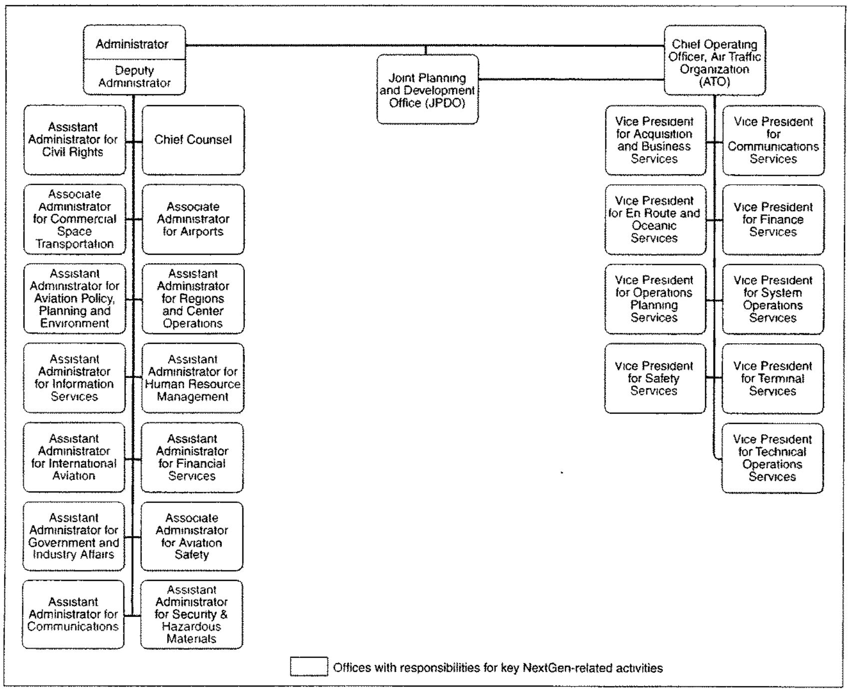
We have previously reported on stakeholders' concerns about the fragmented management structure for NextGen and resulting lack of clear accountability for NextGen's implementation, as well as concerns about JPDO's and FAA's efforts to fully involve stakeholders and acquire needed expertise.[10] Resolving these issues will be critical to advancing both the implementation of capabilities in the midterm and the full transformation to NextGen in the long term.

NextGen Organizational Structure Has Undergone Changes, but Roles and Responsibilities Continue to Be Unclear

Initially, JPDO was established as a separate and independent office within FAA, reporting directly to both the COO of ATO and the FAA Administrator (see fig. 1).

[10]See GAO, *Next Generation Air Transportation System: Status of Systems Acquisition and the Transition to the Next Generation Air Transportation System*, GAO-08-1078 (Washington, D.C.: Sept. 11, 2008) and GAO-08-1154T.

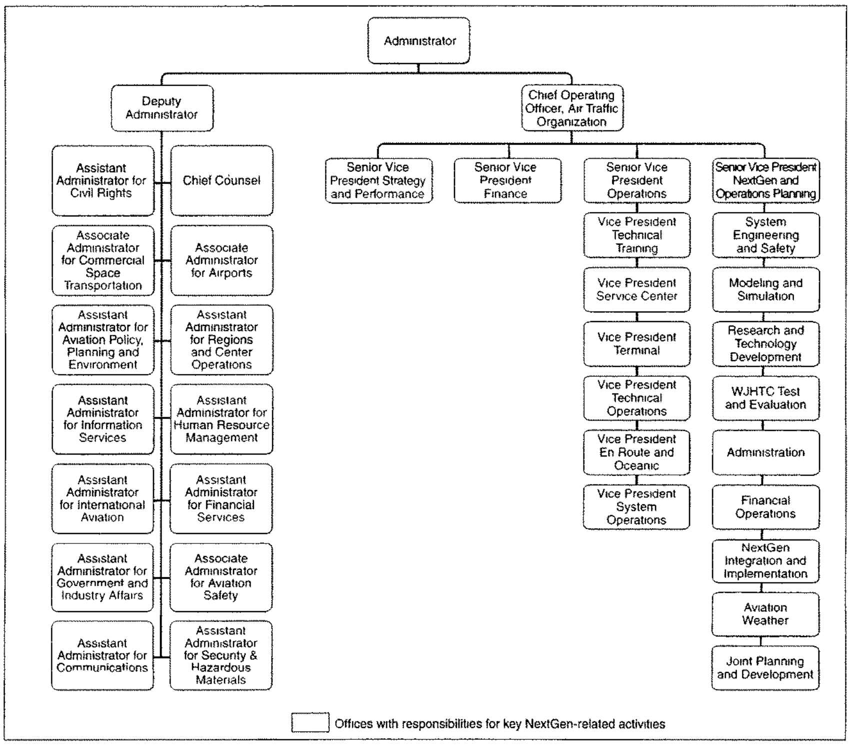
Figure 1: FAA Organization, November 2007



Source FAA

In May 2008, FAA announced a reorganization of its NextGen management structure and named a Senior Vice President for NextGen and Operations Planning who reports to ATO's COO (see fig. 2.). The reorganization eliminated JPDO's dual reporting status, and the JPDO Director now reports directly to the newly created Senior Vice President for NextGen and Operations Planning. The reorganization also led to JPDO's placement lower in FAA's organizational structure—it is now a fourth-level organization.

Figure 2: Current ATO Organization



Source FAA

According to ATO's COO, a purpose of the reorganization was to respond to industry stakeholders' concerns about the fragmentation of authority and lack of accountability for NextGen, which might delay its implementation. In particular, stakeholders have expressed frustration that a program as large and important as NextGen does not follow the industry practice of having one person with the authority to make key decisions. In the COO's view, the reorganization creates one "team" with one person in charge to plan, implement, and oversee NextGen. According to FAA, the Senior Vice President for NextGen and Operations Planning is responsible for integrating and implementing all elements of NextGen.

In November 2008, the President issued Executive Order 13479,[11] which took the positive step of treating NextGen as an important national initiative, but potentially added another level of complexity and uncertainty to the management structure for NextGen. The order directed the Secretary to create a staff to support the Senior Policy Committee, an advisory body chaired by the Secretary of Transportation whose members are the heads of the federal partner agencies and whose purpose is to provide policy guidance for NextGen planning. Previously, JPDO coordinated the agenda of the Senior Policy Committee, but now, according to FAA, the new support staff will coordinate the committee's agenda, although JPDO will continue to be involved in the development of issues and topics for the committee. Furthermore, notwithstanding JPDO's statutory responsibility for coordinating with the federal partner agencies, the director of the support staff will serve as the senior DOT liaison between the Secretary and the federal partner agencies. It remains unclear how these changes will affect JPDO's role relative to the Senior Policy Committee or to other federal partner agencies. The executive order also directed the Secretary to establish a committee to advise the Secretary on the implementation of NextGen. According to FAA's interpretation of the executive order, the new advisory committee will be an external (nongovernmental) committee whose role will be to provide an external stakeholder perspective. The role of this committee could potentially duplicate the roles of other advisory bodies associated with the NextGen initiative. FAA has said that it and JPDO are working with the Department to clarify roles and responsibilities in executing the executive order.

It is difficult to tell how well the reorganization and the implementation of the executive order will address stakeholders' concerns about the

[11]Transformation of the National Air Transportation System, Exec. Order No. 13479 (2008).

fragmentation of authority for NextGen. For example, although the reorganization places JPDO and the office responsible for NextGen integration and implementation under the leadership of the same Senior Vice President, other activities critical to NextGen's implementation lie outside this official's jurisdiction. Several types of aviation operations are under the leadership of the Senior Vice President for Operations, and responsibilities for airport and aviation safety activities fall outside ATO altogether and are headed by FAA Associate Administrators. According to FAA, the NextGen Management Board, which is composed of Associate Administrators, the COO, Senior Vice Presidents, and the Director of the JPDO, ensures agencywide support for NextGen. However with no direct line of authority between the Senior Vice President for NextGen and Operations Planning and these other operations and activities, accountability for NextGen outcomes is unclear, creating the potential for delays in implementation. It is also unclear how the reorganization and the implementation of the executive order will affect the overall role created for JPDO by Vision 100. For example, according to one industry stakeholder, its ability to understand and be involved in the NextGen-related efforts of federal partner agencies has been hampered by JPDO's placement under ATO's management.

Several stakeholders have suggested that an office above the Senior Vice President for NextGen and Operations Planning and these other units—an office that would report directly to the FAA Administrator or the Secretary of Transportation—is needed to ensure accountability for NextGen results. In contrast, another stakeholder suggested that further reorganization may not be needed, but FAA's existing leadership could play a greater role in clarifying the responsibilities of the various offices involved in planning and implementing NextGen and in clearly assigning accountability for NextGen outcomes. In September 2008, the National Academy of Public Administration (NAPA) released a workforce study contracted by FAA that identified leadership as the single most important element of success for large-scale systems integration efforts like NextGen and highlighted leadership as a NextGen implementation challenge. The study, therefore, recommended that FAA tailor its leadership development program to focus on the specific leadership skills needed for managing this large, complex, evolving program, to include communication, collaboration, change management, and accountability and measurement.

Involving Stakeholders and Acquiring Expertise Will Be Critical to NextGen's Success

Some stakeholders, such as current air traffic controllers and technicians, will play critical roles in NextGen, and their involvement in planning for and deploying the new technologies will be important to its success. We have previously reported that active air traffic controllers were not involved in the NextGen planning effort.[12] In following up on this issue, we found that some progress has been made. According to FAA, it has used active controllers as subject matter experts in NextGen development; representatives of both the controllers' and the technicians' unions have seats on the NextGen Management Board; and the controllers' union is participating in the NextGen Midterm Implementation Task Force. Controller union officials have likewise reported participating in several NextGen planning and decision-making groups, including the Institute Management Council,[13] and acknowledge that active controllers serve as subject matter experts for NextGen working groups. However, these union officials have expressed concern that the union is not involved in selecting the subject matter experts. According to the technicians' union, it does not generally participate in NextGen efforts, although it has a liaison working on ADS-B and is seeking to participate in the NextGen Midterm Implementation Task Force. We maintain that input from current air traffic controllers with recent experience controlling aircraft, who will be responsible for managing traffic in the NextGen environment, and from current technicians, who will maintain NextGen equipment, is important when considering human factors and safety issues. Our work on past air traffic control modernization projects has shown that a lack of stakeholder or expert involvement early and throughout a project can lead to cost increases and delays.[14]

FAA will also need technical skills, such as systems engineering and contract management expertise, to implement NextGen. Because of the scope and complexity of the NextGen effort, the agency may not currently have the in-house expertise to manage the transition to NextGen without assistance. In November 2006, we recommended that FAA examine the

[12]See GAO-08-1154T.

[13]The Institute Management Council, consisting of 16 senior leaders from the aviation community, oversees the policy, recommendations, and products of the NextGen Institute—which was established by FAA and the National Center for Advanced Technologies to provide JPDO with access to private-sector expertise, tools, and facilities for application to NextGen activities and tasks.

[14]See GAO, *Air Traffic Control: FAA Needs to Ensure Better Coordination When Approving Air Traffic Control Systems*, GAO-05-11 (Washington, D.C.: Nov. 17, 2004) and GAO-08-1154T.

strengths and weaknesses of its technical expertise and contract management expertise in light of the skills required to define, implement, and integrate the numerous complex programs inherent in the transition to NextGen.[15] In response to our prior recommendation and as noted earlier in this statement, ATO contracted with NAPA to (1) determine the mix of skills needed by the nonoperational (acquisition) workforce to implement NextGen and (2) identify the strategies for acquiring the necessary workforce competencies. The study found that ATO will need to develop or strengthen skills in the areas of software development, systems engineering, research and development, strategic planning, financial budget analysis, and contract administration, among others. Strategies presented to ATO for consideration in acquiring the skills needed for the NextGen transition include aggressively marketing the NextGen vision, enhancing internal research and development skills, and working collaboratively with the agency's human capital office to develop a more integrated approach to NextGen workforce planning.

According to an FAA official, FAA plans to fill a total of 378 NextGen positions in fiscal years 2009 and 2010. NextGen staffing needs can be difficult to address, a senior FAA official said, because historically NextGen skills have been in short supply and competitively priced in the marketplace. However, the current economic conditions could make hiring for these positions less difficult than it otherwise might be. If not adequately addressed, this situation could contribute to delays in integrating new technologies and transforming the national airspace system.

[15]See GAO, *Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System*, GAO-07-25 (Washington, D.C.: Nov. 13, 2006).

Addressing Ongoing Research and Development, Facility, and Infrastructure Challenges Will Be Critical for NextGen's Implementation Going Forward

A number of other challenges affect FAA's ability to move forward with NextGen's implementation, such as addressing ongoing research and development needs, reconfiguring and maintaining existing facilities, and enhancing the physical capacity of airports.

Address Ongoing Research and Development Needs

As NextGen moves forward, applied research will be needed to integrate its five transformational technologies, as well as the legacy facilities and systems that will also be part of NextGen, to ensure that all the components work safely and reliably together. According to FAA, the funding requested in its Capital Improvement Program for 2009 through 2013 reflects the research and development and capital investments deemed necessary to deliver NextGen capabilities in the midterm. The funding requested for FAA NextGen research and development has significantly increased, from a total of $83 million in fiscal year 2009 to about twice that amount in each of the next 4 fiscal years.[16] FAA believes that this level of FAA funding for NextGen research and development will complement investments made by federal partner agencies—particularly the National Aeronautics and Space Administration (NASA)—and will adequately support NextGen's implementation. In addition, the American Recovery and Reinvestment Act has increased NASA's budget for aeronautics research by $150 million, although it does not indicate whether this additional funding will be focused on NextGen-specific research.[17]

NASA's aeronautics research has long supported FAA's air traffic modernization efforts. To help ensure that NASA's aeronautics research is effectively transferred to FAA, the two agencies have developed a strategy

[16]FAA has requested $161 million in fiscal year 2010, $164 million in fiscal year 2011, $165 million in fiscal year 2012, and $167 million in fiscal year 2013 for NextGen research. FAA has also requested additional funding for other research

[17]Pub. L. No. 111-5, title II, 123 Stat. 115 (2009).

that initially establishes four research transition teams, which are aligned with JPDO's planning framework. This strategy also outlines the two agencies' responsibilities for the research—FAA will develop user requirements, and NASA will conduct the fundamental research in each of the four areas and then transfer projects back to FAA for further development. According to FAA, its collaboration with NASA on the research transition teams has better focused NASA's investments on FAA's requirements. Research transition teams have not, however, been established between FAA and the other partner agencies.

Prioritizing the research and development needed for NextGen is also important to avoid gaps and delays. The most recent version of JPDO's Integrated Work Plan identifies the sequence of research that must be completed before specific NextGen capabilities can completed. This research, however, cannot be fully prioritized without identifying the benefits that can be expected from the different capabilities and technologies. According to JPDO officials, they are developing a matrix that will identify benefits and costs and build a business case for all the components of NextGen over the next year that will help in prioritizing research and development.

Going forward, further research and development is needed in a number of areas to implement NextGen, according to FAA, stakeholders, and our analysis. For example:

- *Environmental Impact Research*: According to a JPDO analysis, the environmental impact of aviation will be the primary constraint on the capacity and flexibility of the national airspace system unless this impact is managed and mitigated. In proposed legislation reauthorizing FAA, $111 million for fiscal years 2009 through 2011 may be used for a new FAA research and development program to help reduce aviation noise and emissions. This program—the Continuous Lower Energy, Emissions, and Noise (CLEEN) initiative—would facilitate over the next 10 years the development, maturation, and certification of improved airframe technologies. Aeronautics industry representatives and experts we consulted said that the program's funding levels may not be sufficient to attain the goals specified in the proposal. According to these experts, the proposed funding levels would allow for the further development of one or possibly two projects. FAA recognizes the implications of the proposed funding structure for CLEEN and characterizes the program as a "pilot."
- *Human Factors Research*: Human factors research explores what is known about people and their abilities, characteristics, and limitations in

the design of the equipment they use, the environments in which they function, and the jobs they perform. Compared with the current ATC system, NextGen will rely to a greater extent on automation, and the roles and responsibilities of pilots and air traffic controllers will change. For example, both pilots and controllers will depend more on automated communications and less on voice communications. Such changes in roles and responsibilities raise significant human factors issues for the safety and efficiency of the national airspace system. Until fiscal year 2005, NASA was a primary source of federal aviation-related human factors research, but NASA then began reducing its human factors research staff, reassigning some staff to other programs and reducing the contractor and academic technical support for human factors research. According to NASA, human factors research continues to be a critical component of its aeronautics research program, although its work is now focused at the foundational (earlier-stage) level. FAA plans to invest $180.4 million in human factors research from fiscal year 2009 through fiscal year 2013. It remains to be seen whether or to what extent FAA's research and development, which is typically more applied than NASA's, will offset NASA's reductions in human factors research.

- *Weather Related Research*: Improved weather information is essential to realize key NextGen capabilities that depend on accurate weather information for decision-making. According to FAA, 70 percent of delays are attributable to weather every year. NextGen Network Enabled Weather (NNEW) is one of the five NextGen transformational programs for which current reseach and development is needed, even though their full benefits may not be realized until after the midterm. NNEW is intended to provide weather support services for decision-making in the NextGen environment. More specifically, NNEW is FAA's contribution to the 4-dimensional weather cube[18]—a technology that will provide weather observations and analyses, including forecasts of expected weather conditions, for all users of the national airspace system. FAA is developing the requirements for this program, and the Department of Commerce, through its National Oceanic and Atmospheric Administration, will lead the development of the 4-dimensional weather cube, using the Department's resources and those of the partner agencies. FAA expects to finish defining the requirements for NNEW in March 2009. After validating the requirements, FAA will solicit reviews from the relevant stakeholders on the extent to which their requirements are aligned with those of the other agencies. This is a collaborative effort whose success will depend on

[18]The 4-dimensional weather cube describes the atmosphere in three dimensions (latitude, longitude, and altitude) and adds the dimension of time.

contributions from all parties. Delays in aligning agency requirements, as well as the lack of meteorological knowledge, could lead to delays in implementing NextGen systems.

Reconfigure and Maintain the Existing ATC System and Increase Physical Capacity

To fully realize NextGen's capabilities, a new configuration of ATC facilities will be required. FAA has not developed a comprehensive reconfiguration plan, but says that preliminary efforts are underway to plan concepts for future FAA facilities. Going forward, it will also be critical for FAA to ensure the safety and efficiency of its existing ATC system, since it will be the core of the national airspace system for a number of years and some of its components will become part of NextGen. FAA faces an immediate task to maintain and repair existing facilities so that the current ATC system continues to operate safely and reliably. FAA has estimated a one-time cost of approximately $268 million to repair over 400 existing terminal and en route facilities. Once FAA develops and implements a facility reconfiguration plan, the costs of facility repairs and maintenance may be reduced. The American Recovery and Reinvestment Act provides $200 million to be made available within the next 2 years for improvements in power systems, air route traffic control centers, air traffic control towers, terminal radar approach control facilities, and navigation and landing equipment and indicates that projects that can be completed in 2 years should be given priority.[19] The availability of these funds increases the importance of FAA's developing facility consolidation and reconfiguration plans to ensure that the funds are spent efficiently and effectively. FAA has 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.

Finally, FAA has determined that, even after planned improvements have been completed at 35 of the busiest airports, 14 airports—including some of the 35 busiest—will still need enhanced physical capacity by 2025. 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. Furthermore, without substantial reductions in emissions and noise around the nation's airports and continuing efforts at all levels of government, including increased research and development activities, achieving the goal of safely expanding the capacity and efficiency of the national airspace system to meet 21st century needs may not be attainable.

[19]Pub. L. No. 111-5, title XII (2009).

Thank you Mr. Chairman. I would be pleased to answer any questions that you or Members of the Subcommittee may have at this time.

GAO Contact and Staff Acknowledgments

For further information on this testimony, please contact Dr. Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov. Individuals making key contributions to this testimony include Andrew Von Ah (Assistant Director), Bess Eisenstadt, Bert Japikse, Kieran McCarthy, and Richard Scott.

Related GAO Products

Next Generation Air Transportation System: Status of Systems Acquisition and the Transition to the Next Generation Air Transportation System. GAO-08-1078. Washington, D.C.: September 11, 2008.

Responses to Questions for the Record; Hearing on the Future of Air Traffic Control Modernization. GAO-07-928R. Washington, D.C.: May 30, 2007.

Next Generation Air Transportation System: Status of the Transition to the Future Air Traffic Control System. GAO-07-784T. Washington, D.C.: May 9, 2007.

Joint Planning and Development Office: Progress and Key Issues in Planning the Transition to the Next Generation Air Transportation System. GAO-07-693T. Washington, D.C.: March 29, 2007.

Federal Aviation Administration: Key Issues in Ensuring the Efficient Development and Safe Operation of the Next Generation Air Transportation System. GAO-07-636T. Washington, D.C.: March 22, 2007.

Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System. GAO-07-25. Washington, D.C.: November 13, 2006.

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April 6, 2009

Dr. Gerald Dillingham
Director, Physical Infrastructure Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Dr. Dillingham:

On March 18, 2009, the Subcommittee on Aviation held a hearing on **"ATC Modernization and NextGen: Near-Term Achievable Goals."**

Attached are questions to answer for the record. I would appreciate receiving your written response to these questions by May 15, 2009 so that they may be made a part of the hearing record.

Sincerely,

Jerry F. Costello
Chairman
Subcommittee on Aviation

JFC:pk
Attachment

March 18, 2009
Subcommittee on Aviation
Hearing on

ATC Modernization and NextGen: Near-Term Achievable Goals
Questions for the Record
To:

Dr. Gerald Dillingham,
Director, Physical Infrastructure Issues
U.S. Government Accountability Office

Dr. Dillingham, in your written testimony you state that before midterm NextGen implementation can occur, the FAA must validate and certify technologies and issue rules for new procedures. Please detail the specific steps that must be taken for new avionics to be used aboard aircraft operating in the National Airspace System?

Dr. Dillingham, the "NextGen Implementation Plan for 2009" lists avionics equipage items that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, and the most ready for immediate deployment and why? Please address each technology listed and provide an estimated cost.

Dr. Dillingham, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage, which technologies hold the most immediate potential for accelerating NextGen benefits?

Dr. Dillingham, some have suggested that if the Government were to subsidize aircraft equipage it might share costs with airspace operators to distribute risk between the Government and users. What are GAO's thoughts on this suggestion, and what would be the best way to structure such a cost sharing arrangement?

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United States Government Accountability Office
Washington, DC 20548

May 20, 2009

The Honorable Jerry Costello
Chairman
The Honorable Thomas E. Petri
Ranking Member
Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

Subject: *Responses to Questions for the Record: March 18, 2009, Hearing on ATC Modernization: Near-Term Achievable Goals*

This letter responds to your request that we address questions submitted for the record related to the March 18, 2009, hearing entitled *ATC Modernization: Near-Term Achievable Goals*. Our attached responses to these questions are based on a review of literature on avionics and equipage incentives, interviews with Federal Aviation Administration officials, interviews with stakeholders and developers of avionics with knowledge of the maturity and costs of avionics equipment, and our knowledge of the areas addressed by the questions.

We conducted this work from April 2009 to May 2009 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We are sending copies of this letter to the Acting Administrator, Federal Aviation Administration. The report will also be available on GAO's Web site at www.gao.gov.

If you have any questions or would like to discuss the responses, please contact me at (202) 512-2834 or dillinghamg@gao.gov.

Gerald L. Dillingham

Gerald L. Dillingham, Ph.D.
Director
Physical Infrastructure Issues

Enclosure

Enclosure

March 18, 2009
Subcommittee on Aviation
Hearing on
ATC Modernization and NextGen: Near-Term Achievable Goals
Questions for the Record
To:
Dr. Gerald L. Dillingham
Director, Physical Infrastructure Issues
U.S. Government Accountability Office

Questions for the Record Submitted by Chairman Costello

1. **Dr. Dillingham, in your written testimony you state that before midterm NextGen implementation can occur, the Federal Aviation Administration (FAA) must validate and certify technologies and issue rules for new procedures. Please detail the specific steps that must be taken for new avionics to be used aboard aircraft operating in the National Airspace System (NAS)?**

RESPONSE: In order for new avionics to be used aboard aircraft operating in the national airspace system (NAS), steps must be taken in three broad areas when the new equipment, such as Automatic Dependent Surveillance - Broadcast (ADS-B), is part of an air traffic control system that has both airborne and ground components:

(1) Certification of airborne equipment.
(2) Ground system approval (that is linked to the airborne equipment).
(3) Procedure development.

Certification of Airborne Equipment

Before airborne equipment can be used in the NAS, several steps must be completed to certify its use including the following:

(1) Establish requirements for the airborne equipment and for its validation.[1]
(2) Certify or approve the airborne equipment's design, production and installation.
(3) Certify the use of it (by pilots and controllers). This step is called "operational approval."

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[1] Validation is the process through which a technology is shown to operate in a real-life environment with a desired level of confidence.

Enclosure

Establishing requirements and standards, which RTCA[2] most often does, typically takes 1 to 5 years, because government, industry, and international stakeholders need to reach consensus and air traffic control systems are increasingly complex. RTCA is currently developing an updated equipment standard for ADS-B Out,[3] the next step in ADS-B's deployment, and expects to complete this phase by December 2009. The requirements and standards typically form the basis for a Technical Standard Order (TSO),[4] which FAA uses to grant design and production approval. TSOs make installation approval, which is the next step in the certification process and is needed before the equipment is placed in service, simpler and less costly.[5] Design and production approval are the responsibility of FAA's Aircraft Certification Service. Installation approval is granted by the Aircraft Certification and Flight Standards Services. Lastly, FAA's Flight Standards Service is responsible for giving operational approval, which requires that an applicant, such as an airline, demonstrate, among other things, that its pilots are trained to use the equipment and that its maintenance personnel are trained to maintain it.

To meet the demands of NextGen, the entire process from the initial request (in most cases to RTCA) to set up a committee and produce a consensus standard, through the issuance of a TSO or aircraft certification and through operational approvals must be streamlined. RTCA is working on streamlining the production of the standards documents. The FAA must do the same for the process of developing and issuing the related TSO or aircraft certification and finally operational approval.

Ground System Approval

The ground system that is linked to the airborne equipment must also be approved before the airborne equipment can be used in the NAS. This approval focuses on safety and is done in accordance with FAA contract documents and policies and procedures that are part of the agency's acquisition management system. FAA's Air Traffic Organization has the primary responsibility for the approval of ground systems. Before a ground system can be used in the NAS, several steps must be completed, including the following:

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[2] Organized in 1935 and once called the Radio Technical Commission for Aeronautics, RTCA is today known just by its acronym. RTCA is a private, not-for-profit corporation that develops consensus-based performance standards for air traffic control systems. RTCA's recommendations are the basis for a number of FAA's policy, program, and regulatory decisions.

[3] ADS-B has two components. ADS-B Out continuously transmits an aircraft's position, altitude, and direction to controllers on the ground and to other aircraft. ADS-B In enables another aircraft to receive the transmitted data, giving pilots with ADS-B In a complete picture of their aircraft in relation to other ADS-B equipped traffic. FAA is deploying the nationwide ground infrastructure needed to receive ADS-B information and integrate it with controller displays. FAA expects this ground network to be fully deployed in 2013. FAA is proposing a rule that mandates ADS-B out equipage by 2020. Some stakeholders believe that this mandate is too far out and that incentives should be provided to encourage aircraft operators to equip sooner.

[4] A TSO is a minimum performance standard for specified materials, parts, and appliances for use on civil aircraft.

[5] To receive installation approval, the applicant submits a certification plan and test plan to one of FAA's aircraft certification offices for review and approval. In addition, the applicant conducts ground and flight tests under FAA's supervision to ensure that the new equipment operates properly upon installation.

(1) Establish requirements for the ground system.
(2) Design and develop the system.
(3) Test and evaluate the system.
(4) Train personnel to operate and maintain the system.
(5) Ensure that the ground system works as intended when installed (commissioning).

FAA develops, owns, and operates most ground systems that provide air traffic services and air navigation services. However, FAA has contracted with a private firm to deploy the ground infrastructure needed nationwide to receive ADS-B Out information. FAA expects the ADS-B ground system to be tested in 2010 and the ground network to be fully deployed in 2013.

Procedure Development

Even after the airborne equipment has been certified and the ground system approved, the capabilities of some airborne equipment cannot be fully used until more procedures are developed. Procedure design criteria are developed by the Flight Standards Service; the procedures themselves are developed by FAA's Aviation System Standards within the Air Traffic Organization. For example, these procedures include Area Navigation (RNAV)/Required Navigation Performance (RNP) procedures for arrivals and departures, RNAV procedures for routes, and RNP procedures for approaches, all of which rely on Global Positioning System (GPS) navigation as opposed to traditional ground navigation aids. Since 2004 FAA has published more than 260 RNAV procedures, more than 135 RNAV routes, and 135 RNP approaches, but much remains to be done. FAA estimates that the following numbers of procedures remain to be developed:

Table 1: FAA's Estimate of the Procedures Needed in the NAS for Performance–based Navigation

Procedure type	Development targets
RNAV/RNP procedures (arrivals and departures)	2,000-4,000
RNAV/RNP routes	800-1,200
RNP approaches	1,000-2,000

Source: FAA.

FAA believes that it can annually develop about 50 RNAV/RNP procedures, 50 RNAV routes, and 50 RNP approaches. We and others have previously expressed concerns about the time and human resources required to develop procedures and have identified them as a significant risk to the timely and cost-effective implementation of NextGen. It is important to note that outside of FAA, numerous companies with expertise and experience to develop procedures exist and are doing this work for air navigation service providers around the world. In addition, some stakeholders have noted that procedure development needs to move beyond basic overlays of existing routes to incorporate more optimal flight paths, improved airport arrivals and departures in mountainous areas, and improved and efficient traffic flows. Furthermore, FAA must develop new standards for reduced separation between aircraft that take advantage of the latest technologies like ADS-B in order for NextGen to fully deliver on its promise of increased capacity and efficiency.

With multiple FAA offices responsible for each of the steps within the three broad areas described above, including the Aircraft Certification Service, Flight Standards Service, and Air Traffic Organization, coordination and integration is vital since delays in avionics certification, ground system approval, procedure development, or separation standard reduction, for example, could each prevent or delay full realization of NextGen benefits.

2. Dr. Dillingham, the "NextGen Implementation Plan for 2009" lists avionics equipage items that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, and the most ready for immediate deployment and why? Please address each technology listed and provide an estimated cost.

RESPONSE: The aircraft capabilities listed in FAA's 2009 NextGen Implementation Plan that are most mature and ready for immediate deployment are those associated with performance-based navigation and approach capabilities, while most surveillance and information display capabilities and data communications capabilities listed in the plan are a little further behind. The costs of equipping planes with these capabilities are difficult to estimate precisely because the needs of each aircraft type will differ depending on the equipment that it already has and some of the needed equipment has yet to come to the market. Where estimates are available, we provide ranges of potential costs provided by stakeholders. It is important to note that procedure development (including procedures for the use of closely spaced parallel runways), timely certification, airspace redesign, standards for reduced separation between aircraft, FAA automation, and pilot and controller training are necessary precursors to producing the benefits that could be provided by equipping aircraft with the latest technologies. In addition, construction of new airport infrastructure and timely deployment of technology and procedures to manage ground operations safely and efficiently will be important to take full advantage of an equipped aircraft fleet.

Performance-Based Navigation and Approach Capabilities

Of the avionics capabilities listed in the NextGen Implementation Plan, performance-based navigation and approach capabilities—including Area Navigation (RNAV) and Required Navigation Performance (RNP), curved path capability (also known as RNP-RF), RNP Authorization Required (RNP AR),[6] Vertical Navigation (VNAV), and Localizer Performance with Vertical Guidance (LPV)—are the most mature and in some areas are already in use. These capabilities allow for more efficient arrival and departure

[6] RNP AR is a category of RNP approach procedures that take advantage of specific equipment, aircrew qualifications, and operating procedures to allow for lower approach minimums. A required component of RNP AR approaches is the ability of the navigation system to monitor the navigation performance achieved and to identify to the flight crew whether or not the operational requirements are being met during the operation.

procedures, more repeatable and predictable trajectories, more routes, and enable the use of runways that cannot currently be used under certain conditions. The equipment (navigational systems and sensors) needed for aircraft to achieve these capabilities exists and is certified for installation on aircraft.

The extent to which the existing fleet of aircraft is equipped with these capabilities and the cost to equip varies. FAA and MITRE[7] estimate that nearly all air carriers have the capability to fly en route and terminal RNAV and RNP operations. To equip those aircraft used by air carriers that are not equipped, the cost is estimated at between \$100,000 and \$200,000 per aircraft. Fewer of the aircraft used by air carriers—MITRE estimates about one-third—are equipped with the navigational systems and sensors needed for more advanced and precise RNP capabilities—such as curved path capability and RNP AR. To equip for curved path capability, costs for air carriers are estimated at between \$400,000 and \$600,000 per aircraft, while the costs to equip for RNP AR capability are between \$1 million and \$2 million per aircraft. All major air carriers currently have VNAV capability through a flight management system to fly a specified vertical profile. FAA also estimates that LPV, which provides vertically-guided approach service down to 200 feet using the Wide Area Augmentation System (WAAS), is available on more than 20,000 aircraft (out of over 200,000 aircraft), primarily within the general aviation community.

Action from FAA is required for greater use of these capabilities within the NAS. As discussed earlier, thousands more RNAV and RNP procedures must be developed at individual airports for these capabilities to be used across the NAS. In addition, FAA has not yet begun to develop any navigational procedures for arrivals and departures that would allow aircraft to use curved path capability within the NAS. For RNP AR—for which some procedures have been developed with curved paths—additional training and certification of flight crews is also necessary for aircraft to fly those procedures. Furthermore, according to stakeholders, existing procedures are not used as much as they could be and operational approvals to use the existing procedures are needed. To more fully leverage the potential benefits of these capabilities, FAA must also engage in major airspace redesign around the more congested airports, which would require the creation of new flight paths and thus may also require environmental approvals, which can take several years. The environmental constraints could be a major obstacle to achieving timely benefit from RNAV/RNP and could benefit from deliberate attention by the community to solve.

Another approach capability listed in the NextGen Implementation Plan is the GNSS Landing System (GLS), but this capability is a little further behind the capabilities listed above in terms of its maturity. GLS is a positioning and landing system that integrates satellite and ground-based navigation information to provide the position information required for precision approach and landing guidance. According to one stakeholder involved in the development of this technology, the ground-based systems for GLS will

[7] The MITRE Corporation is a not-for-profit organization chartered to work in the public interest. MITRE manages four Federally Funded Research and Development Centers including one for FAA. MITRE has its own independent research and development program that explores new technologies and new uses of technologies to solve problems in the near-term and in the future.

be certified to basic precision approach standards this year.[8] The cost of these ground-based systems, including the equipment and installation is estimated to average about $2.5 million. Several aircraft are equipped with the avionics needed to meet these standards.

Surveillance and Information Display Capabilities

Among the surveillance and information display capabilities listed in the NextGen Implementation Plan are ADS-B Out, ADS-B In, and Electronic Flight Bag (EFB) integrated with ADS-B. These capabilities are not fully mature because standards are still under development, standards have just been finalized for them and the equipment is not yet widely available, or the capability is still under development and demonstration. In addition, the applications that will be supported by the ADS-B technology have not been fully defined.

ADS-B Out enables an aircraft to transmit its position, velocity, and other information to air traffic control systems for surveillance purposes. With ADS-B Out, controllers will see radarlike displays with highly accurate traffic data derived from GPS satellites. RTCA plans to publish a revised standard (DO-260B) with specifications for ADS-B Out and FAA plans to publish a revised TSO that references this standard in December 2009. Manufacturers will then be able to produce the ADS-B transceiver and any associated onboard equipment based on the new standard. In addition, FAA issued a Notice of Proposed Rulemaking in October 2007 and plans to issue the Final Rule in April 2010. This rule would mandate that all aircraft be equipped with ADS-B Out by 2020. The revised standard will be consistent with the FAA's requirements in this rule. Equipment does not yet exist relative to the revised standard and therefore costs for equipping aircraft to that standard are unknown. However, cost estimates to equip aircraft based on ADS-B Out equipment that meets the current standard range from $32,000 to $78,000 to upgrade current production aircraft, and up to $175,000 to retrofit aircraft that are out of production. Additionally, to fully implement ADS-B Out, FAA must continue to deploy ADS-B ground stations, which are scheduled for full deployment by 2013.

ADS-B In enables aircraft to receive information transmitted by ADS-B Out from nearby aircraft, Traffic Information Services – Broadcast from the ground, and Flight Information Services – Broadcast. This information can then be viewed on a cockpit display. Aircraft equipped with ADS-B In and an associated cockpit display will be able to "see" each other, which, among a number of capabilities, will allow for greater situational awareness in the cockpit and enable the self-spacing of aircraft, and also eventually allow for self-separation, which will increase capacity and decrease delays. RTCA has published standards for application related to situational awareness and spacing, but not for self-separation, which requires more stringent performance requirements. Several applications have been developed for ADS-B In, but only a few are certified.

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[8] A basic or "Category I" precision approach has a 200-foot ceiling/decision height and visibility of one-half mile. A Category II precision approach has a 100-foot ceiling/decision height and visibility of one-quarter mile. A Category III precision approach has even lower requirements.

EFBs provide electronic charts, manuals, and other applications to aid flight crews. Higher-capability EFBs can incorporate information from ADS-B transceivers to show the location of other aircraft in the air or on the airport surface, and moving map displays, enabling some ADS-B In applications. Although EFBs are ready for deployment on aircraft, stakeholders indicated that there is currently no clear business case for equipping with higher capability models, given the high cost to equip. Depending on whether the EFB is portable or fully installed and subject to airworthiness requirements and the type of aircraft (i.e., whether it is a retrofit of an out-of-production or in-production aircraft), costs can range from about $166,000 to $388,000 per aircraft.

Data Communications Capabilities

Initial data communications capabilities are mature and ready for deployment while more-advanced data communications capabilities are maturing, but are not ready for immediate, widespread deployment.[9] Data communications enables flight crews to receive and reply to air traffic control clearances via electronic messages instead of voice messages as is done today, enabling controllers to safely handle more traffic. This improves air traffic controller productivity, and enhances efficiency, capacity and safety. Standards for VHF Digital Link Mode-2 (VDL-2) radios—which support data communication—and for data communications applications are mature. Certification of data communications equipment supporting initial Aeronautical Telecommunications Network applications (known as ATN Baseline 1) required for the European data link mandate is expected in 2010. While VDL-2 radios and Future Air Navigation System version 1/A+ (FANS-1/A+) application software are widely available now for aircraft in the current Boeing and Airbus fleets, most of today's aircraft must upgrade their radios to VDL-2, and install data communications application software. To retro-fit aircraft, the cost is estimated to range between $55,000 to $190,000 per aircraft. For forward-fit on new aircraft, the range is $13,000 to $23,000 per aircraft. Additionally, FAA's ground communications network and ground automation systems are not yet capable of data communications operations outside of a couple of airports. Data communications for the en route environment will require updates to the En Route Automation Modernization system, the timing of which depends on how FAA sets priorities for the program.

A later data communications model, ATN Baseline 2, is also listed in the NextGen Implementation Plan and is intended to build on the initial data communications system's capabilities, providing widespread Flight Management System integration and advanced applications. These advanced applications are not yet defined well enough to be able to define standards and standards have not yet been developed. This should not cause the FAA to postpone delivering interim capabilities over the midterm.

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[9] Data communications (FANS-1/A+, ATN Baseline 1) is the basic data communications capability that will initially provide globally harmonized data link capabilities. Data communications (ATN Baseline 2) builds on initial capabilities and provides advanced applications.

Enclosure

3. Dr. Dillingham, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage, which technologies hold the most immediate potential for accelerating NextGen benefits?

RESPONSE:

<u>Technologies with the Greatest Benefits (Capacity and Efficiency) over the Next 2 Years</u>

Stakeholders told us that the technologies with the greatest immediate potential (over the next 2 years) to accelerate the NextGen benefits of increased capacity and system efficiency are RNAV/RNP and limited ADS-B Out.

<u>RNAV/RNP</u>
As previously discussed, many aircraft are already equipped to use RNAV/RNP but accompanying arrival and departure procedures have not been fully developed at most airports. To illustrate that this technology is here and being used to generate fuel and time savings, one stakeholder reports that during a 12-month period, more than 8,000 RNP approaches at Brisbane, Australia, saved 34 Qantas 737-800 aircraft a total of 4,200 minutes of flying, 65,000 gallons of fuel, and 621 metric tons of carbon dioxide emissions. Average delays at the airport were reduced by 30 seconds for each arriving aircraft, which benefit from the fact that the RNP approaches for the 737-800 aircraft are taking between 10 and 23 nautical miles off their approach path to the runway, compared with an existing visual approach. Since 2005, Alaska Airlines, an early RNP pioneer, has documented 5,300 flights that avoided diversions using RNP procedures. In 2008, avoiding these diversions saved $8 million. The United Parcel Service, relying on Continuous Descent Arrivals which uses RNP, uses these procedures at Louisville, KY with reported savings of between 250 and 465 pounds of fuel (37-69 gallons) per arrival.

<u>ADS-B Out</u>
Immediate benefits to operators from ADS-B Out are limited, but ADS-B Out is a key enabler of future benefits to be derived from ADS-B In and other NextGen technologies. Immediate benefits include increased capacity over limited nonradar areas such as the Gulf of Mexico, large portions of Alaska, or in airports beneath radar coverage. For areas with no radar coverage, there is a business case for aircraft operators to equip with ADS-B Out because separation between aircraft can be reduced. However, few areas in the United States, other than the areas mentioned above, are without radar coverage. In addition, FAA cites some safety improvements, and benefits associated with more efficient, fuel saving continuous descent approaches in its notice of proposed rulemaking on ADS-B Out. However, FAA has not committed to reducing aircraft separation. Deploying ADS-B infrastructure without tying it to reduced separation, merging, spacing, and other applications delivers little benefit, and thus there is very little incentive for aircraft operators to equip their fleets now. From a systemwide perspective and over the midterm and long-term, equipping with ADS-B Out also provides benefits to FAA in the form of reduced costs from decommissioning a large number of the secondary surveillance radars, and from more efficiency and precision in air traffic control surveillance information.

Enclosure

Technologies with the Greatest Benefits over the Next 3 to 6 Years or More

Over the next 3 to 6 years or more, according to MITRE and others, additional technologies that hold significant potential for accelerating NextGen benefits include data communications and RNP-RF.

Data Communications
According to MITRE and others, data communications will do the most to accelerate capacity benefits nationwide in the 4 to 6 year time frame. Data communications will help relieve congested or constrained en route airspace by increasing the effectiveness of air traffic control automation systems and increasing air traffic controller productivity. Coupled with the controller capability to reroute multiple aircraft around weather and datalink clearances to multiple aircraft, it has the benefit of increasing schedule reliability and reduce miles flown and fuel used, which are most important metrics for scheduled carriers. To realize these benefits, updates to automation systems, controller training, and new procedures will be required.

RNP-RF
According to MITRE, RNP-RF will provide benefits over the next 3 to 5 years in congested, multi-airport metropolitan areas. Increasing the number of aircraft with this capability would allow airspace to be redesigned to expand and remove conflicts between arrival and departure flows for multiple airports in dense metropolitan areas. To realize these benefits, updates to airspace design, controller training, and procedures will be required.

Besides increasing capacity over the near term, equipping aircraft with the avionics mentioned above will increase efficiency and fuel savings and build a foundation for later NextGen capabilities.

4. **Dr. Dillingham, some have suggested that if the government were to subsidize aircraft equipage it might share costs with airspace operators to distribute risk between the government and users. What are GAO's thoughts on this suggestion, and what would be the best way to structure such a cost sharing arrangement?**

RESPONSE: Traditionally, FAA mandates the equipage of aircraft and provides several years for operators to comply. For example, FAA has recently proposed a rule that mandates equipage with ADS-B Out by 2020. However, for a variety of reasons, operators do not equip until the mandate is near because they face a number of disincentives to invest early in new technologies. For example, a technology may not work as needed, may not provide any operational benefits until a certain percentage of all aircraft are equipped, or may become obsolete because a better technology is available. In addition, several stakeholders have indicated that potential early investors are concerned that FAA may not follow through with the requisite ground infrastructure, procedures, or separation standard reductions. Given all of these disincentives, several options exist to encourage operators to equip aircraft earlier than the mandate with the latest technologies. The federal government can (1) develop standards, procedures, processes, and infrastructure fully enough to create a strong business case to purchase the aircraft equipment, (2) provide operational benefits to those that equip, a notion that FAA has endorsed, called "best-equipped, best served", and (3) provide financial incentives such as sharing the cost of the equipment through subsidies or tax credits. Generally, a combination of these options may be needed to promote early equipage of a new technology.

Given the range of potential options to address the equipage problem and the disincentives facing operators, Congress could consider a number of issues if it decides to establish a structure through which the government and airspace operators can share the cost and risk of equipping aircraft.[10] First, a subsidy, whether it be a grant, investment tax credit, fuel tax reduction, or other mechanism, should be targeted and specific to airborne equipment that (1) is mature, but does not have a strong aircraft operator business case for immediate implementation, and (2) achieves capabilities that lead to real benefits in terms of increasing the capacity and efficiency of the NAS. It is in these cases that the federal government's sharing of costs is most justifiable because there are adequate aggregate net benefits to be realized through equipage, but those who need to make the investments in the equipment do not accrue enough benefits themselves to justify their individual investments.

The second issue that must be considered is how to provide benefits to those that equip with the targeted avionics early—either with or without a subsidy. FAA has furthered the notion of "best equipped, best served" to encourage operators to equip. What this means in practical terms is that FAA must ensure that those that do equip receive some form of operational benefit, such as preferred airspace, routings, or runway access, which can save time or fuel. If early equippers get a clear competitive advantage, other operators may be encouraged to follow their example, further incentivizing all operators to fully equip their fleets. For some capabilities, a critical mass of users is needed before benefits can be realized. For example, enough aircraft must be equipped with ADS-B Out for FAA to effectively separate traffic and provide preferential airspace to those that are equipped, because in a mixed equipage environment, FAA must retain more conservative separation standards for less well-equipped aircraft. According to RTCA, data communications capabilities can lend themselves well to the "best equipped, best served" concept. For example, currently when controllers are faced with unpredicted weather facing many aircraft, they effectively slow them all down in order to give the controller time to devise reroutes and communicate new clearances by voice for each one. With data communications, the controller can uplink reroutes to all equipped aircraft without slowing them down, but slow down those aircraft that are not equipped

[10] Congress has sometimes authorized cost-sharing arrangements to provide incentives to industry to pursue advanced technology where there are perceived to be broad public benefits but there may not be an established business case for such investment. Examples include tax incentives for the installation of alternative energy sources and the Department of Energy's Advanced Technology Vehicles Manufacturing Loan Program, which authorized up to $25 billion in grants and direct loans to automobile manufacturers for developing more fuel-efficient vehicles.

in order to provide them with clearances one at a time by voice. Thus, those equipped would get a clear benefit in terms of reduced delay and better routes.

Another issue to consider is that stakeholders may not have an incentive to equip early because FAA has not always followed through in the past to allow operators to take full advantage of investments in equipage. As a result, industry questions whether FAA will now follow through with the tasks required to provide these benefits. According to many stakeholders, operators are wary of investing in equipage when they cannot achieve the full benefit of this investment and recoup their investment until FAA has completed tasks such as developing RNAV/RNP procedures at major airports around the country, redesigning airspace, reducing separation standards, and deploying the necessary ground systems in a timely manner. To allay industry's concerns, FAA could complete some of these activities so that operators can take better advantage capabilities they already have, such as RNAV/RNP. The majority of air carriers have aircraft that are equipped to take advantage of RNAV/RNP capabilities now, but until FAA completes its work, they cannot do so. In addition, FAA could implement its "best-equipped, best served" notion to simultaneously provide incentives for users to equip and build trust in FAA to follow through on promises to provide benefits to early equippers.

Finally, because prudent use of taxpayer dollars is always important, it is preferable that a minimum of government resources be used to reach the threshold number of equipped aircraft required to produce real, tangible benefits for those that equip. Any cost-sharing arrangement should be structured so as to avoid unnecessarily equipping aircraft (e.g., those that are about to be retired) or paying more of a subsidy to equip than would otherwise be necessary. One option that Congress could consider to achieve a minimum level of subsidy is to employ market incentives through a reverse auction. Under a reverse auction, aircraft operators would presumably be willing to bid down the level of subsidy to the point that the value still resulted in a positive business case for the installation of specified airborne equipment. Under the simplest form of such an auction, the subsidy starting value would be the full cost of aircraft equipment including purchase, installation, and training. The auction would proceed with the subsidy dropping by a specified amount over a given time period until a targeted critical number of equippers remained. To reiterate, tangible benefits that "complete" the business case and provide a competitive advantage for aircraft operators who equip must accompany the subsidies so that those operators that do not equip have an incentive over time to equip their aircraft in order to take advantage of the same benefits. The advantage of holding an auction for such support is that the government can have more assurance that it'is paying the lowest price for achieving the desired benefits, because the auction is employing market forces and allowing individual airlines to make decisions in their own best interest.

Enclosure

Questions for the Record Submitted by Ranking Member Petri

1. **Investment tax credits have been mentioned as an incentive for early equipage. Would this tax incentive, and its promise of competitive advantage, significantly encourage operators to invest in NextGen equipment? Are there any potential negatives to this plan?**

RESPONSE: Tax credits could encourage some operators to invest early in NextGen equipage, and some stakeholders suggest they be considered as the government examines different ways to provide incentives to equip. However, tax credits have several disadvantages when compared with alternative ways for the government to provide financial incentives for equipage. First, in light of the decline in passenger and cargo revenue, many commercial carriers may not have any tax liability that tax credits could be used immediately to offset. While tax credits can be carried forward over several years and used when a carrier returns to profitability and has tax liability, the ability to reduce future tax burdens may not provide a significant incentive to equip now unless the credit is particularly generous. Second, unless the credit can be transferred to firms that do have a current tax liability, a tax credit would provide a more valuable subsidy for carriers that are currently profitable than for those that are not. Other forms of subsidy—grants for example—would provide an investment incentive regardless of the current profitability of the carrier and therefore would not create larger incentives for some carriers than for others. Finally, using the tax system to provide a financial incentive can have administrative consequences for the Internal Revenue Service.

2. **Equipage is an important component of NextGen. Right now the economic conditions and financial pressures on Canadian air carriers are similar to those on U.S. carriers. Yet, in Canada, carriers have said they would be responsible for equipage if NAV CANADA deployed the system. The financial pay back for those who do equip will be fuel and time savings due to more direct routing and optimum altitudes. Would this model work in the United States? If not, why not?**

RESPONSE: No, the Canadian model is not applicable to the U.S. situation for the following key reasons:

(1) Canada is pursuing a voluntary equipage strategy to enable more efficient flight in areas without radar coverage—especially areas over Hudson Bay. Planes equipped with ADS-B Out will be able to fly with reduced separation, as is now required in areas without radar coverage. Therefore, there is a clear and substantial benefit to airlines that equip to fly in that particular airspace. Airlines are not equipping their entire fleets, just those aircraft that fly certain routes across Hudson Bay. United Airlines reviewed its international routes over Hudson Bay and decided to voluntarily equip its airplanes with ADS-B Out because of the potential cost savings. In the United States, while the Gulf of Mexico is similar to Hudson Bay, there is not much other significant non-radar space.

(2) ADS-B Out is not being deployed in Canada where there is already radar coverage, as is being planned in the United States. Therefore, Canada is not requiring operators to voluntarily equip their aircraft, and ADS-B is not envisioned as replacing radar to the same degree as in the United States. Consequently, carriers that operate solely in areas covered by radar may not have an incentive to install ADS-B equipment.

(3) The ADS-B Out technology that Canada is requiring for routes over Hudson Bay corresponds to the minimum standards and equipment for ADS-B today and limits potential future ADS-B In capabilities. In the United States, FAA is establishing internationally recognized ADS-B Out avionics equipage standards. These revised standards, which RTCA is developing, will enable higher-performance applications and services that will enhance the capacity, flexibility, and safety of the evolving airspace. Therefore, there are different concepts of future benefits resulting from equipping a critical mass of aircraft with technology that meets the higher standard. Canada intends to require the internationally recognized standards once they are adopted by the United States and Europe.

(4) Canada is not currently focused on a strategy of voluntary equipage for ADS-B In applications. According to NavCanada, the Canadian air traffic management authority, ADS-B In requirements, capabilities, and strategies for equipage have yet to be determined. In the United States, FAA has conceptualized a number of capabilities arising out of ADS-B In technologies and equipment that it eventually plans to incorporate in the NAS.

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Testimony of

Patrick Forrey, President,

National Air Traffic Controllers Association

Before the House Transportation Committee

Subcommittee on Aviation

Wednesday, March 18, 2009

ATC Modernization and NextGen: Near-Term Achievable Goals

Introduction

The National Air Traffic Controllers Association (NATCA) is the exclusive representative of over 15,000 air traffic controllers serving the Federal Aviation Administration (FAA), the Department of Defense and the private sector. In addition, NATCA represents approximately 1,200 FAA engineers, 600 traffic management coordinators, 500 aircraft certification professionals, agency operational support staff, regional personnel from FAA's logistics, budget, finance and computer specialist divisions, and agency occupational health specialists, nurses and medical program specialists. NATCA's mission is to preserve, promote and improve the safety of air travel within the United States, and to serve as an advocate for air traffic controllers and other aviation safety professionals. NATCA has a long history of supporting new aviation technology, modernizing and enhancing our nation's air traffic control system, and working to ensure that we are prepared to meet the growing demand for aviation services.

NATCA's Recommendations

NATCA remains, as ever, completely committed to the safety and efficiency of the National Airspace System (NAS). New technology has the potential to improve safety, expand capacity, and increase efficiency of the NAS. Therefore, we support the FAA's willingness to undertake the large scale and long-term research, development and modernization project that it has labeled The Next Generation Air Transportation System (NextGen). There are however, several outstanding shortcomings with the FAA's methodology and plans that need to be addressed at this early stage of the process.

1. **The FAA must collaborate meaningfully with stakeholders** – The inclusion of NATCA is critical to the success of NextGen and all projects relating to modernization, technology and procedures. As recently as February 11th of this year, the Government Accountability Office and the Inspector General of the Transportation Department have both testified before this Committee that controller involvement prevents cost overruns and implementation delays. NATCA must be included in all stages, from inception to implementation.
2. **NowGen must not be neglected as we prepare for NextGen** – The current air traffic control system has fallen into disrepair. Both the human infrastructure, including staffing levels of air traffic controllers, inspectors, engineers, and other aviation safety professionals, and physical infrastructure, such as poorly-maintained and deteriorating air traffic control facilities, need attention in the near term.
3. **Human factors must be addressed** – Several of NextGen's proposals raise serious concerns regarding human factors, including the increased complexity and safety risk inherent in a best equipped, best served policy. These issues must be addressed during the development stages in order to avoid delays, cost overruns, and safety failures.
4. **Safety requires redundancy** – NATCA is concerned that the system being proposed by the FAA, which is centralized and lacking a viable backup, is unacceptably vulnerable to attack or natural disaster. Human intervention must not be the first and only layer of redundancy. The FAA must build redundancy into the system in order to ensure that in the event of an attack, natural disaster, or technological failure, safety is not compromised.

Collaboration is Critical

The participation of NATCA throughout all stages of NextGen's development and implementation is critical to the success of this project. NATCA's members are frontline workers who are able to provide vital insight to help the team identify and address human-interface issues and other concerns. Doing so on the front-end rather than during implementation will save the agency time, taxpayer money and resources while avoiding potential damage to the integrity of the air traffic control system. Because NATCA's members have an intimate understanding of frontline air traffic control, they are uniquely qualified to provide insight into the needs of the system, the utility of the FAA's proposed technology, and the usability of the products included under the NextGen umbrella.

The FAA's go-it-alone strategy has come under criticism by this Committee and throughout the aviation industry. Last month, the FAA announced that it has committed to launching a NextGen Implementation Panel, through the RTCA Inc. (formerly the Radio Technical Commission for Aeronautics). Despite this gesture, to date we have received no indication from the FAA that the Agency has any intention of meaningfully collaborating with NATCA.

During the late 1990s and into the early part of this decade, the FAA completed more than 7,100 projects to install and integrate new facilities, systems, and equipment into the NAS, as well as more than 10,000 hardware and software upgrades. During this time, NATCA had representatives on over 70 modernization and procedure development projects[1] through the Controller Liaison Program. This program allowed controllers to provide crucial insight and guidance for the development and implementation of some of the most effective technological and procedural advancements including: Advanced Technologies and Oceanic Procedures (ATOP), Display System Replacement (DSR), User Request Evaluation Tool (URET), Voice Switching Control System (VSCS), Domestic Reduced Vertical Separation Minimum (DRVSM), and Standard Terminal Automation Replacement System (STARS). Despite its success, the Liaison Program was terminated in 2003. Throughout the rest of the Bush Administration, the FAA resisted any meaningful input from NATCA – to the detriment of the NAS.

The labor-management environment that developed during the Bush administration continues to make meaningful collaboration nearly impossible. The contempt with which all levels of Agency management has treated and continues to treat the air traffic controller workforce makes it clear that the agency does not value the professionalism of NATCA's members. It is our hope that after the imposed work rules are addressed by the Obama Administration and NATCA and the FAA reach a mutually-accepted collective bargaining agreement, we can again return to an era of cooperation and collaboration that will best serve the needs of the FAA, air traffic controllers, stakeholders, and the flying public.

NowGen: Human Infrastructure

While NATCA believes that NextGen may hold some promising plans and technology for the future of air traffic control, we are concerned that the Agency's focus on NextGen comes at the expense of the current air traffic control system, or NowGen. There are some very pressing problems facing the air traffic control system of today that can be addressed using available technology and infrastructure.

Air traffic control facilities across the nation are severely understaffed as a result of the wave of retirements and resignations following the agency's unilateral imposition of work and pay rules on the air traffic controller workforce. Rampant fatigue in the workforce is undermining safety across the system as those controllers that remain are required to work excessive amounts of overtime, have fewer opportunities for rest on and off the shift, and are often required to do a job designed for two to four controllers when Radar Associate positions are eliminated and positions are combined. The FAA's

[1] National Air Traffic Controllers Association, *2002 Air Traffic Modernization Tools*

recent hiring efforts intended to combat the staffing problem have resulted in an unsafe ratio of trainees, a training backlog, and an overreliance on developmentals, or trainees, to work live traffic.

Over 46,000 years of experience has been lost since the imposed work rules.[2] Along with that experience, vital institutional knowledge and qualified instructors have been sacrificed over the past two and a half years. The FAA must make addressing the workforce issue its top priority; returning to the bargaining table to reach a legitimate and mutually-acceptable collective bargaining agreement would go a long way towards stabilizing today's air traffic controller workforce and setting a solid foundation for the training and development of the air traffic controller workforce of tomorrow.

NowGen: Physical Infrastructure

In addition to the deterioration of the human infrastructure, the FAA must contend with the deterioration of the physical infrastructure. According to a recent report by the Department of Transportation Inspector General, fifty-nine percent of FAA facilities are beyond their 30-year design life, while all 23 En Route centers are over 40 years old. Several air traffic control facilities including Detroit Metropolitan Airport Tower and TRACON (DTW), O'Hare International Airport Tower (ORD), Kansas City Tower/TRACON (MCI), Miami ARTCC (ZMA), and Memphis ARTCC (ZME) have reported problems with mold contamination. At DTW inspectors have confirmed the presence of stachybotrys, a toxic form of mold believed to be a contributory factor in health problems experienced by controllers at the facility, including cases of occupational asthma as well as seven cancer diagnoses during the past six years.

The FAA has also fallen behind in the installation of vital runway incursion prevention technology. Airport Surface Detection Equipment-Model X (ASDE-X) is a developed and proven surface radar system that has been used to great effect where it has been installed. Unfortunately, the FAA has allowed this demonstrated technology to take a back seat to NextGen and is on track to miss its delivery benchmarks. While the FAA estimated that ASDE-X would be deployed at the 35 busiest airports by the end of 2010, to date they have installed only 13 of the 35 (having taken four years to install the first 11)[3], and many of those that have been installed are still experiencing serious implementation glitches.

The FAA must make the maintenance and appropriate equipage of existing air traffic control facilities a priority. Air traffic controllers must be provided with safe and secure facilities and up-to-date equipment so that they can continue to maintain the safest and most efficient air traffic control system in the world.

Potential Advantages of NextGen Technology and Systems

NATCA believes that there is great potential in Automatic Dependent Surveillance – Broadcast (ADS-B). As the FAA has stated, satellite-based technology is capable of providing a more accurate depiction of aircraft location and eliminating the lag time of traditional radar scans. This degree of precision can help ensure greater safety and efficiency by allowing air traffic controllers the ability to make better-

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[2] Calculation assumes 25 years experience for every retiree. Twenty-five years of services is the minimum for retirement eligibility for most air traffic controllers.

[3] Dillingham, Gerald, *Aviation Safety: FAA Has Increased Efforts to Address Runway Incursions* Government Accountability Office Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives September 25, 2008

informed decisions regarding aircraft movements. If aircraft were equipped with ADS-B displays, pilots would have additional tools with which to process and understand their location and flying conditions, allowing pilots to maintain greater situational awareness, particularly during periods of poor visibility.

This capability will give controllers greater flexibility and provide predictability to the users. For example, controllers will be able to more frequently instruct pilots to proceed to the airport visually, utilizing the ADS-B in weather currently requiring instrument flight rules (IFR). A visual approach, which is granted at the discretion of air traffic controllers, requires pilots to utilize a simple "see and avoid" method of separation, allowing then to follow more closely than instrument guided approach standards permit. With current technology, controllers may only grant visual approaches during good weather and when visibility is unobstructed, as pilots must safely see the runway, ground, surrounding terrain, and other aircraft in the vicinity. With ADS-B displays, pilots would be able to artificially "see" other aircraft even during inclement whether, giving controllers greater flexibility to use these less complex and more efficient approach rules, increasing the arrival rates regardless of the weather. There would no longer be a need to reduce arrival rates during IFR weather. The users could more accurately predict scheduling, reduce delays, and increase capacity.

Concerns over NextGen

Based on the public documents that the FAA has made available on NextGen, NATCA has several outstanding concerns that we believe the FAA must address comprehensively before it can begin the roll-out of any major NextGen technology or policy changes. As previously stated, we believe that these and other issues can be most effectively addressed in a collaborative environment, and we sincerely hope that NATCA can be a part of developing the solutions to the problems facing the current air traffic control system and plan for the future system. Below are the concerns NATCA believes must be addressed immediately, which will be discussed in greater depth in the sections that follow.

1. The FAA must retain a back-up system: Redundancy is the essential element of any safety operation. The FAA's published plans contain no viable backup should the satellite fail due to natural or criminal activity. Limited frequency availability further complicates this situation.
2. Safe and viable plan for equipage: The success of NextGen is dependent on the equipage of thousands of aircraft with new technology, an expensive undertaking that would be a major financial strain on airlines, general aviation and business aviation, particularly in the current economic climate. The FAA has tried to address this by instituting a new "best equipped, best served" policy for air traffic control. This policy has serious implications for safety, as it adds an untenable level of complexity to air traffic control operations. If the FAA wishes to incentivize equipage, it must do so in a way that does not compromise safety.
3. Full consideration of human factors: Many of the proposed changes to the air traffic control system place significant demands on the people who make the system work. The usability of the technology and the accompanying procedures must be a priority.
4. Research before rulemaking: Many of the plans and promises made in the FAA's NextGen documents are based on assumptions about technology that has yet to be developed. While the ideas are a good basis for research and development projects, it is misleading for the FAA to describe its plans for operations as if the required technology were already available.

Redundancy: The Need for a Viable Back-Up System

While we believe ADS-B has tremendous potential and is capable of providing precise, accurate, and instantaneous information on aircraft positions to air traffic controllers, it is particularly vulnerable due to its single-site source. ADS-B is satellite-based technology, with information broadcasting from a single source satellite orbiting the earth. While this allows it to be more precise than the current ground-based radar, the singularity of its source makes it vulnerable to natural disasters and criminal or terrorist acts. If the satellite were to cease functioning for any reason, the entire US air traffic control system would be crippled.

The current ground-based radar system gathers its information from numerous radar sights located throughout the country. If one radar sight were to fail, another site could act as a back up. For example, if a terminal radar site were to fail, Center Radar, or CENRAP, from the nearest en route radar site would be able to provide the relevant data. In most cases when this occurs, FAA separation requirements are increased from three miles to five miles, but safety is maintained and service is uninterrupted.

Until redundancy can be incorporated into the new technology, the easiest option for creating the system redundancy necessary to maintain the safety of the NAS is to maintain the existing ground radar coverage as a back-up for the ADS-B system. However, due to financial considerations, the Agency wants to decommission many of the current radar sites, which would result in an incomplete backup system with gaps in coverage.

Further complicating this is the issue of frequency congestion. ADS-B transmits its information in the same frequency spectrum as the current radar systems, TCASS, ASDE-X and other critical aviation safety technology. There are simply not enough frequencies available to transmit all of the necessary information. According to a briefing before the Aviation Rulemaking Committee (ARC) on February 24, 2009, the FAA would have to decommission all existing radar sites and reduce TCASS surveillance to 60 percent in order to safely utilize ADS-B[4]. This further limitation of the available redundancy makes the NAS more vulnerable to failure and puts the safety of the flying public at risk.

Before ADS-B is implemented, the FAA must develop a safe and viable means of providing a back-up system. Redundancy and workable back-up systems are vital to the safety of the NAS, and must not be discounted in the fervor to introduce new technology.

Equipage: A Major Hurdle in Tough Economic Times

In order to utilize the technology and procedures that create the foundation of NextGen, aircraft must be equipped with new technology. For general and business aviation, the process of equipage may be cost-prohibitive. Encouraging voluntary compliance for these fliers may prove to be a fruitless effort, and mandatory equipage may cripple the general aviation industry beyond repair. One NATCA member and private pilot echoed the sentiments of many when he said, "I'll stop flying before I spend $35,000 on new equipment for my $50,000 plane." Particularly during these difficult economic times, when private pilots are struggling to pay for regular maintenance and fuel costs, the added expense will be cost prohibitive to most.

[4] Capezzuto, Vincent, *Surveillance and Broadcast Services: Aviation Rulemaking Committee Briefing*, Federal Aviation Administration, Februay 24, 2009.

For the commercial airline industry, moving forward with NextGen means undergoing the expensive process of retrofitting a fleet of aircraft, a major challenge for airlines struggling to continue operations despite the economic downturn. Early equipage difficulties may be exacerbated by the FAA's history of changing technological requirements and delaying or abandoning modernization efforts. American Airlines, for example, retrofitted its fleet to install the Controller Pilot Data Link Communication system (CPDLC) only to see the FAA abandoned its efforts in 2004, leaving the airline to foot the bill for technology it would never use.

Airlines may be reluctant to equip their fleets until they can see a clear operational or economic benefit and until the FAA has demonstrated a firm commitment to a particular set of equipage standards. NextGen will be delayed until the FAA is able to effectively address the legitimate concern of airlines and aircraft owners and convince them that the technology is a good investment.

"Best Equipped, Best Served": Implications on Human Factors

In an attempt to create artificial economic incentives for early equipage, the FAA has announced that it will implement a policy that would "provide 'best-equipped, best-served' priority in the NAS to early adopters." This has serious implications for safe and efficient operations and for the workload and complexity for air traffic controllers.

Currently, air traffic controllers provide service on a first-come, first-serve basis. Air traffic controllers instruct aircraft to merge onto airways or disburse to their destinations in the order which comes most naturally, the order in which they arrive. Giving priority to particular aircraft would require complex maneuvering on the part of air traffic controllers, who would have to vector aircraft around one another in order to give preferential treatment. This is an unnecessary level of complexity introduced into the already complex air traffic control environment. As with any additional complexity, it brings with it an increased risk in terms of both safety and delays.

Air traffic controllers are also taught to maximize the efficiency of the NAS to the maximum extent practicable without sacrificing safety. This often means granting requests from pilots to proceed directly to particular navigation points of reference, VORs, rather than continuing along the prescribed route. Currently, this is done whenever air traffic and whether conditions permit. As there is no way to increase the use of these on-the-fly improvements to efficiency, the only way to provide incentives is to instruct controllers to avoid giving direct routes to aircraft without the new equipment. This means decreasing the overall efficiency of the NAS, and increasing flight delays for unequipped aircraft.

Lastly, differential treatment from air traffic control based on level of equipage requires the controller to know the level of equipage. This would mean an additional piece of information in an already-cluttered data-block. According to a Civil Aerospace Medical Institute (CAMI) study, the quantity of information in the display has a direct relationship to the time it takes for a controller to scan that display. Similarly, when a display is cluttered with information, it takes additional time to scan and parse out the relevant data.[5] Therefore, adding this additional information to the data blocks will increase the complexity of air traffic control even before one accounts for the preferential maneuvering.

[5] Xing, Jing, *Information Complexity in Air Traffic Control Displays* Civil Aerospace Medical Institute, Federal Aviation Administration. September 2007.

Human Factors Considerations for "Trajectory Management"

The FAA's NextGen plans include increased automation and eventual self-separation of aircraft, resulting in a shift in the "traditional responsibilities and practices of pilots/controllers." Under the proposed system, air traffic control would shift to what the FAA is euphemistically referring to as "Trajectory Management." Essentially, air traffic controllers would discontinue active air traffic control and shift instead to air traffic monitoring and route management. This could have serious implications for the safety of the NAS.

Studies have shown that "when acting as a monitor of an automated system, people are frequently slow in detecting that a problem has occurred that necessitates their intervention. Once detected, additional time is also needed to determine the state of the system and sufficiently understand what is happening in order to be able to act in an appropriate manner. The extra time associated with performing these steps can be critical, prohibiting performance of the very activity the human is present to handle."[6] Safe air traffic control depends on the ability to quickly assess situations and make split second decisions.

Training and experience would also be a serious issue in this scenario. After this changeover of duties is completed it won't be long before the system is staffed entirely by individuals with no active air traffic control experience or on the job training. Even those who might remain in the profession and remember active air traffic control would quickly fall out of practice. Currently, controllers and managers who are working off the floor are required to work positions for 16 hours to maintain currency. Maintaining this level of currency would be impossible should automated separation become the standard. This too, would make it difficult for air traffic monitors to safely perform air traffic control functions should automated separation fail.

Research Before Rulemaking

At this stage of NextGen's progress, it is difficult to talk about near-term benefits of the system. Although this Committee is justified in looking for short-term improvements to help alleviate delays and improve capacity of the NAS, NextGen may not be the best place to look. Right now, NextGen is little more than a very ambitious research and development project. While the technology being developed may eventually produce great benefit to the system, it is misleading for the FAA to speak of plans as if the technology already existed.

For example, On January 29th of this year, the FAA published a PowerPoint presentation entitled "Delivering NextGen: Trajectory Based Operations," This document included statements such as "ANSP uses scheduling tools and trajectory based operations to assure a smooth flow of traffic and increase the efficient use of airspace,"[7] implying the availability of 4-D scheduling tools (three traditional directions plus time) that are, in fact, still in the early stages of developments. It is still unknown when these scheduling tools will be fully developed or even how they will function, yet the FAA continues to publish descriptions of how flight paths will be changed and how the new procedures will look.

To create and outline the procedures at this early stage of the development process is both disingenuous and irresponsible. The FAA is misleading its stakeholders into thinking the process is already further

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[6] Parasuraman, R and Mustapha Mouloua, *Automation and Human Performance: Theory and Applications.* Lawrence Erlbaum Associates, 1996.

[7] Federal Aviation Administration, *Delivering NextGen: Trajectory Based Operations"* January 29, 2009, pg 4.

along than it actually is. It is also spending time, money and manpower developing procedures and plans when it is unknown precisely how the necessary tools will function. This means that FAA is either developing broad and non-specific procedures, which are largely useless except as a public relations tool, or they are developing specific procedures which will likely need to be rebuilt once the technology is available.

Conclusion

In NextGen, the FAA has undertaken a large-scale and long-term research and development project to overhaul the technological infrastructure of the air traffic control system. This ambitious undertaking has serious implications for the future of the National Airspace System and should therefore include the meaningful participation of all NAS stakeholders.

NATCA supports the FAA's modernization efforts and is eager to be a part of the team developing and planning the technology that will bring us into the next generation of air traffic control. We look forward to working with the FAA to help them address the serious outstanding issues including human factors, equipage, and redundancy concerns. It is essential for us to be included as partners in this ongoing modernization effort.

STATEMENT OF

CAPTAIN RORY KAY

EXECUTIVE AIR SAFETY CHAIRMAN

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

BEFORE THE

SUBCOMMITTEE ON AVIATION

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

UNITED STATES HOUSE OF REPRESENTATIVES

WASHINGTON, DC

March 18, 2009

ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS

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**STATEMENT OF
CAPTAIN RORY KAY
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SUBCOMMITTEE ON AVIATION
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March 18, 2009

Good morning, Mr. Chairman and members of the Subcommittee. I am Captain Rory Kay, Executive Air Safety Chairman of the Air Line Pilots Association, International (ALPA). ALPA represents more than 52,250 pilots who fly for 35 passenger and all-cargo airlines in the United States and Canada. On behalf of our members, I want to thank you for the opportunity to provide our perspectives on the issues that are of great importance as both the FAA, as the Air Traffic Service provider, and the pilots and operators that use the system work to collaboratively modernize the National Airspace System into the Next Generation Air Transportation System (NextGen).

Today's US air transportation system is the safest in the world. The commercial aviation accident rate is on the order of 0.0007 per 100,000 departures for passenger airlines. If we speak only of passenger turbine powered aircraft, the number is about half that level. In other words: you are about 40 times safer in an airliner than on the safest highway system in the world. But we are at a crossroads. Our Air Traffic Control system is getting older and there are many systems on our aircraft that we are unable to use to their fullest capabilities. These shortcomings, left unchecked, eventually have the potential to decrease efficiency and even erode safety margins, because our air traffic system and infrastructure have not been kept up to date. Our colleagues in Europe are facing many of the same challenges, and have begun localized implementation of many NextGen-like concepts that are still being debated in the US.

In 1931, ALPA's founders chose the motto "Schedule with Safety." That era saw accident rates many times higher than those of today. In fact, over half the founding members of ALPA died in aircraft accidents, so ALPA was keenly aware of the continuing need to improve the safety of the air transportation system any way possible. Safety is still one of the two pillars for which ALPA stands. Over the past 78 years, the National Airspace System (NAS) has changed greatly. The air traffic control (ATC) system in the contiguous United States has moved from separating flights using radio position reports to positive control using radar that extends from coast to coast. The introduction of jet powered aircraft and liberalizing bilateral agreements made air travel affordable to larger segments of the world population. With the introduction of the Global Positioning System (GPS), a system originally designed by the Department of Defense as a precision method to attack targets and adapted by the aviation industry, aircraft navigation has begun to move from a ground-based navigation system to a satellite-based navigation system and at the same time achieved levels of accuracy in positioning that are unprecedented.

Communications have also evolved from light signals and burning oil cans to lightweight and reliable radios, and are now using a data link technology akin to texting; yet we are unable to use satellite based surveillance and navigation to its fullest potential.

All of these changes have two things in common. They have made air travel safer, and they were successfully accomplished when there was a collaborative relationship between the government and the private sector. In each example, the private sector and government worked together to develop system and equipment specifications, new controller and pilot procedures, training requirements, and the development and implementation of ground and airborne infrastructure. ALPA is working actively with industry, the FAA, and the JPDO to ensure that NextGen is yet another example of a successful collaboration leading to fundamental change to the NAS.

However, NextGen requires a new way of thinking about the National Airspace System (NAS). No longer can we tolerate a NAS composed of a number of independent ATC systems and tools. NextGen must be an integrated blend of future technologies, procedures, and public policy reform designed to enhance system safety, increase throughput, and decrease emissions through the use of collaborative decision-making, more precise and efficient flight routings and separation standards.

Pilots literally sit at the intersection of new technology, operational measures, air traffic control procedures, and varying aircraft capabilities. This gives us a unique vantage point to see and experience firsthand what can happen if well-intended, but unrealistic operational procedures are instituted. Without thorough study and stakeholder involvement, complexity can increase, efficiency can decrease, and in some cases safety margins are eroded.

The future of air transportation will bring a combination of commercial air carriers, unmanned aerial vehicles, micro-jets "jet taxi" service, and general aviation. The airspace system of the future will involve a great many more operations than we have today in an increasingly complex environment. NextGen must be a flexible and scalable system capable of accommodating any fleet mix that evolves. The American people deserve a system that will readily accommodate that new demand – safely and seamlessly.

Funding NextGen

There is little debate over the need to modernize to sustain the growth in aviation and the concurrent demands on capacity. The problem is how to pay for it and who pays for it. As a nation, we all benefit from the airlines' return to economic solvency if capacity and efficiency can be improved. It has been demonstrated that new technologies and procedures can also increase safety, particularly in areas not well served by the current infrastructure. However, any new procedures and technologies must be thoroughly and systemically evaluated so we know that the level of safety is maintained or improved.

The continued road toward the implementation of NextGen will also require an additional element – a national resolve. Just like the development of the transcontinental railroad in the 19th century or the interstate highway system during the 20th century, NextGen is a major step forward for the 21st century. National resolve is required to continue funding the operation of the current system while we research, develop, and implement NextGen components. While costly, we are left with no alternative. We can not just turn a switch and immediately transition from the existing ATC system to NextGen. This is an investment in our future as a nation and our leadership in the transportation world.

National resolve requires a sustained funding stream. In 1997, while a member of Congress, former Secretary of Transportation Norm Mineta chaired the National Civil Aviation Review Committee (NCARC). NCARC recommended the FAA's funding and financing system receive a federal budget treatment that ensured revenues from aviation users and spending on aviation services were directly linked and shielded from discretionary budget caps. This would ensure that FAA expenditures would be driven by aviation demand. While some movement has been made on this issue, this recommendation has not been fully implemented. With the movement toward NextGen, the issue of a sustained funding stream is even more urgent. Without a national resolve, the funding of NextGen is uncertain, and will most certainly cost even more and take much longer to implement.

NextGen has an enormous price tag so the economic risk of mistakes in development or implementation is significant. In January 2009, the Government Accountability Office (GAO) removed the FAA's air traffic control modernization program from its High Risk List (HRL) for the first time in 14 years. The HRL identifies Federal programs and operations that the GAO deems as high risk due to their greater vulnerabilities to fraud, waste, abuse, and mismanagement. The FAA was initially placed on the HRL in 1995 due to their poor track record of program deployment and cost over-runs. The GAO noted that management focus and willingness to attack and rectify their shortcomings were the reasons that it felt comfortable removing FAA modernization from the High Risk List. The GAO also noted the FAA's plan to continue improvements into 2009.

The current US ATC infrastructure is woefully outdated, the equipment's capabilities are limited, facilities are crumbling, efficiency is decreasing and capacity is limited. The delays and similar problems in the system that currently plague the ATC system clearly underscore the critical need for ongoing National Airspace System Modernization. Despite all that, it is a tribute to the dedication and professionalism of our pilots, controllers, and air traffic services employees that the system does continue to operate albeit at a slower tempo during periods of radar outages, poor weather, and mass congestion. The system we are given to work with cannot keep going indefinitely.

Sustained long-term funding of the Nation's airspace and air traffic control infrastructure is essential. ALPA feels that that funding must be comprised of Federal funds and fees requiring all airspace users to pay "their fair share" because all users will benefit from modernization. NextGen is simply a project that cannot be killed in mid stream. It is not the airlines but the FAA that realizes the first benefits. Airlines will see incremental benefits at first, if at all. Airports will see capacity increases and thus opportunity to increase their revenues more quickly. Once many of the pieces are in place, then efficiencies in airplane operations will manifest themselves in lower operating costs and fewer emissions. The airlines may not see benefits of installing the new aircraft avionics for many years, but the equipage is necessary to build the foundation for the future. So where do you start passing the hat?

Obviously with a price tag this high, we must get this right the first time. Transforming the NAS has been likened to changing the tire on a truck while it is underway at 70 MPH. It can be done, but it must be well thought out and it will take new technologies to make it happen. ALPA is working with the FAA and industry stakeholders to insure that the airline pilot voice, the major operator, is a part of all discussions regarding the transition from the current ATC system to NextGen. This transition must be made without affecting the excellent safety record of the National Airspace System. Similarly, Congress must involve all stakeholders in a plan to develop ways to pay for modernizing the National Airspace System without driving our airlines out of business.

NEAR-TERM NEXTGEN GOALS

RNAV/RNP

Taking advantage of area navigation (RNAV and RNP) that offers a great deal of flexibility in procedure design and improved navigational accuracy available right now in many modern aircraft can be used to improve efficiency and reduce delays without compromising safety. However, efforts to use this technology to its fullest extent are lagging and must be accelerated.

In April 2002, FAA Administrator Jane Garvey announced the migration away from a ground-based navigation system to a "required navigation performance" (RNP) system. Airlines have long complained of sending aircraft to the boneyard with equipment that had never been fully utilized – equipment capable of operating independent of ground-based navigation systems. This avionics equipment had been developed and installed with the hope that the capabilities could be used. However, this was an example of how the private sector and government did not work in a collaborative manner.

NextGen must take better advantage of this aircraft capability. Area navigation (RNAV) uses onboard avionics that allow an aircraft to fly more direct and precise flight paths, improving efficiency. This enhanced navigation capability allows greater ATC flexibility in assigning routes compared to traditional ground-based procedures, which in turn allows ATC to put more aircraft in the same airspace safely. Using these improved procedures on departures has led to reduced departure delays, decreased taxi times, and reduced fuel burn and associated emissions. For example, RNAV operations have saved operators $8.5 million annually at Dallas/Fort Worth International Airport and a total estimated $34 million at Hartsfield-Jackson Atlanta International Airport. Required Navigation Performance (RNP) builds upon RNAV and allows flights to land with lower minima. Using RNP, in 2006 Alaska Airlines was able to continue 980 approaches that otherwise would have been diverted, largely due to adverse weather conditions. NextGen plans call for continued deployment of RNAV and RNP procedures, and we will begin to couple them with other decision support tools to maximize their capabilities.

RNAV allows aircraft to fly more fuel efficient arrivals into airports. This has been demonstrated at San Francisco, Atlanta, and other airports. Aircrews receive the arrival path guidance matched to a specific flight by taking into consideration factors including aircraft performance, air traffic, airspace and weather. Boeing reported earlier this month that the tests carried out at San Francisco International Airport showed this method helped the airlines cut fuel consumption by 1.1 million pounds and cut carbon dioxide emissions by 3.6 million pounds extrapolated over one year.

One of the advantages of a satellite based navigation system is the ability to expand capacity of the existing airports through greater precision instrument approaches to all runways, not just those served by the ground-based workhorse of precision landing approach guidance, the Instrument Landing System (ILS). To meet this goal will require a rethinking of the FAA's instrument procedure production and maintenance capability. Currently the FAA develops and maintains over 13,000 instrument procedures. Approximately 20% of these approaches are published as satellite-based procedures, and the number continues to increase. However, a large number of these are in fact, RNAV versions of existing ground-based procedures. While we applaud this step toward reduction in the need for ground-based infrastructure, these so-called "overlay" procedures do not use the technology to improve efficiency. The FAA must accelerate the development, testing, and implementation of true RNAV procedures in order to improve efficiency safely.

In addition, the FAA is still maintaining 1,700 procedures based on non-directional beacons (NDBs), the oldest navigation technology in the NAS and as a result, using resources to maintain ground equipment based on navigation methods that are now approaching 100 years old. Instead of spending resources on older technologies, the resources should be spent on advancing the capabilities of the NAS. No longer can we afford to base the NAS on the lowest common denominator. Users that decide to equip with the newest technologies should benefit instead of being penalized.

ADS-B

Fifty years ago, two airliners collided over the Grand Canyon killing all on board both aircraft. As a result of this horrific accident, Congress demanded the establishment of an air traffic control radar system requiring commercial aircraft to be under positive radar control, that is ground surveillance. Once again government and industry collaborated to quickly establish a radar system across the NAS and at major airports that has evolved into the present system in use today.

In March, 2007, Administrator Blakey announced the surveillance system of the future – Automatic Dependent Surveillance – Broadcast (ADS-B). ADS-B, unlike radar does not rely on a ground based surveillance system of emitters and receivers. With ADS-B, each aircraft broadcasts a position report of where it "thinks" it is along with additional information. Any other receiving station, either on the ground or other aircraft can use the position report. In addition, limitations imposed on ground-based radar by terrain and antenna location cease to be a limiting factor. Controllers and flight crews will be able to know the real-time position of aircraft, on the ground or in the air. Just like radar increased the air traffic controller's situational awareness, ADS-B will increase situational awareness for everyone in the system.

In 2007, FAA issued a proposed regulation that, if finalized, would require ADS-B "Out" equipment on all aircraft operating in certain classes of airspace within the NAS by 2020. ADS-B "Out" refers to the broadcast of the position signal by the aircraft to ground stations. FAA has yet not issued a regulation proposing a timeframe for the adoption of ADS-B "In", which would allow not only ground facilities, but suitably equipped other aircraft, to receive the inbound signal. Please remember that a radar uses ground based signals to determine the location and make calculations on the location of the aircraft in their airspace. By receiving better data directly from the source, that is the aircraft, you are freed of many constraints and can make both strategic and tactical decisions in how best to guide that airplane.

Once again, to be successfully implemented, ADS-B requires collaboration between industry and government. The FAA will recognize a substantial savings by reducing the number of ground radars sites while increasing reliability and efficiency. These cost savings should be used to find incentive programs for the early equipping of commercial aircraft. This approach, which was successfully used in the Capstone Program in Alaska, allows for the rapid equipage of aircraft, resulting in a faster implementation and adoption by those users. Faster implementation reduces the cost and increases the benefits for the FAA and users because there is a critical mass of participation before the benefits are realized.

Additionally, the government and industry should push for the careful development of some of the air-to-air ADS-B applications that benefit the users. These applications should result in faster equipage which will result in more benefits.

In January 2009, testing for NextGen accelerated with an agreement to equip US Airways aircraft with ADS-B. The FAA partnership with US Airways and Aviation Communication and Surveillance Systems (ACCS) will equip 20 US Airways Airbus A330s with ADS-B avionics for tests at Philadelphia International Airport.

Under the agreement, the A330s will use both ADS-B "In" and ADS-B "Out" signals. ADS-B "In" is information sent into the cockpit, and will be used to evaluate potential safety improvements on the airport surface; ADS-B "Out" involves an aircraft broadcasting information, such as its location, out to ground stations and other aircraft, allowing controllers to separate traffic.

ATC MODERNIZATION

During the summer of 2008, the NAS saw a record number of delays. Government and industry worked together to implement a series of programs to reduce delays. These programs have had some effect in reducing delays, but more work is needed. Air traffic congestion in flight and on the ground remains a major issue, indeed the crux of the problem. There are physical limits in time and space of capacity, and a major impediment is the ground infrastructure, i.e. concrete runways, taxiways, aprons, and buildings. Each new runway takes an average of over 10 years to design and build and costs billions of dollars. The impacts of noise and pollution regulations are forcing the cost even higher.

Airlines have been forced to increase the scheduled time between departing the gate and arriving at the destination gate. The flight of a propeller driven Douglas DC-7 in the 1950's between Dallas and Atlanta had a shorter *scheduled* time than does a flight today in a Boeing 757. The extra time is necessary to navigate on the ground to and from the runway. At some airports, airlines routinely allocate over 70 minutes just to get from the departure gate to the runway.

Increased airport surface congestion increases the chances of runway incursions and possible collisions. Ground delays cost more than just the extra time. Time delayed due to congestion adds costs for fuel, wear and tear on aircraft, follow on schedule disruptions for crews and aircraft and so forth that collectively amount to billions of nonproductive dollars annually lost due to sitting in traffic.

Industry and government must collaborate on a series of efforts to reduce the challenges of airport surface management, including the use of ADS-B, previously discussed, for increased surface situational awareness for both pilots and controllers. The collaborative use of flight data such as departure time of a flight from the gate and the estimated time before a flight will touchdown can be used by the airport, air traffic control, and airline managers to more effectively and dynamically manage the surface traffic of aircraft and ground vehicles.

The potential benefits of more effective surface management are tremendous. With the rising cost of fuel, less fuel will be consumed taxiing resulting in immediate savings. Reduced taxi time also translates into less noise and emissions. Better knowledge of exactly where the aircraft is on the surface translates into more efficient gate management and will allow the air traffic controller to arrange departures into a more efficient departure stream.

NextGen is the plan — but an architect's plans tend to work out best when the people building the house are actively engaged with the planners. That is the approach that will sustain the forward momentum if we're to achieve success.

Looking at the situation broadly, we face a number of key challenges: We know that the demand for air transportation will grow in the long term. We know that safety, security, and national defense must be sustained, but "improved" is probably a better word to use there. It is not a zero sum game. Aviation's environmental footprint will need to shrink, and tackling the energy costs that are rippling through the system today is essential. Done wisely it will trigger a reduction of operating costs and hopefully increase profitability.

A critical decision in all this will revolve around the aircraft capabilities needed for NextGen success. When it comes to looking at equipage, we've got to start with the airplane. Aircraft capabilities are essential to NextGen. As we've learned from too many of the start-and-stop modernization plans of the past, decisions to implement new avionics-enabled capabilities must be made by industry and government together. And both sides need to be clear on what they're buying into and what return on investment they can achieve. Clarity on proposed aircraft capabilities is especially important and especially challenging. These must be vetted, refined and matured by the aviation community.

The good news here is that many of NextGen's capabilities are already on aircraft now. We've got to build on that success. It is essential that the capabilities selected for NextGen evolve from the capabilities of today. They've got to be both clearly justified and cost-effective.

Given the national significance of these challenges, partnership has to be the order of the day. And everyone must weigh in. Potential capabilities only turn into system performance when both sides make the required investment. Certainly aircraft operators will play a decisive role in the resolution of these challenges. The operators must make focused investments in the key aircraft equipment enablers required to deliver operational capabilities that are going to enable NextGen — including the avionics and other aircraft performance requirements. And operators must have some real assurance not just wishful thinking — that the investments they make in new aircraft and avionics will pay-off.

We need to define exactly how the NAS could operate in 2018. We need to be able to explain how data link, ADS-B, RNP and other existing systems will work together to make things better than they are right now. And most importantly, we need to understand from operators how these systems can translate into business performance. After all, an industry that makes money can invest and upgrade faster than one simply seeking to survive.

An example of this is the new En Route Automation Modernization (ERAM). ERAM is the replacement for the existing host computer for en route centers. ERAM was designed with NextGen in mind. It will support satellite-based systems, such as ADS-B, and data communication technologies. This, in turn, will clear the way for future gains in efficiency and safety. ERAM will begin installations in the 20 air route traffic control centers (ARTCCs) in the next couple of months.

ERAM includes a fully functional backup system and precludes the need to restrict operations in the event of a primary system failure. The backup system also provides safety alerts and weather information not available on today's backup system. ERAM has increased flexibility in routing around congestion, weather and other airspace restrictions. Automatic flight coordination increases efficiency and capacity.

A fully developed NextGen could eliminate as much as 15% of today's delays, increase safety and capacity, and concurrently reduce emissions. Funding of important research activities like wake vortex studies are critical to that full development. More information about and understanding of wake vortex patterns around runways will allow spacing of traffic on the runway based on real hazards – a more accurate standard than the currently used mileage separation. It is critical to continue funding for important infrastructure improvements including runway and taxiway additions and improvements. Poor airport design, including those with intersecting runways, increases taxi time and increases fuel use. Adding high-speed taxiway exits from runways can reduce runway occupancy time thus increasing airport capacity. Additional runways, like those recently commissioned at Seattle-Tacoma, Chicago O'Hare and Washington Dulles airports, reduce fuel wasted in holding patterns and long lines of aircraft waiting for take-off.

Unmanned Aerial Systems (UAS)

The need to modernize extends beyond simply upgrading today's ground and airborne equipment. New concepts and new technology must be integrated. Among the most dramatic changes in technology is the Unmanned Aerial System (UAS). The introduction of UAS to the NAS is a challenging enterprise for the FAA and the aviation community. UAS proponents have a growing interest in expediting access to the NAS. There is an increase in the number and scope of UAS flights in an already busy NAS. The design of many UASs makes them difficult to see, and adequate "detect, sense and avoid" technology is years away. Decisions being made about UAS airworthiness and operational requirements must fully address safety implications of UASs flying in, around, or over the same airspace as manned aircraft, and perhaps more importantly, aircraft with passengers who have come to expect a single level of safety that is the highest in the world.

UAS are aircraft that range in size from as small as a bird, to as large as a Boeing 737. They are flown remotely from an operational center or control stations that can be located at the launch and recovery site or thousands of miles away. Some are capable of "autonomous operation" meaning they follow pre-programmed instructions without direct operator control. Their pilots/operators are not currently required to be FAA licensed pilots or even have a common level of proficiency. Most of the current designs were developed for the Department of Defense (DoD) for use in combat areas and so are not necessarily designed, built, maintained or operated in the same manner as other aircraft in the National Airspace System. As a result, today they are typically flown in segregated airspace, i.e. military restricted airspace or equivalent, but have the clear potential to stray into our airspace in the event of a malfunction.

The UAS industry is currently focused on the rapidly growing DoD UAS application but is moving toward adapting current UAS to civil use. There is growing pressure by the UAS industry to gain access to the NAS as for commercial applications. In order to guarantee an "equivalent level of safety" for UAS in the NAS, extensive study of all potential hazards and ways to mitigate those hazards must be undertaken. The pressure for rapid integration into the NAS must not result in incomplete safety analyses prior to any authorization to operate.

The much-publicized success of UAS in combat operations has created a large potential market for the use of these aircraft by commercial enterprises. Many are also in use domestically by government agencies (law enforcement, customs, agriculture, etc). As the number of these aircraft increase, and the potential for business use increases, so does pressure to allow their unrestricted operation in the NAS. Currently, they are operated in exclusionary airspace and not in the common areas. Before UAS can be authorized to occupy the same airspace as airlines, or operate in areas where UAS might inadvertently stray into airspace used by commercial flights, there needs to be in place a standard or combination of standards that will ensure the same high level of safety as is currently present in the NAS. We can not afford to misjudge this issue in the name of profits.

ALPA believes that in all types of aviation, a well-trained and experienced pilot is the most important safety component of the commercial aviation system. The role of the pilot is a major area of concern within the UAS and piloted aircraft communities. These pilots should be trained, qualified, and monitored to the same standards as pilots that operate aircraft from within the aircraft. ALPA will continue to work to protect the safety and integrity of the NAS and ensure the introduction of UAS operations will not compromise the safety of our members, passengers, cargo or the public at large.

ALPA is in full support of the former FAA Associate Administrator for Aviation Safety Mr. Nick Sabatini, when he said "that UAS should do no harm," when referring to their potential integration into the NAS. The standards for design, construction, maintenance and operation of

UAS must be developed to the point where they operate with the same high level of safety we all expect of commercial aviation before they are allowed unrestricted access to the NAS.

ENVIRONMENTAL CONSIDERATIONS

Aviation in the United States is a vital part of the economy, providing millions of jobs, linking our communities and the world, and making commerce possible. All U.S. aviation combined contributes only about 3 percent of U.S. greenhouse gas (GHG) emissions, and has vastly improved the efficiency of airplanes even as passenger and cargo traffic has grown six-fold over the past 40 years. The industry is committed to address its role in climate change, but progress requires government as an active partner. Environmental concerns have become a competitive weapon between the airlines of North America and those in Europe. Europe is attempting to adopt environmental standards that place the US at an economic disadvantage by not giving aviation credit for technological and operational developments that have reduced aviations GHG emissions.

ALPA's ongoing efforts are focused on ensuring that the aviation industry remains safe and is positioned to recover economically as we address environmental challenges. As our industry seeks to leverage new tools and technologies to help address climate change, airline pilots have a unique perspective from the cockpit. We know what will work and what won't when pilots fly the line. ALPA will remain engaged every step of the way.

In 2008, ALPA called for a comprehensive National energy policy that reduces fuel prices and volatility by controlling rampant speculation, recognizes aviation's contributions to conservation, continues the use of carbon-based fuels without increasing the industry's tax burden, and supports new technology. ALPA's leaders also urged creation of a transportation policy that fosters a viable and functional airline industry and protects the long-term interests of the public and all airline employees.

Strong national policy on energy and transportation is the true solution for the airline industry and the environment. ALPA will continue to work on a bipartisan basis with the U.S. Congress and the Administration to craft a national energy and transportation policy to put our industry—and our country—on the path to sustainability.

A former FAA Administrator and others have dubbed ALPA the "conscience of the airline industry" and, in that role, we take very seriously the need to ensure that any new operational measures are fully understood and thoroughly considered before implementation. Pilots have a unique vantage point to see and experience firsthand what well-intended, but unrealistic operational procedures can do to safety margins.

Another principal reason for our interest in this subject is the need to ensure the ongoing viability, what we call the sustainability, of our airline industry. We recognize all too well that our employers are under tremendous financial stress due to the record high cost of fuel and pressures from environmental concerns to reduce fuel consumption and corresponding emissions. Pilots have a genuine ability to help their airlines burn less fuel, and thereby put less noise and tailpipe emissions into the environment. Pilots look for opportunities to reduce fuel burn and do so every day.

Pilots and the airline industry as a whole have already made great strides toward reducing total fuel burn, noise, and tailpipe emissions. We believe Congress should take this into account when it considers any legislation regarding greenhouse gas (GHG) emissions. Our employers have made extraordinary investments to reduce consumption and pollution. When oil peaked near $140 per barrel, airlines parked airplanes because they could no longer afford to fly them, name-brand legacy carriers looked for mergers in order to survive, airlines were spending about 40% of their revenues on fuel, and airline pilots faced an uncertain future in an industry made unstable because of this energy crisis. In 2008, four ALPA air carriers shut down entirely and more than 14,000 airline jobs were eliminated.

Airlines and aviation face unique challenges concerning fuel efficiency and reduction of emissions. First are the long and expensive lead times for the research, development, design, and certification implementation for new technologies. Second is the lack of any economically viable alternative to fossil-based fuel for our aircraft. Compounding these issues is the lack of a comprehensive national energy policy that addresses the short and long term needs of our transportation systems.

Airline pilots can, and do, save fuel and emissions through our companies' operating procedures. Safety is our utmost concern, of course, but where safety is not impacted, airline pilots will reduce fuel usage through such measures as:

- Outbound taxi with fewer than all engines operating – Under certain conditions, it is not necessary that all aircraft engines be operated to taxi on the ramp or on taxiways. When conditions permit, starting one engine (or more on some aircraft) may be delayed until reaching the end of the runway for takeoff.

- Engine shut-down during inbound taxi – Once the aircraft has exited the landing runway and is headed to the gate or parking stand, one or more operating engines may be shut down either in the taxiway environment or on the ramp.

- Technology enhanced departure procedures – New procedures are being developed with the aid of Area Navigation (RNAV) and Required Navigation Performance (RNP) technology which permit shortening the distance and time traveled during approach and departure.

- Optimal altitude – Each jet aircraft, based on weight and ambient conditions, has an optimum altitude where fuel burn is minimized. To the extent that conditions and circumstances permit, pilots may request that optimal altitude in order to conserve fuel, which reduces emissions. The concepts embodied in NextGen increase the likelihood of these optimal altitudes being flown.

- Optimal-speed flight plans – Planning and operating a flight at an efficient speed can save fuel. Pilots can optimize fuel burn based on aircraft weight, winds, and atmospheric conditions.

- Continuous Descent Arrival (CDA)/Optimized Descent Procedure (OPD) – Normal approach and landing procedures require an aircraft to reduce power, descend to a new altitude, and then add considerable power to level off and fly straight and level – that process may be repeated several times during any approach and landing. A new procedure discussed in NextGen planning, the Continuous Descent Arrival, CDA, or what we sometimes refer to as an Optimized Profile Descent, OPD, is being explored. This concept permits pilots to reduce power on all engines and not use significant thrust until establishing a stabilized approach configuration just before landing. This procedure cannot work at all airports at all times due to operational constraints, but at those locations where it can be used, it can save substantial fuel on a single approach.

- Reduced Vertical Separation Minimum (RVSM) – Taking advantage of improved technology, appropriately equipped aircraft can now fly with 1,000 feet – compared with 2,000 feet previously – vertical separation at higher altitudes. This operational change added six additional useable altitudes increasing the opportunity for pilots to fly their aircraft at the optimal, most fuel efficient altitude, in addition to permitting much greater airspace utilization.

We as pilots do not design the aircraft, make the decision on which aircraft to fly or to what destinations. Our employers do that. We are, however, the ones who, by operating in the most cost efficient manner consistent with safe practices, also operate with the least environmental impact.

The aviation industry arguably has the most successful record of limiting its impact on the environment while increasing its productivity of any industrial sector. Airlines have greatly reduced carbon based emissions through engine technology which reduces fuel burn and production of undesirable gases and particulates. Compared to aircraft in use in 1972, the U.S. airline industry now carries six (6) times more payload using 60% less fuel and has reduced by 95% the number of people significantly impacted by aircraft noise. This outstanding record of environmental achievement has resulted almost entirely from the airlines continually demanding new aircraft from the manufacturers that burn less fuel, carry greater payloads, and create less noise. Boeing is preparing for the first flight of the B-787; due to its cutting edge technology, that aircraft is designed to use 20% less fuel – and thereby create 20% less GHG emissions – than current aircraft of the same size. This aircraft is just one example of the kinds of investments that the airlines make in a very heavily capitalized industry; those investments should be taken into account by any legislation that deals with fuel conservation and GHG emissions.

The government should give greater support to research for alternative fuels which are renewable, pollute less or not at all, and are less expensive than today's fuels. Because of aircraft engine design and extreme atmospheric conditions at altitude, the airline industry relies entirely on petroleum-based jet fuel; it cannot substitute ethanol or other fuels as some industries are able to do.

We call on Congress to avoid adding any economic burdens, in the form of market-based measures, to an already crippled industry. Such measures as planned to take effect in Europe and as were proposed in the Lieberman-Warner bill last year are biased against the airline industry and do not provide sufficient re-investment of revenue for new aviation technologies and fuel. These carbon cap-and-trade schemes are designed to provide an economic incentive to reduce emissions – our industry already has that incentive and is continually searching for more ways to reduce fuel use and emissions. Diverting funds needed for new, more fuel efficient aircraft and alternative fuels research will only slow these efforts. We need to continue to work with the International Civil Aviation Organization (ICAO) to establish real global emissions standards and operating measures for uniform application across this global industry.

Aviation is a good news story; we safely move hundreds of millions of passengers around the world in comfort, at great speed, and with less impact on the environment than any other mode of transportation in history. However, aviation is a visible target and has drawn the attention of numerous groups around the world who condemn the industry for being a driver of projected climate change.

As pilots, we deal with facts, and the facts clearly show that while aviation is a contributor of greenhouse gas and other emissions, it plays a very small role in the overall issue. Indeed, we could ground the entire world's fleets, and not have a significant effect on the climate change issue. The industry is poised to make great strides in reducing emissions through technology and operating procedures. We believe that the best way to achieve those results is the same way that we have made such great advances thus far, namely, through industry's investments in increasingly advanced technology.

SUMMARY

NextGen has the potential to revolutionize the NAS and our air transportation system, but only if private industry and government work together. By collaborating, we have made major strides in the almost 102 years since the Wright Brothers first flew. However, the next 20 years could see major changes in aviation. Forecasted increases in air traffic of two to three times today's traffic can not be met in today's NAS. The changes will be not be cheap or easy and will require much work and effort. As a member of the NextGen Institute, ALPA looks forward to collaborating with industry, academia, and government to meet these challenges.

As 9/11 showed, the air transportation system is a vital driver of our economy. With the number of flights and passengers in the next 20 years forecasted to increase by a factor of two to three, industry and government must once again collaborate to build NextGen. Neither industry nor government can afford to attempt, or are capable of completing, this enormous undertaking alone.

Any measures to address NextGen's Near-term Achievable Goals should be based on the following principles:

- **Air traffic control (ATC) modernization:** The Administration and Congress should work to accelerate the FAA's NextGen plan to modernize our antiquated ATC, communications, navigation, surveillance and management infrastructure; this is vital to safety and efficiency and can bring significant reductions in GHG emissions.

- **Technology and research:** Industry is driven by customer demand and market forces to develop and deploy improvements to the NAS, aircraft, and engines.

- **Alternative fuels:** Industry is partnering with government to drive the research, development and deployment of commercially viable, environmentally friendly alternative jet fuels as well as an unleaded fuel for general aviation.

- **Operational measures:** Aviation has vastly increased the efficiency of its operations to minimize GHG emissions; widespread use of GHG-saving navigation procedures such as continuous descent arrivals (CDA) or as they are also known, Optimized Profile Descents (OPD) awaits ATC modernization.

- **Ground infrastructure investment:** More infrastructure investment is required to address shortcomings at our busiest airports and improve operational efficiency.

- **Economic measures:** Positive incentives can add to the industry's efforts, but fees, charges or taxes, whether direct or indirect, are counterproductive. Should any climate change measures raise revenues, such revenues must be reinvested into initiatives that reduce aviation's GHG emissions.

We must have a plan that offers a systematic approach that builds on better science and improved decision support tools, advanced air traffic procedures, enhanced aircraft technology, sustainable alternative fuels, and policies to address environmental challenges. Advances in aircraft technology and renewable fuels are essential if we are to provide solutions for the energy and climate challenges for the U.S. aviation system. The close partner to this sustainable development is livability, the fourth area of this Administration's priorities. In aviation, this entails a commitment to the flying public to continue to focus on the safety, convenience, and confidence of the traveling public, with minimal environmental impacts on our communities.

Captain Rory Kay
Executive Air Safety Chairman
Air Line Pilots Association, International

Captain Rory Kay serves as Executive Air Safety Chairman for the Air Line Pilots Association, International (ALPA). He represents ALPA pilots in airline safety and engineering matters arising within the industry and government. His responsibilities include the oversight of more than 700 safety representatives from 37 airlines in the United States and Canada as well as budgetary and management supervision of over 200 projects within the ALPA Safety Structure.

Captain Kay is a member of the Steering and Oversight Committee for the ALPA, International Safety Structure and is a former member of the Operations Committee.

Prior to his current appointment, Captain Kay served as Central Air Safety Chairman for the United Airlines MEC. He also worked as Safety Coordinator for the Association of STAR Alliance Pilots (ASAP). Captain Kay attended the crash site of United's flight 93, at Shanksville, PA.

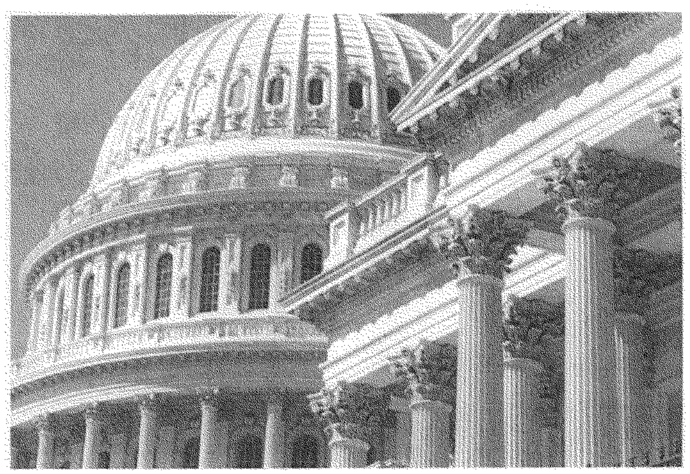
Captain Kay began flying in 1974 and attended the Oxford Air Training School, where he worked as a Commercial Flying Instructor, teaching airline pilot students from all over the world. He subsequently worked as a training and checking pilot for British Aerospace, as well as managing a Flight Department for a diamond mining operation in West Africa.

Currently, Rory Kay is a Boeing 767 and 757 Captain, and Line Check Airman for United Airlines. He is rated on the Boeing 777, 767, 757, 727, and 737, and Airbus 320 & 319 family. He was an FAA Check Captain on the Boeing 727. His total flight time is around 18000 hours. He holds an FAA and UK CAA Airline Transport Pilots License.

Captain Kay is originally from the Channel Island of Guernsey, and currently resides in Warrenton, Virginia with his wife and two children.

ATA TESTIMONY

Air Traffic Control Modernization and NextGen: Near-Term Achievable Goals



Statement of James C. May
President and CEO
Air Transport Association of America, Inc.
before the
Subcommittee on Aviation
of the
House Committee on Transportation and Infrastructure

March 18, 2009

AIR TRANSPORT ASSOCIATION

INTRODUCTION

The time to jump-start air traffic control (ATC) system modernization is now. A meaningful down payment over the next few years will pay dividends in the form of greatly improved system performance and corresponding public benefits.

The shortcomings of the existing ATC system are well known. Technologically, it is outdated and limited in its capabilities. It relies on ground-based radar for surveillance and navigation, and voice communications to relay instructions between controllers and pilots. Compared to modern and emerging technologies, our ATC system is slow and cumbersome. These limitations force operational procedures such as separation standards and indirect point-to-point routings that are inefficient because they appropriately put safety first. Consequently, as U.S. civil aviation has grown and become more complex – including scheduled commercial, nonscheduled business, public and private charter, air taxi and private recreational flying – the ATC system has become strained and, in some geographic areas, overwhelmed. This is especially true when severe winter or summer weather disrupts normal operations. The result is congestion and delay for all system users, unhappy passengers and shippers, and airlines who struggle to recover normal operations and rebook passengers when forced to cancel flights.

The current ATC system limitations impose significant costs on our society in general, and the airline industry in particular. The Joint Economic Committee estimates air travel delays impose $41 billion annually in costs on the U.S. economy.[1] In the 12-month period ending September 2008, 138 million system delay minutes drove an estimated $10 billion in direct operating costs for scheduled U.S. passenger airlines and cost airline passengers an estimated $4.5 billion in lost wages and productivity. These figures do not capture the costs of extra gates and ground personnel to passenger airlines or the direct costs incurred by cargo airlines and their customers. The airline industry cannot survive, and the public will not invest in it, if these conditions remain *status quo*.

Looking forward, these problems will only worsen unless and until change occurs. By 2025, the Federal Aviation Administration (FAA) forecasts there will be approximately 30,000 more operations per day than the 2007 estimate of 44,000 daily operations. The current ATC system cannot handle this projected future demand, even if the forecast is reduced to account for current economic conditions. Even if the forecasted growth is significantly reduced, today's ATC system is so inefficient that it will not be able to handle a modest increase in activity.

Why is this important?

The ATC system is a critical national infrastructure that serves the American people and the commerce of the United States, and all system users rely on it, especially the scheduled airline industry. The airline industry is the foundation of the commercial aviation sector, which comprises airlines, airports, manufacturers and associated vendors. **U.S. commercial aviation ultimately drives $1.1 trillion per year in U.S. economic activity and 10.2 million U.S. jobs.** By any measure, the U.S. airline industry is a valuable national asset and its continued economic health should be a matter of national concern. Without a modern, efficient ATC system, the airline industry will slowly strangle, U.S. commerce and productivity will be impaired and U.S. businesses will not be able to compete effectively in the global economy. For these reasons, modernizing the ATC system now is critically important to the growth and competitiveness of our economy.

ATC MODERNIZATION - NEXTGEN - WILL PROVIDE CRITICALLY NEEDED BENEFITS

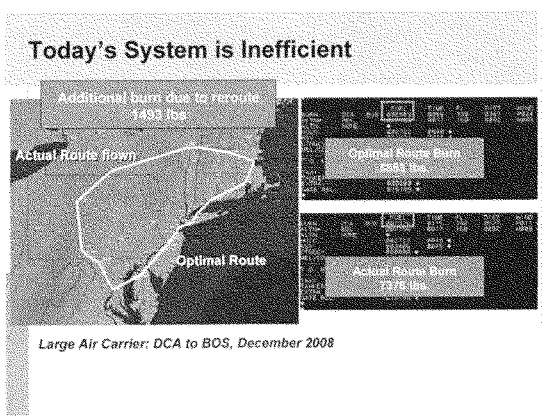
[1] http://jec.senate.gov/index.cfm?FuseAction=Reports.Reports&ContentRecord_id=11116dd7-973c-61e2-4874-a6a18790a81b&Region_id=&Issue_id=

The FAA ATC modernization project – the Next Generation Air Transportation System (NextGen) – will usher in a new era of air traffic management and control that promises enormous benefits for all stakeholders and the American people. Public benefits include improved operational efficiency, reduced fuel consumption and emissions and lower operating costs for airlines. ATA strongly supports NextGen because it addresses numerous critical needs:

- **Capacity.** The current ATC system is saturated and, in some locations, cannot provide the capacity to meet public demand for convenient, safe air transportation. This situation inhibits competition and industry growth. It also is the source of unnecessary congestion and delays, and compounds the effect of weather-related delays. NextGen will enable more precise spacing of aircraft and flight paths, which will allow FAA to handle safely and efficiently the traffic growth that it forecasts.

- **Efficiency and Productivity.** NextGen will enable more efficient flying. Today's ground-based radar system requires planes to fly over specific points on the ground to maintain radar and communications contact. Navigational aids, radar and controllers are all terrestrial. They are linked to form a complex network system that supports airways, through which aircraft fly. Today's system also requires spacing to accommodate the time it takes for radar to detect objects. Consequently, aircraft fly indirect routings and aircraft spacing – required for safety – wastes capacity. Today's ATC system cannot, and never will be able to, take full advantage of available technology or integrate and fully exploit emerging technology.

  The environmental and economic impact of today's inefficient ATC system is illustrated below. The flight in this example burned an additional 1,493 pounds of fuel (218 gallons). This added an extra 4,560 pounds of carbon dioxide (CO_2) that was released into the air and cost the carrier an extra $688 in fuel (given razor-thin margins, this is significant).



In contrast to today's ATC system, NextGen will enable: optimized, direct routings between airports; reduced aircraft spacing; continuous descent arrivals, precise arrival and departure routings (known as RNAV and RNP procedures), and closely spaced approaches on parallel runways in instrument flight rule conditions. These are just a few of the operational benefits of NextGen.

These efficiency enhancements will drive significant improvements in productivity – both in terms of asset utilization and personnel. That, in turn, will reduce operating costs, which will help keep fares down and enable those savings to be plowed back into wages and benefits and operating capital.

Improved ATC efficiency also will benefit private aircraft owners. Corporations use private aircraft with the expectation that such use is efficient. While we disagree with that proposition, ATC modernization will provide corporate aircraft owners the same kind of efficiency benefits that commercial airlines will enjoy if their aircraft are properly equipped. Even if they are not properly equipped, they still will enjoy a spinoff benefit simply from operating in the same airspace as more efficient commercial aircraft.

- **Environmental Benefits.** More efficient operations also will use less fuel, increasing aircraft fuel efficiency and reducing greenhouse gas and other emissions. It was estimated initially that full implementation of NextGen would reduce emissions significantly. The environmental benefits of ATC modernization are real and important. Improved fuel efficiency also will reduce operating costs and contribute to improved financial conditions that, like the productivity improvements discussed above, will benefit the public and employees.

- **Operational Integrity and Customer Satisfaction.** Closely linked to capacity, efficiency and productivity is operational integrity. By expanding capacity and enabling more efficient operations, NextGen will enable better on-time performance and improved customer satisfaction. Today's outdated ATC system contributes to delays and disruptions that could be avoided and will be avoided when NextGen is implemented. With improved operational integrity comes fewer delays, fewer missed connections, fewer misplaced checked bags and more satisfied customers.

- **Safety.** The NextGen satellite-based system will look and act much like a network to which aircraft and ATC are interconnected. It will provide more precise information to both controllers and pilots about aircraft locations, both in the air and on the ground, and will enable aircraft to constantly know one another's locations. This locational awareness and corresponding digital communications capability will provide critical real-time flight status information not available today. Some of the technology and operating procedures already have been tested and produced dramatic results. A sharp drop in aircraft accidents in Alaska occurred under the Capstone Program, introduced earlier this decade, which utilizes ADS-B technology, a foundational technology for NextGen.

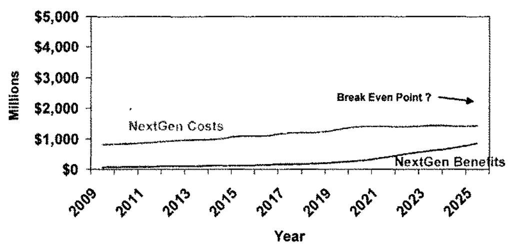
- **Scalability.** NextGen will be considerably more nimble than today's facility- and labor-intensive system. Accordingly, it will be much easier for the FAA to scale the system to meet demand from all aviation sectors, whether that demand is a steady growth curve or fluctuates from time to time. Automation and digital data communications will make it easier for the FAA to adjust the system as needed.

- **Improved Financial Performance.** Modernization will respond to legitimate shareholder expectations that the airlines they invest in will earn a positive return on investment. The current ATC system hobbles the industry's ability to achieve financial stability because of the costs it drives by being inefficient. As noted above, these failures lead to costly delays and congestion.

THE NEXTGEN PLAN FLAW – DELAYED BENEFITS

While we strongly support NextGen, the current FAA plan does not produce significant benefits – the capacity, efficiency and economic benefits described above – for the traveling and shipping public or for system users until 2025. For system users – airlines, business aviation and general aviation – this delay presents a special problem. The plan contemplates significant stakeholder investment, in addition to FAA investment, but no real benefit for many years. Without a timely return on investment, there is little incentive for airlines and other users to invest in new equipment and training. In short, the current FAA plan does not make a strong business case. Airlines, air taxis, charter operators and corporate aircraft owners have a fiduciary responsibility to their shareholders and owners to achieve a reasonable return on their investment in this context, just as they do with respect to any other major capital expense.

Current NextGen Cost/Benefit Projection



Note: Cost projection based on 2009 FAA NextGen budget proposal with 5% annual increase through 2025. Benefit projections based on ATA analysis of estimates by government and industry sources.

This flaw is particularly troublesome given the fragile state of the U.S. airline industry. 2008 saw U.S. airlines lose an estimated $8 billion (final, audited results are not yet available) on top of the $31 billion lost since 2000. Airlines reduced operations sharply and were forced to slash 28,000 jobs in 2008; additional reductions are already in place for 2009 and softening demand will require even further reductions as carriers continue to cut back operations. Should jet fuel prices move sharply upward, the industry could easily see 2009 losses approaching the magnitude of losses in 2008.

THE NEXTGEN SOLUTION: ACCELERATE READY CAPABILITIES TO DRIVE EARLY BENEFITS

The flaws in the NextGen plan can be overcome. There is a real and achievable solution, and that is to advance the point in time when the investment in NextGen begins to pay off for both the public and vested stakeholders. If the public and aviation stakeholders begin to realize the benefits in a few years instead of 10 or more, then the NextGen business case improves dramatically.

To accomplish this critical shift, the government must accelerate its near-term investment in NextGen, with a corresponding reduction in later years, in order to leverage existing technology in the near term. This investment will stimulate accelerated manufacture and installation of ground infrastructure facilities, required avionics, and development and certification of new operations procedures. This proposal includes only those elements that are proven and ready to deploy:

- Automatic Dependent Surveillance-Broadcast (ADS-B) – ADS-B is a critical component of NextGen. By relying upon satellite and additional technology, ADS-B enables an aircraft to constantly broadcast its current position simultaneously to air traffic controllers and other aircraft. Tremendous safety, security, capacity and environmental improvements are realized. Unlike ground radars, ADS-B offers much more precise data on an aircraft's position in the sky or on the runway, including altitude, category of aircraft, airspeed and identification. ADS-B has two components. ADS-B "Out" and "In". ADS-B "Out" continuously transmits an aircraft's position, altitude and intent to controllers. ADS-B "In" is the reception of the transmitted data by other aircraft, which allows pilots to have a complete picture of their aircraft in relation to other traffic, both in the air and on the ground. ADS-B has the potential to reduce delays, reduce fuel burn through more efficient routings, and increase capacity – all while improving safety.

- Area Navigation (RNAV) – enables aircraft to fly on any path within coverage of ground- or space-based navigation aids, permitting more access and flexibility for efficient point-to-point operations.

- Required Navigation Performance (RNP) – like RNAV, RNP enables aircraft to fly on any path within coverage of ground- or space-based navigation aids, but also includes an onboard performance monitoring capability; RNP enables closer en route spacing without intervention by air traffic control, and permits more precise and consistent departures/arrivals.

- Electronic Display Upgrades – will allow the display of traffic information that becomes available with ADS-B deployment and reduce the risk of runway incursions. Whether upgrades to existing forward displays or the addition of a supplemental display (such as an Electronic Flight Bag), users will be able to see other traffic while taxiing and have access to surface navigation tools, electronic versions of airport maps and pilot handbook materials.

- Ground-Based Augmentation System (GBAS) – GBAS is the next-generation technology to support precision landings. It provides additional information to aircraft to allow GPS to be used for landings in low-visibility conditions. This minimizes schedule disruptions due to weather, and also enables more environmentally friendly procedures and increased safety during ground operations.

- Localizer Performance with Vertical Guidance (LPV) – approaches leverage satellite-based precision to improve safety and provide all-weather access at thousands of general aviation airports, critical to the general aviation community.

In addition to accelerating the government's investment in NextGen, we also propose targeted deployment to those metropolitan areas and regions of the country where it is most needed to address congestion and delays, such as New York/Philadelphia, Chicago, Atlanta, San Francisco and Los Angeles. Deploying these capabilities in high-value locations before expanding to other areas will maximize NextGen benefits for the greatest number of people.

To support the earliest possible delivery of benefits and further investment by carriers, we also endorse the FAA "best equipped/best served" principle included in the governing principles of the NextGen 2009 Implementation Plan. Under this principle, consistent with safe and efficient operations, FAA will provide priority in the National Airspace System to Next-Gen equipped aircraft.

Accelerated and targeted deployment will produce significant benefits for the flying public in terms of airspace capacity and efficiency. It will lead to improved reliability and on-time performance, thereby greatly diminishing (if not eliminating) the single biggest source of the public's dissatisfaction with flying. It should also drive improvements in other customer service areas such as checked baggage delivery and long taxi-out times.

OTHER CHALLENGES ALSO MUST BE OVERCOME TO REALIZE NEXTGEN BENEFITS

Investment, equipment and technology development/deployment are critical to delivering the benefits that NextGen promises. But they are not the only critical factors. The operational, environmental and economic benefits of NextGen can still be lost, and the investment in equipment and technology wasted, if other important challenges are not met head-on by the FAA. It is essential that each FAA organization executes its NextGen responsibilities in a timely fashion and that they all work together pursuant to a coordinated and unified strategy that prioritizes NextGen implementation. These challenges include:

- ***Promptly complete airspace redesign.*** FAA has underway a major overhaul of the NY/NJ/PHL airspace that is essential to improving the flow of traffic into, out of and through these metropolitan areas. It will significantly improve operational efficiency in this region and the entire NAS. Because it changes noise patterns, however, it has met stiff local political and public opposition and is the subject of multiple legal challenges. It is imperative that FAA push through these political and legal challenges and stay the course. And it must stay the course as it implements airspace redesign initiatives elsewhere in the NAS, such as Chicago and the West Coast corridor.

- ***Develop new separation standards and approve new operations procedures.*** For NextGen to deliver new capacity and efficiency, the FAA must develop new, reduced separation standards that take advantage of NextGen technological capabilities. In addition to separation standards, FAA also must establish criteria for the development and approval of new operations procedures such as simultaneous operations on closely spaced parallel runways, curved approaches, multiple precise departure paths, continuous descent approaches and optimized profile descents. Bureaucratic roadblocks and turf battles must be avoided. New standards and procedures must be viewed as going hand in glove with new technology.

- ***Controller acceptance and implementation of new procedures.*** FAA must partner with its controller workforce and make them part of the NextGen process. If controllers to not accept new separation standards and utilize new precision operations procedures, then the equipment investment for NextGen will be wasted. FAA must find a way to resolve the contract dispute with the controllers, which to date has served as a roadblock to controller input into NextGen development.

- ***Maintain a sufficient constellation of satellites to meet FAA safety standards.*** There is an assumption that the GPS satellite constellation servicing NextGen surveillance, navigation and communications functions will be adequate to meet stringent FAA safety standards. However, in some models, the minimum number of satellites FAA assumes for its performance-level safety analysis is not sufficient. FAA and the Department of Defense must come to agreement on the minimum satellites needed for NextGen to provide the performance level required by FAA safety criteria, and Congress must provide the necessary funds.

CONCLUSION

We have arrived at a pivotal moment for U.S. aviation. Industry stakeholders support the FAA NextGen program – an event not to be overlooked – and the FAA has developed a comprehensive implementation plan. The plan's flaw, which delays NextGen benefits for too long, can be overcome by an immediate boost in funding to jump-start equipment deployment on the ground and in the air. We urge the Subcommittee to make the rapid, successful implementation of NextGen happen now.

Before the Committee on Transportation and Infrastructure
Subcommittee on Aviation
United States House of Representatives

For Release on Delivery
Expected at
10:00 a.m. EDT
Wednesday
March 18, 2009
CC-2009-044

Federal Aviation Administration: Actions Needed To Achieve Mid-Term NextGen Goals

Statement of
The Honorable Calvin L. Scovel III
Inspector General
U.S. Department of Transportation

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

We appreciate the opportunity to discuss the Federal Aviation Administration's (FAA) development of the Next Generation Air Transportation System (NextGen) and what the Agency can achieve toward this effort in the near and mid term. The National Airspace System is an integral part of the Nation's economy and handles almost 50,000 flights per day and more than 700 million passengers per year.

Developing NextGen is a high-risk effort involving billion-dollar investments from both the Government (new ground systems) and airspace users (new avionics). The challenges with NextGen are multi-dimensional and involve research and development, complex software development and integration for both existing and new systems, workforce changes, and policy questions about how to spur aircraft equipage.

As the Subcommittee is aware, civil aviation faces uncertain times. U.S. airlines have been buffeted by the softening economy and volatile fuel costs. As a result, airlines have taken a considerable amount of capacity out of the system. As of November 2008, airlines reduced scheduled domestic flights by 13 percent and grounded approximately 360 aircraft. However, these airline cutbacks have helped to reduce delays. While 2007 trends in flight delays continued in the first half of 2008 (more than 1 in 4 flights were either delayed or cancelled), delays declined by 24 percent in the second half of the year at most airports. Yet, high levels of delay continued at more heavily congested airports such as Newark International, John F. Kennedy International, and Atlanta Hartsfield-Jackson International.

Notwithstanding the uncertainty facing the industry, FAA is presented with an opportunity to strategically position itself for a rebound in air travel demand. Our work shows that much work remains for FAA to set reasonable expectations for what can be delivered, establish priorities and realistic funding estimates, quantify benefits, and develop viable transition plans for NextGen.

Secretary Lahood is making NextGen one of his top priorities for the Department. The Secretary is committed to providing more clarity with respect to what can be achieved from NextGen investments.

After more than 4 years of planning, FAA must take a number of actions to advance NextGen. My remarks today will focus on four points.

- First, while FAA is developing NextGen, it must also sustain the existing system. This includes maintaining ground-based radars, navigation equipment, and aging facilities. This will be important since about 30 existing projects form platforms for NextGen initiatives.

We found that FAA must make numerous critical decisions over the next several years that will have significant budgetary implications and materially affect the pace of NextGen. For example, FAA must decide what is needed for displays and automation systems that controllers rely on to manage traffic in the vicinity of airports. Costs have not been formally "baselined" but are projected to be around $600 million. Also, FAA will decide whether to restart development of a satellite-based precision approach landing system (Local Area Augmentation System). The costs for this system are projected to be $500 million.

- Second, it will be important for FAA to maintain focus on near-term efforts that can enhance the flow of air traffic. These include new airport infrastructure projects, airspace redesign projects, and performance-based navigation initiatives (i.e., Area Navigation and Required Navigation Performance or RNAV/RNP).

  In our September 2008 report on short-term capacity initiatives, we found that RNAV/RNP routes and procedures have significant potential to enhance capacity, reduce fuel burn, boost controller productivity, and reduce noise emissions.[1] These new routes take advantage of avionics already installed on aircraft and represent an important bridge from today's system to mid-term NextGen goals.

  To reach their full potential, however, RNAV/RNP routes need to be fully integrated with airspace redesign initiatives as future routes shift away from localized operations to "networking" city pairs (e.g., Washington, DC, and Chicago, Illinois). It is also important to note that the more demanding—and beneficial—RNAV/RNP routes are only available to specially equipped aircraft and flight crews.

  To help speed the introduction of RNAV/RNP routes, FAA is relying on non-Government third parties to develop and implement new procedures. At the request of the Chairman, we are examining (1) the extent to which FAA is relying on third parties and (2) whether FAA has sufficient mechanisms in place to provide oversight.

- Third, FAA must complete the "gap analysis" of the current system and the vastly different NextGen system, which is targeted for 2025, and develop an interim architecture or technical blueprint. FAA is focusing considerable attention on NextGen's mid-term goals, now targeted for 2018, but has not reached consensus with stakeholders on how best to move forward, and fundamental issues need to be addressed.

  FAA has begun the gap analysis but will not complete it until this summer. Completing this analysis is important because FAA's documents we reviewed

[1] OIG Report Number AV-2008-087, "Observations on Short-Term Capacity Initiatives," September 26, 2008. OIG reports and testimonies are available on our website: www.oig.dot.gov.

show that mission and performance gaps still exist. Further, while FAA has made progress with developing the interim NextGen architecture, it has not yet developed firm requirements that can be used to develop cost and schedule estimates for modifications to existing programs or new acquisitions.

To help chart a course for NextGen in the mid term, FAA is working with RTCA[2]—a joint FAA/industry forum—to forge a consensus on what should be the top priorities, what should be implemented, and what actions are needed to realize benefits. The RTCA task force is scheduled to complete its work this summer.

- Finally, there are number of business and management actions FAA needs to take to help shift from NextGen planning to mid-term implementation. These include (1) establishing priorities and Agency commitments with stakeholders and reflecting them in budget and plans; (2) managing NextGen initiatives as portfolios and establishing clear lines of responsibility, authority, accountability; (3) acquiring the necessary skill mix for managing and executing NextGen; and (4) examining what can reasonably be implemented in given time increments.

I will now discuss these issues in further detail.

[2] Organized in 1935 as the Radio Technical Commission for Aeronautics, RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance, and air traffic management (CNS/ATM) system issues. It functions as a Federal Advisory Committee.

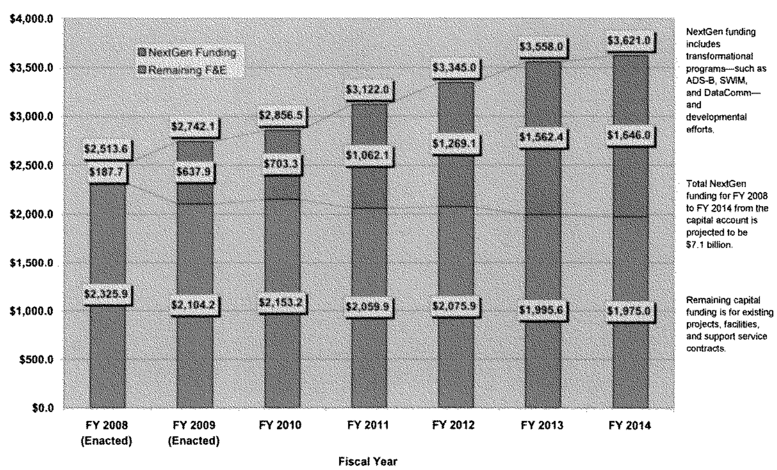
FAA FACES CHALLENGES IN SUSTAINING THE NATIONAL AIRSPACE SYSTEM AND DEVELOPING NEXTGEN

It will be critical for FAA to keep ongoing projects on track—as many form platforms for NextGen—and maintain aging facilities. In 2009, FAA plans to spend $2.7 billion for capital funding, an increase of 9 percent over last year's enacted level. FAA is starting a new chapter in modernization with NextGen, and the Agency's capital account is now being shaped by these initiatives. Between fiscal year (FY) 2008 and FY 2014, FAA plans to spend $22 billion for capital efforts, including $7.1 billion specifically for NextGen projects. We note that much of the projected funding for NextGen is focused on developmental efforts, including demonstration projects.[3]

Perspectives on FAA's Capital Account and NextGen Funding

FAA plans to spend more than $630 million in 2009 on NextGen-related programs, which include a satellite-based system called Automatic Dependent Surveillance-Broadcast (ADS-B) and a new information sharing system called System-Wide Information Management (SWIM). Figure 1 illustrates FAA's planned investments in ongoing projects and NextGen initiatives from FY 2008 to FY 2014.

Figure 1. FAA Capital Funding for FY 2008 to FY 2014
($ Totals in Millions)



Source: FAA

[3] Developmental efforts are funded through the Engineering, Development, Test, and Evaluation portion of the capital account.

In FY 2010, FAA plans to request more than $800 million for NextGen. In addition to specific capital projects totaling $703 million as shown in figure 1, FAA is also requesting $57 million for Research, Engineering, and Development projects, $48 million for support service contracts, $26 million for NextGen-related personnel expenses, and $13 million from the Operations account.

Progress and Problems with FAA Acquisitions

In April 2008, we reported on progress and problems with 18 major FAA acquisitions valued at $17.5 billion.[4] Overall, we are not seeing the significant cost growth and schedule slips with FAA major acquisitions that occurred in the past. This is because FAA has re-baselined[5] a number of efforts and taken a more incremental approach to managing major acquisitions. When comparing revised baselines, only 2 of the 18 projects we reviewed have experienced additional cost growth ($53 million) and delays (5 years) since our last report in 2005.[6] However, from program inception, six programs have experienced cost growth of nearly $4.7 billion and schedule delays of 1 to 12 years.

While FAA's incremental approach may reduce risk in the near term, it has left several programs with no clear end-state and less visibility into how much they will ultimately cost. A case in point involves modernizing facilities that manage traffic in the vicinity of airports, which is commonly referred to as "terminal modernization."

We are concerned that there is no defined end-state for terminal modernization, and past problems with developing and deploying STARS leave FAA in a difficult position to begin introducing NextGen capabilities. Future terminal modernization costs will be shaped by (1) NextGen requirements, (2) the extent of FAA's terminal facilities consolidation, and (3) the need to replace or sustain existing (legacy) systems that have not been modernized.

FAA Must Make Several Critical Decisions To Successfully Transition Current National Airspace Systems to NextGen

According to FAA, approximately 30 existing capital programs will serve as "platforms" for NextGen. For example, the $2.1 billion En Route Automation Modernization (ERAM) program, which provides new hardware and software for facilities that manage high-altitude traffic, is a linchpin for the NextGen system. Because ERAM is expected to serve as a foundation for NextGen, any schedule delays will affect the pace of introducing new capabilities.

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[4] OIG Report Number AV-2008-049, "Air Traffic Control Modernization," April 14, 2008.
[5] Re-baselining a project is important to establish reliable cost and schedule parameters. It is consistent with Office of Management and Budget guidance for managing major acquisitions.
[6] OIG Report Number AV-2005-061, "Status of FAA's Major Acquisitions: Cost Growth and Schedule Delays Continue To Stall Air Traffic Modernization," May 26, 2005.

In February 2007, we recommended that FAA examine existing modernization projects to determine if they were still needed and, if so, what adjustments would be required.[7] FAA concurred with our recommendation and stated that it had begun this assessment. Over the next 2 years, FAA must make numerous critical decisions about ongoing programs. We identified five areas involving decisions that will have significant budgetary implications and affect the pace of NextGen in the mid term (see examples in table 1).

Table 1. Critical Decisions for Existing Systems

Critical Decision Area	Description
Terminal Modernization	FAA plans to make an initial investment decision on how to modernize displays and computers that controllers use to manage traffic in the vicinity of airports. Currently, costs have not been baselined but are projected to be around $600 million. A final investment decision leading to a contract award is expected in late 2010.
Satellite-Based Navigation and Landing Systems	In 2009, FAA plans to decide to restart development for the Local Area Augmentation System (LAAS).[8] Costs have not been baselined but are projected to be around $500 million. FAA will also decide in 2009 if additional enhancements will be needed for the Wide Area Augmentation System (WAAS). Planning documents we reviewed suggest modifications to WAAS could cost as much as $1.5 billion.
Traffic Flow Management	FAA relies on Traffic Flow Management to manage traffic and reduce the impacts of bad weather. This year, FAA plans to decide what additional capabilities will be incorporated into the system. This decision is for the collaborative air traffic management Work Package 3. Costs have not been baselined, but FAA projects they will be about $450 million.
En Route Automation	FAA plans to make initial decisions in FY 2010 on what adjustments will be made to the $2.1 billion ERAM system. Costs remain uncertain but could be in the billions of dollars.
Data Communications	FAA plans to make the final investment decision for the first segment of Data Communications in FY 2010. Costs are uncertain, but the Segment 1 investment decision is expected to include $400 million specifically for upgrades to ERAM.

Note: Cost projections for FAA projects have not been baselined.

[7] OIG Report Number AV-2007-031, "Joint Planning and Development Office: Actions Needed To Reduce Risks With the Next Generation Air Transportation System," February 12, 2007.

[8] The Local Area Augmentation System (LAAS) is a ground-based augmentation to GPS that focuses its service on the airport area for precision approach, departure procedures, and terminal area operations. LAAS is expected to provide the extremely high accuracy, availability, and integrity necessary for Category I, II, and III precision approaches and will provide the ability for flexible, curved approach paths.

FAA Faces Significant Challenges with Key NextGen Transformational Programs

FAA has established initial cost and schedule baselines for the first segments of two key NextGen initiatives: ADS-B and SWIM. Our work shows that both programs face considerable risk associated with development and implementation and will require significant oversight.

ADS-B

In August 2007, FAA awarded a service-based contract for the ADS-B ground infrastructure worth $1.8 billion (if all options are exercised). FAA estimates that ADS-B will cost about $1.6 billion in capital costs for initial implementation segments through 2014, including a nationwide ground system for receiving and broadcasting ADS-B signals. In FY 2009, FAA plans to spend $300 million on ADS-B—the largest single budget line item for an acquisition.

A key challenge facing FAA—and NextGen implementation—is realizing the full benefits of ADS-B. FAA plans to fully implement the *ADS-B Out* phase in the 2020 timeframe, which will require aircraft to broadcast their position to ground systems. However, most capacity and safety benefits from the new system will come from *ADS-B In*, which will display information in the cockpit for pilots. FAA has not yet finalized requirements for *ADS-B In*.

Our work shows that FAA must address several risks to realize the benefits of ADS-B. These include: (1) gaining stakeholder acceptance and aircraft equipage, (2) addressing broadcast frequency congestion concerns, (3) integrating with existing systems, (4) implementing procedures for separating aircraft, (5) assessing potential security vulnerabilities, and (6) finalizing requirements for *ADS-B In* and new cockpit displays. Given FAA's history with developing new technologies and its approach to ADS-B, in which the Government will not own the ground infrastructure, this program will require a significant level of oversight. We will report later this year on the risks facing ADS-B and the strengths and weaknesses of FAA's contracting approach.

SWIM

In June 2007, FAA baselined the first 2 years of segment 1 of SWIM (planned to occur between FY 2009 and FY 2010) for $104 million. FAA's latest Capital Investment Plan cost estimate for SWIM is $285 million. We are currently examining the overall status of SWIM and the risks facing a nationwide deployment.

Challenges facing the program include determining requirements and interfaces with other FAA systems, including ERAM and Air Traffic Management programs. Moreover, FAA must integrate SWIM with other Federal agencies' operations to realize NextGen benefits and develop a robust cyber security strategy and design.

FAA also needs to establish the architecture, strategy, and overall design for SWIM. Finally, FAA has yet to determine additional segments and the cost to fully implement the program. As a result, FAA is pursuing SWIM in a decentralized way and providing other programs with funds to develop interfaces with the system.

Sustaining FAA's Vast Network of Aging Facilities

A key cost driver for NextGen is determining to what extent FAA realigns or consolidates air traffic control facilities. This has significant cost implications for the number of controller displays and related computer equipment needed to manage traffic. In the American Recovery and Reinvestment Act,[9] Congress provided FAA with $200 million for FAA facilities.

In December 2008, we reported that many FAA air traffic control facilities have exceeded their useful lives, and their physical condition continues to deteriorate.[10] In some cases, facilities deteriorated so badly that they required urgent and repeated actions. While the average facility has an expected useful life of approximately 25 to 30 years, 59 percent of FAA facilities are over 30 years old (see table 2).

Table 2. Average Age of FAA Facilities

Type of Facilities	Average Age
Air Traffic Control Towers	29 years
Terminal Radar Approach Control Facilities	26 years
En Route Control Centers	43 years

Source: FAA

FAA points out that flexible ground communication networks do not require facilities to be near the traffic they manage. FAA often cites its aging facilities and the related expense of maintaining such a large number of facilities to justify consolidating the air traffic control system into a smaller number of facilities. However, there are technical and security prerequisites for major consolidation, such as implementing new "voice switching" technology to allow for more flexible communication and enhanced automation.

FAA's 2007 reauthorization proposal called for a "Realignment and Consolidation of Aviation Facilities Commission" to conduct an independent review and make recommendations to the President. The current House reauthorization proposal (H.R. 915) also recognizes the issue of consolidation and the need for further examination.

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[9] Pub. L. No. 111-5 (2009).

[10] OIG Report Number AV-2009-012, "FAA's Management and Maintenance of Air Traffic Control Facilities," December 15, 2008.

FAA plans to spend $17 million in FY 2009 to examine various alternatives for revamping its facilities. FAA should ensure that this analysis clearly addresses the technological and security prerequisites as well as key cost drivers, benefits, and logistical concerns associated with consolidations so decision makers in Congress and the Administration will know what can reasonably be accomplished. This is a critical action item because until important, strategic decisions are made regarding consolidations, FAA will be unable to define its long-term funding capital requirements.

SEVERAL NEAR-TERM EFFORTS ARE IMPORTANT TO ENHANCE THE EFFICIENCY OF THE NATIONAL AIRSPACE SYSTEM

Because of the developmental nature of many NextGen initiatives, it will be important to keep a number of near-term efforts on track. At the request of the Chairman, we examined in September 2008 what initiatives have the most potential to enhance capacity and reduce delays within the next 5 years. We found that, while there is no "silver bullet," there are several initiatives that can help boost capacity and enhance the flow of air traffic even before NextGen is fully in place.

New Airport Infrastructure

According to FAA, building new runways provides the largest increases in capacity. Currently, there are four key runway projects underway at Boston, Charlotte, Chicago (O'Hare), and New York (John F. Kennedy) airports. These projects are expected to be complete by 2014. These capacity benefits, however, cannot be realized without new air traffic control procedures and improved airspace redesign.

Challenges that could impede the progress of new runway projects include the years of planning required, extensive environmental reviews, coordination among numerous stakeholders, and legal issues. Another challenge is making corresponding improvements to an airport's infrastructure (e.g., terminal gates and passenger waiting areas) to accommodate the increased traffic. Unfortunately, building a new runway is not an option for some airports, like New York's LaGuardia Airport, which does not have the physical infrastructure to support a new runway.

Airspace Redesign

Airspace redesign efforts are critical to realize the full benefits of runways and can enhance capacity without new infrastructure. Currently, FAA is pursuing six airspace redesign projects nationwide, including a major but controversial effort to revamp airspace in the New York/New Jersey/Philadelphia area. Once implemented, FAA believes this effort could reduce delays by as much as 200,000 hours. FAA plans to spend $11.2 million on airspace redesign projects in FY 2009.[11]

FAA has done a better job of coordinating airspace changes with Agency stakeholders and linking projects to its capital account[12] since we reported on the airspace redesign program in 2005.[13] We remain concerned, however, that FAA's airspace redesign efforts still do not function as a "national" program since FAA facilities are now using their own resources to redesign airspace without coordinating with Headquarters. There are still challenges concerning roles and responsibilities and decision-making authority for airspace redesign efforts. FAA is developing procedures to address this problem, but those have yet to be finalized.

Performance-Based Navigation Initiatives

FAA is pursuing two initiatives that rely on aircraft avionics for improved route precision: RNAV and RNP. RNAV allows aircraft to fly any desired flight path without the limitations imposed by ground-based navigation systems. RNP adds an on-board performance monitoring and alerting capability for pilots and allows aircraft to fly more precise flight paths into and out of airports. This reduces fuel burn, boosts controller productivity, reduces noise emissions, and increases capacity.

The development of RNAV/RNP routes has gained considerable industry support. For example, Southwest Airlines announced plans to spend $175 million to equip at least 500 aircraft and train over 5,800 pilots over the next 6 years to implement RNAV/RNP.

As of February 6, 2009, FAA has published more than 500 routes and procedures and made this capability available at more than 100 airports. In 2008, FAA published 49 RNAV routes and 63 RNP procedures. The Agency intends to publish at least 50 RNAV and 50 RNP procedures for FY 2009 and at least that same amount per year through FY 2012, with priority given to new routes for airports in the congested New York, Chicago, and Dallas areas.

Challenges facing this initiative include close coordination with airspace redesign as future RNAV/RNP routes shift away from localized operations toward "networking" routes between city pairs (e.g., Washington, DC, and Chicago, Illinois). It is also important to note that current RNAV/RNP routes are only available to well-equipped aircraft and trained aircrews, and air carriers must meet certain qualifications to fly

[11] For FY 2009 FAA has requested $11.2 million in funding from its operations and capital accounts, totaling $8.2 million and $3 million, respectively.

[12] Prior to 2007, FAA's airspace program was funded solely from the Operations account. By linking each project's requirements to both the operations and capital budgets, the Agency will be better able to address procedural, environmental, technical, and staffing requirements to complete projects.

[13] OIG Report Number AV-2005-059, "Airspace Redesign Efforts Are Critical To Enhance Capacity but Need Major Improvements," May 13, 2005.

these special airport approaches.[14] To get the full benefits of RNAV/RNP, modifications to FAA automation systems will likely be required.

To help speed the introduction of RNP, FAA is relying on non-Government third parties to develop and implement new procedures. At the request of the Chairman, we started a review last month focusing on FAA's plans to oversee these parties' activities. Our objectives are to (1) assess the extent to which FAA is relying on third parties for the development of new procedures and (2) determine whether FAA has established sufficient mechanisms and staffing to provide safety oversight of third parties.

FAA MUST COMPLETE A GAP ANALYSIS AND REFINE THE MID-TERM NEXTGEN ARCHITECTURE

Last April, FAA concurred with our recommendation to conduct a "gap analysis" of the current National Airspace System and the vastly different NextGen system and develop an interim architecture for the 2015 timeframe. Completing this analysis and refining other key NextGen planning documents would help highlight transition issues and establish requirements that could be used to develop reliable cost and schedule parameters for NextGen. Also, important policy questions exist about how to spur aircraft equipage and how to best organize FAA to manage and execute NextGen

FAA Must Address Key Planning Elements To Achieve NextGen's Mid-Term Goals

FAA is focusing considerable attention on mid-term goals for NextGen, which are planned for the 2018 timeframe. However, we found that FAA needs to address fundamental issues with three key elements to achieve these goals.

Gap Analysis of the Current and NextGen Systems

This effort is important because FAA intends to rely on existing automation systems to provide the basis for NextGen through the mid-term phase of the effort. A key question focuses on the most cost-effective way to implement changes for displays and computers that controllers use to manage traffic in the vicinity of airports. FAA has begun this analysis and expects to complete it this summer.

NextGen Implementation Plan

FAA's January 2009 plan[15] provides a framework for what NextGen will resemble in 2018 and reflects the need to link FAA and stakeholder investments. However, FAA and stakeholders point out that the plan does not yet reflect a consensus on how to move forward, and much work is required to set priorities, quantify expected benefits,

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[14] In this case, we are referring to special instrument flight procedures that are known as RNP Special Aircraft and Aircrew Authorization Required (SAAAR). RNP SAAAR is the certification required by FAA to allow aircrew to use RNP avionics during RNP approaches. RNP SAAAR helps aircraft fly more precise approaches and departures, thereby increasing operational efficiency and reducing operating costs, noise, and emissions.

[15] FAA's *NextGen Implementation Plan*, January 30, 2009.

address integration issues, and clarify timing and location of equipment needs. In addition, the plan will need to illustrate the operational, regulatory, policy, and procedural issues that need to be resolved to implement NextGen capabilities. Also, stakeholders point out that the plan does not yet clearly assign responsibility, authority, or accountability for mid-term initiatives.

NextGen Mid-Term Architecture

FAA has made progress in developing components of a general blueprint for the 2018 timeframe. It has also developed "road maps" for, among other things, automation, communication, navigation, and surveillance efforts. FAA's current blueprint highlights more than 340 key decisions that it must make to reach the envisioned mid-point NextGen architecture. However, FAA has not yet established firm requirements that can be used to develop the cost and schedule estimates for modifications to existing programs or new acquisitions. FAA's documents caution that ground systems continue to be developed from "the bottom up,"[16] which results in mission and performance gaps. Further, air and ground elements are not yet synchronized, and FAA must determine which trade-offs to make regarding which capabilities will reside in aircraft versus FAA ground systems. FAA officials told us they expect to complete these efforts later this summer.

To help chart a course for NextGen in 2018, FAA tasked RTCA (a joint Government/industry forum) to forge a community-wide consensus on what should be implemented and what actions will be needed to realize benefits. The RTCA task force has an ambitious agenda; it is expected to make recommendations to help FAA prioritize efforts, frame the business case for new systems (for FAA and airspace users), and define the necessary actions to achieve benefits in 2018. The task force plans to complete its work this summer.

NextGen Implementation Presents Congress with Important Policy Questions

NextGen planning documents call for users to equip with a range of new avionics including ADS-B, data link for communications for controllers and pilots, and new navigation equipment. Stakeholders have argued that $4 billion of stimulus funds should be used to equip aircraft and accelerate NextGen efforts, including $2 billion specifically for ADS-B. Congress did not provide funds in the American Recovery and Reinvestment Act of 2009 to help airspace users equip with NextGen systems, but the issue remains important in how FAA moves forward with NextGen in the mid term.

[16] FAA's "bottom-up" approach focuses on the modifications to existing systems. This approach is evolutionary and is a necessary step but creates the risk of building in overly complex integration solutions, replicating requirements in multiple systems, and increasing related costs. A "top-down" approach, conversely, would focus more on where to put key NextGen capabilities and seek ways to reduce complex integration issues Both approaches are needed to help arrive at the most cost-effective way to implement NextGen.

As stakeholders point out, there is a precedent for helping airspace users equip specifically with ADS-B avionics. FAA purchased ADS-B avionics for operators in Alaska as part of the Capstone initiative.[17] This provided a base of properly equipped aircraft and allowed FAA to examine the costs and benefits of the new technology.

In a recent report on implementing ADS-B, stakeholders noted that incentives for ADS-B deployment could take a number of forms.[18] These include purchasing equipment for operators, an investment tax credit, an adjustment to current excise taxes for ADS-B-equipped aircraft, or research and development tax credits specifically for avionics manufacturers.

Whether such incentives should be used is a policy decision for Congress. However, FAA has never managed such a large effort to equip aircraft in the continental United States. A clear understanding of exactly what the incentives would be used for is needed, especially because FAA has not finalized the requirements for key capabilities, such as *ADS-B In*. In our opinion, a full consideration of the strengths and weaknesses of various incentives as well their timing and potential impact is critical. One possibility is cost-sharing arrangements, which have merit because they distribute risks between the Government and airspace users. FAA could also use incentives to demonstrate and refine NextGen capabilities and provide detailed information on how to certify equipment, such as new cockpit displays.

Observations on FAA's Reorganization of NextGen Efforts

The question of whether FAA is properly organized to implement NextGen is important because it will drive the success of the effort. NextGen development cuts across all lines of the FAA's Air Traffic Organization (ATO). It also involves FAA's airport and certification offices. We believe that clear lines of accountability and budget authority will be essential for managing NextGen.

The overall governance of the NextGen effort has been the subject of debate, and stakeholders have raised concerns that FAA is not properly organized to manage or execute a multibillion-dollar effort. Furthermore, there continues to be friction between the ATO and Joint Planning and Development Office (JPDO), which was mandated by Congress to pursue a multi-agency approach for NextGen. This friction is due in part to vastly different planning horizons. The ATO is an organization that operates constantly but has a short planning horizon. The JPDO, on the other hand, is focused on planning how to introduce cutting-edge technologies and transform the National Airspace System by the 2025 timeframe.

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[17] The Capstone Project was a joint industry and FAA research and development effort to improve aviation safety and efficiency in Alaska. Under Capstone, FAA provided avionics equipment for aircraft and the supporting ground infrastructure.

[18] Report from the ADS-B Aviation Rulemaking Committee to the Federal Aviation Administration, "Recommendations on Federal Aviation Administration Notice No. 7–15, *Automatic Dependent Surveillance—Broadcast (ADS–B) Out Performance Requirements to Support Air Traffic Control (ATC) Service; Notice of Proposed Rulemaking*," September 26, 2008.

In May 2008, FAA announced a reorganization of its NextGen efforts, which included establishing a Senior Vice President for NextGen and Operations Planning within the ATO; this individual reports to the ATO Chief Operating Officer. FAA has also established an office for NextGen Integration and Implementation to support the Senior Vice President.

Under this framework, the JPDO now reports to the Senior Vice President for NextGen and Operations Planning. In the past, the JPDO reported directly to the FAA Administrator and the Chief Operating Officer. While FAA believes the change will help move NextGen concepts closer to implementation, it could also give the appearance that the JPDO has been reduced in stature and importance. We offered observations on this matter last September.[19]

- First, the roles and responsibilities of the JPDO and the ATO office for NextGen Implementation and Integration need better definition. According to FAA, the JPDO will focus on long-term planning and interagency cooperation while the ATO will focus on more short-term efforts and other implementation issues. However, it is difficult to establish clear demarcation lines because implementing NextGen capabilities depends heavily on modifying existing modernization projects. Both offices will have budget functions, modeling and simulation capabilities, and architecture staffs. Because both offices will help to shape research and development plans, it will be important for FAA to establish clearly defined roles and responsibilities.

- Second, while the ATO's Senior Vice President for NextGen and Operations Planning will manage demonstration projects, other ATO Vice Presidents will manage major modernization projects considered to be essential platforms for NextGen. For example, the Vice President for En Route Services manages multibillion-dollar efforts like ERAM and ADS-B. SWIM, however, will be managed by the Vice President for Technical Operations. Similarly, the Vice President for Terminal Services manages efforts to modernize controller displays and computer equipment located in the vicinity of airports. Also, airports—which play a key role in NextGen—are managed by a different FAA office that is outside the ATO.

  The Senior Vice President for NextGen and Operations Planning stated that she will be responsible for the integration and implementation of all NextGen elements even though most elements will be managed and executed by other ATO service units and lines of business. The NextGen and Operations Planning Office will rely on coordination and a commitment monitoring process. However, FAA has little experience with relying on this approach for managing and executing

[19] OIG Testimony Number CC-2009-118, "The Status of FAA's Efforts To Develop the Next Generation Air Transportation System," September 11, 2008.

NextGen initiatives. An FAA-commissioned study that examined skill sets for NextGen cautions that while the Senior Vice President for NextGen has overall responsibility for leading the transition to NextGen, the authority delegated to this position is weakened by, among other things, fragmented decision-making that may affect the timeliness and quality of key program decisions.

- Third, the new management structure will be challenged by complex, cross-cutting Government issues. For instance, in our opinion, it will be challenging for an office within the ATO to work out agreements with Department of Defense and Department of Homeland Security on major decisions affecting surveillance and airspace security. FAA must clearly communicate that the change in organizational structure is not a lessening of the Agency's commitment to a multi-agency approach for developing NextGen.

In November 2008, the President issued an executive order to reestablish modernizing the aviation system as a national priority. The order designated the Secretary of Transportation as responsible for implementing NextGen. Specific direction to the Secretary included convening quarterly meetings of the NextGen Senior Policy Committee[20] and establishing within the Department a support staff that would include employees from other departments and agencies to support NextGen.

FAA will likely have to revisit the question of NextGen governance once it has a better understanding of what will be required to develop and implement NextGen. How best to organize FAA is a policy call for Congress. We note that the House Reauthorization proposal (H.R. 915) would establish an Associate Administrator for NextGen who would report directly to the FAA Administrator. We believe such an approach has merit as the cross-cutting nature of the NextGen effort will require close coordination of multibillion-dollar investments from industry and other Federal agencies.

FAA NEEDS TO COMPLETE SEVERAL BUSINESS AND MANAGEMENT ACTIONS TO ADVANCE MID-TERM EFFORTS

We have made numerous recommendations to FAA to help it move forward with NextGen. These include developing an interim architecture, assessing the skill mix with respect to necessary systems integration and contracting, and focusing human factors research to ensure concepts can be safely implemented. At this time, FAA must move beyond planning and advance NextGen.

[20] The Senior Policy Committee (SPC) was mandated by Congress in Vision 100 – Century of Aviation Reauthorization Act (Pub. L. No. 108-176). The SPC is chaired by the Secretary of Transportation, and membership includes senior representatives of NextGen partner agencies The SPC is intended to advise the Secretary on policy, national goals, and strategic objectives for the transformation of the Nation's air transportation system.

To do so, FAA needs to take the following business and management actions:

- **Establish priorities and Agency commitments with stakeholders and reflect them in budget requests.** It remains difficult for decision makers to determine what to invest in first from the wide range of operational improvements in NextGen planning documents. Stakeholders have asked for a clear articulation of the timing, location, and assignment of responsibility for NextGen capabilities. This past year, FAA has worked to shape priorities and identify core capabilities. However, the Agency must do more and work with stakeholders to identify the proper sequencing of efforts. Also, stakeholders have asked FAA to clearly state mid-term Agency and operator commitments in its NextGen Implementation Plan. FAA should continually work to provide this Subcommittee with a clear understanding of its NextGen priorities and commitments and reflect them in budgets and plans.

- **Manage mid-term initiatives as portfolios and establish clear lines of responsibility, authority, and accountability for NextGen efforts.** FAA must manage NextGen capabilities as portfolios because several systems, new procedures, and airspace changes funded through different accounts will be required to deliver benefits. FAA is developing various portfolios and understands the need to manage them in an integrated fashion. However, as an FAA study points out, FAA's Acquisition Management System was not designed for managing NextGen investments.[21] Rather, FAA's system focuses on baselines and specific capital programs—not a collection of investments. FAA recognizes that it must modify its system to effectively manage multiple NextGen efforts. FAA could also strengthen its NextGen Implementation Plan by clearly assigning responsibility, authority, and accountability for specific NextGen portfolios.

- **Focus attention on the relief that various NextGen technologies can provide to already congested airports in major metropolitan areas, like New York and Chicago.** An important metric for NextGen is to what extent FAA can improve *airport arrival rates* under various weather conditions. FAA recognizes the importance of this and is shifting resources to this issue. The Agency plans to spend $37.1 million in FY 2009 on Flexible Terminals and Airports and $18.2 million on high-density arrivals and departures. However, FAA's efforts to examine "high-density operations" are in the very early stages, and planning documents and budget requests thus far do not detail how individual NextGen systems can specifically boost airport capacity and reduce delays. Decision makers and stakeholders need to know what elements—ADS-B, new routes, and data link communications for controllers and pilots—are essential to improve capacity at already congested airports.

[21] "Independent Assessment of FAA Acquisition Management System," April 22, 2008.

- **Acquire the necessary skill mix to effectively manage and execute NextGen.** In response to our February 2007 report, FAA commissioned the National Academy of Public Administration to assess the skill sets needed for NextGen. In its September 2008 report, the Academy identified 26 competencies where FAA lacks both capacity and capabilities to accomplish NextGen implementation.[22] These include experience in large-scale systems acquisition and integration. FAA has identified an additional 175 staff positions that it plans to fill in 2009 and another 162 positions for 2010 to address identified skill requirements.

- **Develop a realistic plan for implementing ADS-B and realizing the air-to-air benefits of the new technology.** FAA has a contract in place for ADS-B and has published a Notice of Proposed Rulemaking (NPRM) calling for users to equip with *ADS-B Out* in the 2020 timeframe. FAA has received comments from 177 organizations or individuals about the details of the NPRM. While most agree that ADS-B is an important part of the future, some raised concerns about requirements, the cost of equipage, and lack of clear benefits—all legitimate issues that will need to be resolved. To advance ADS-B, FAA must expedite efforts to establish requirements for *ADS-B In* and cockpit displays.

- **Assess "implementation bandwidth" and develop transition benchmarks.** FAA's ability to implement multiple capabilities in a given time period needs to be assessed. There are limits to what can be accomplished given the scope of change envisioned and ongoing efforts. For example, FAA has staggered key NextGen capabilities, such as data link communications, to wait for the completion of ERAM in the 2012 timeframe. Further, FAA and the industry need realistic transition benchmarks that point to when new training (for controllers and pilots), equipment (new avionics and ground systems), and procedures need to be in place at specific locations.

In summary, FAA faces a number of critical decisions in the next year. A clear picture of FAA priorities and an executable path for NextGen should emerge sometime this summer when the RTCA task force completes its work. A considerable level of oversight will be required, and we will continue to monitor progress with this important program.

That concludes my statement, Mr. Chairman. I will be happy to answer any questions that you or other Members of the Subcommittee may have.

[22] Report by a panel of the National Academy of Public Administration, "Identifying the Workforce to Respond to a National Imperative - The Next Generation Air Transportation System (NextGen)," September 2008.

U.S. House of Representatives
Committee on Transportation and Infrastructure

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Chairman

David Heymsfeld, Chief of Staff
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Washington, DC 20515

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Ranking Republican Member

James W. Coon II, Republican Chief of Staff

March 24, 2009

The Honorable Calvin L. Scovel
Inspector General
U.S. Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Inspector General Scovel:

On March 18, 2009, you appeared as a witness before the Subcommittee on Aviation hearing on NextGen. I thank you for your participation and ask that you provide written responses to the Committee on the following questions-for-the-record:

- I understand that in standing up the Senior Policy Committee staff director's office, a detailee appointment was probably appropriate for timely action on the executive order. Should the Senior Policy Committee staff director be established as a permanent position within the Office of the Secretary of Transportation, or should it continue to be filled by detailees?

- RNAV and RNP routes can offer more efficient and automated approaches to airports, and potentially even for end to end flight. With regard to questions raised about third-party development of RNAV and RNP routes, can the FAA's development of these routes keep pace with the demand for these more efficient routes?

- How many RNAV and RNP procedures does the FAA produce each year? Also, do the routes developed by the FAA always meet the needs of airspace users?

Thank you for your kind attention to this letter and please contact Holly Woodruff Lyons or Bailey Edwards at (202) 226-3220 if you have any questions.

Sincerely,

Thomas E. Petri
Ranking Republican Member
Subcommittee on Aviation

Congressman Petri's QFR 1

ROLE OF THE SENIOR POLICY COMMITTEE STAFF DIRECTOR

Question: I understand that in standing up the Senior Policy Committee's staff director's office, a detailee appointment was probably appropriate for timely action on the executive order. But should the Senior Policy Committee staff director be established as a permanent position within the Office of the Secretary of Transportation, or should it continue to be filled by detailees?

Answer: The Senior Policy Committee has played an important role in shaping NextGen and advancing the multi-agency approach as mandated by law. Therefore, we believe that the staff director should be established as a permanent position within the Office of the Secretary. This would clearly demonstrate a commitment to NextGen and ensure continuity for a multibillion-dollar effort that will require significant management attention from the Department.

Congressman Petri's QFR 2

FAA Development of RNAV/RNP Routes

Question: RNAV and RNP routes can offer more efficient and automated approaches to airports, and potentially even for end to end flight. With regard to the questions raised about third-party development of RNAV and RNP routes, can the FAA's development of these routes keep pace with the demand for these more efficient routes?

Answer: The development of RNAV/RNP routes has considerable industry support. However, there is substantial debate among industry and FAA regarding this issue. Various aviation industry groups have expressed concerns that FAA will not be able to accommodate the growing demand for new routes. Yet, FAA officials that we spoke with believe they can keep pace with industry demand. FAA claims that it is fully capable of meeting NextGen goals for RNAV/RNP development. Our review of FAA's development of RNAV/RNP procedures is underway, and we are not yet in a position to make a final determination on this matter.

Congressman Petri's QFR 3

Number of RNAV/RNP Routes FAA Produces per Year

Question: How many RNAV and RNP procedures does the FAA produce each year? Also, do the routes developed by the FAA always meet the needs of the airspace users?

Answer: FAA intends to publish at least 50 RNAV and 50 RNP procedures for FY 2009 and at least that same amount per year through FY 2012, with priority given to new routes in the congested New York, Chicago, and Dallas areas. FAA believes it is meeting the needs of airspace users and points out that many of the RNAV/RNP routes and procedures developed are the direct result of requests from airspace users. As we noted in our statement, FAA and industry will face challenges as future routes shift away from localized operations toward "networking" city pairs. To obtain the full benefits of these new procedures, FAA may need to modify its automation systems. Our audit work is underway, and we cannot conclude at this time whether FAA is fully meeting the needs of airspace users.

STATEMENT OF DR. AGAM N. SINHA BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION HEARING ON ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS

March 18, 2009

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STATEMENT OF DR. AGAM N. SINHA
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION HEARING ON ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS

March 18, 2009

Good morning, Chairman Costello, Ranking Member Petri, and Members of the Subcommittee. Thank you for inviting me to participate in today's hearing on ATC Modernization and NextGen: Near-Term Achievable Goals. My name is Agam Sinha and I am a Senior Vice President at The MITRE Corporation. I am also the General Manager of MITRE's Center for Advanced Aviation System Development (CAASD), which is the Federal Aviation Administration's (FAA's) Federally Funded Research and Development Center (FFRDC).

My testimony today will address many of the initiatives that are supporting the near-term goals for NextGen. To put these into context, I will be addressing some of the following points:

- Passengers flying in the National Airspace System (NAS) are still experiencing increasing delays, even though the overall number of flights has been declining.
- We know, however, that based on history the overall level of traffic will continue to rise in the future; this period of reduced operations provides an opportunity to invest in system improvements before problems become even more difficult to resolve.
- In the near-term, we need to continue to pursue diverse initiatives which require minimal new investments in aircraft avionics or new ATC automation, such as procedures that leverage existing aircraft area navigation capabilities, airspace redesign of metropolitan areas, and early ADS-B applications. In addition to these ongoing initiatives, there are more opportunities to make progress in the near term.
- I will briefly discuss the importance of ensuring that the NAS is well positioned to meet the air traffic demand expected in the 2015-2018 timeframe and beyond.
- Finally, moving forward will require significant collaboration: not only between FAA and the flight operators, the direct customers of the air traffic control system, but between FAA and the many other government entities that contribute to the national transportation system.

Near-Term Needs for Improvements in the National Airspace System

We all have experienced delayed flights and know how disruptive and frustrating air traffic delays can be. In 2008, 2.1 million, or 25% of flights arrived more than 15 minutes late, 12% worse than in 2004[1]. Yet air traffic operations declined by almost 9% during the same period[2]. In fact, the nature of congestion has changed. Congestion has become more localized at large metropolitan areas such as New York and Chicago. According to Bureau of Transportation Statistics, in 2008 Newark Liberty International Airport (EWR) was the most delayed airport with only 62% of flights arriving on time, followed by LaGuardia Airport (LGA) at 63%,

[1] Based on data from the Federal Aviation Administration's Aviation (FAA) System Performance Metrics (ASPM) database for calendar year 2000 to 2009.
[2] Based on data from the FAA's OPSNET database for the top 75 airports.

Chicago O'Hare (ORD) at 68% and John F. Kennedy International Airport (JFK) at 69%. The effect of these local delays can be seen at the 75 biggest airports where on-time arrivals have decreased from 78% in 2004 to 75% in 2008.

In the aggregate, delays have increased in the NAS, even as operations continue to be lower than they were in 2000 (see Figure 1). However, the distribution of NAS operations has changed significantly over this time period. Although traffic at some airports has certainly declined, operations at many major airports have continued to increase, leading to higher delays across the NAS due to the interdependence and connectivity between airports. For example, summer time traffic (June – August 2008) is up 9% compared to 2000 at 7 airports: Hartsfield-Jackson Atlanta International Airport (ATL), EWR, George Bush Intercontinental Airport (IAH), JFK, LGA, ORD, and Philadelphia International Airport (PHL). Although these 7 airports only accounted for 56% of NAS delays in 2000, they now account for 77% of the delays today.

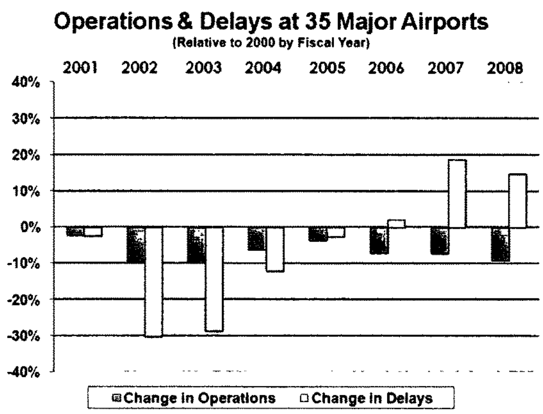


Figure 1

An additional disturbing trend in the data is that despite reductions in operations over the past several years, extremely long delays are increasing. Data shows that over 73,000 flights last year took one hour or more to taxi during departure[3]. Although these delays are less than 1% of the total flights, they are the delays that garner the most attention from the traveling public with stories of aircraft stranded on the tarmac unable to takeoff or return to the gate. The percentage of these delayed flights has steadily increased, doubling since 2002.

Passengers are experiencing this congestion in other ways, as well. During the past three summers the airline industry experienced historically high load factors as operations were reduced at some airports but passenger traffic continued to climb. During this time, load factors reached 84% – 86% for major air carriers, the highest they have been since 1970. Load factors in this range make it more difficult to re-accommodate passengers on cancelled flights, potentially leading to even longer passenger delays and increased inconvenience. In addition, very high load factors may contribute to higher delays, as airlines are more reluctant to cancel flights.

[3] Based on data from the FAA's Aviation System Performance Metrics database for the top 75 airports

Although the current economic crisis is causing a reduction in passenger demand and fewer flights, history tells us that this downturn is temporary and that passenger and flight demand will return. Despite recessions, oil shocks and terrorist attacks since the early 1970's, passenger demand has steadily increased by a factor of four while air travel has steadily become more affordable as airline productivity has improved (see Figure 2).

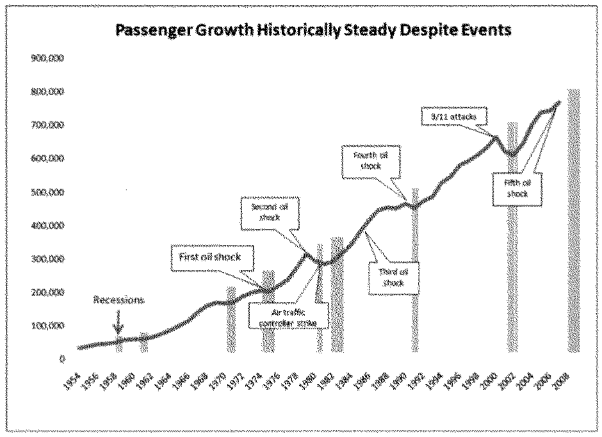


Figure 2

The FAA's 2008-2025 Aerospace Forecast projects that by 2016, over one billion passengers will fly each year, nearly 3 flights a year for every man, woman and child in the U.S. Because there are no immediate solutions that fully address today's air traffic control system limitations, it is imperative that the FAA and the aviation community continue to work toward specific, near-term, achievable goals to begin mitigating problems at the locations where they are occurring. They must seize the opportunity today to get ready for the significantly increased number of flights that will occur as the economy recovers. Along with this growth comes the challenge of maintaining the excellent aviation safety record in the U.S. Continued safety improvements are needed to reduce the rate of accidents. Unless the rate of accidents is lowered, overall perceptions of aviation safety may be undermined as the total number of accidents will increase with increasing demand.

Near-Term Initiatives are Delivering Measurable Improvements in NAS Performance

MITRE is working with the FAA and a broad range of aviation community stakeholders, which include air carriers, General Aviation, and manufacturers, to develop capabilities and procedures to address many of the delay and congestion problems outlined above, as well as to address needs for improved safety, efficiency, and airport access. For problems related to congestion and delays, there are many near-term procedure changes which have been implemented or are underway that leverage current aircraft avionics capabilities and that require minimal changes to

FAA systems. These and other initiatives are described in the FAA's NextGen Implementation Plan, which lays out the FAA's commitments for implementing operational improvements in the NAS.

The near-term initiatives include those related to area navigation and required navigation performance procedures, new wake vortex procedures to increase capacity for airports with closely spaced parallel runways, airspace redesign, improved procedures for General Aviation and small community access, new ADS-B services for General Aviation and commercial operators in the Gulf of Mexico, as well as new safety and efficiency initiatives. While important, these new capabilities and procedures will not fully meet today's needs for the NAS; for each of these topics I will also identify other initiatives that need to be done in the near term.

Area Navigation (RNAV) and Required Navigation Performance (RNP) Procedures

In the past, airspace design and utilization were the result of several limiting factors, including the dependence on the location of ground-based navigation aids (NAVAIDs) and conventional navigation methods, i.e., navigating from one VHF Omni-directional Range (VOR) to another. These conventional navigation methods lead to less-efficient routes, procedures and airspace usage.

The aviation community is moving forward in solving these problems by better utilizing capabilities already available on a majority of air transport and regional airline aircraft to perform Area Navigation (RNAV) and Required Navigation Performance (RNP) operations. Area Navigation enables aircraft to fly any desired path rather than flying to or from a fixed ground navigation aid. RNP takes advantage of on-board avionics coupled with satellite-based technology to navigate with more precision and accuracy for more efficient use of the airspace. RNAV and RNP aircraft capabilities have been steadily increasing over the past several years. MITRE's analysis suggests very high levels of RNAV equipage, in excess of 85% for many locations.

RNAV and RNP procedures are being implemented to establish precise arrival, approach and departure paths for aircraft. These procedures improve airport capacity and throughput, reduce the likelihood of aircraft collisions with terrain (known as Controlled Flight into Terrain, or CFIT), improve situational awareness for pilots and controllers, and facilitate smoother traffic flows. Using RNAV and RNP also enables the creation of procedures for airports where the terrain or infrastructure limitations make it difficult or impossible to safely fly conventional NAVAID procedures.

RNAV procedures are being used to increase terminal area ingress and egress, as well as increase runway use for departures. For example, Figure 3 illustrates the East and South departure flows from Atlanta; RNAV procedures have enabled additional departure streams in each direction. In addition, diverging (i.e., fanning out) RNAV departure procedures implemented at the Hartsfield-Jackson Atlanta International Airport (ATL) in 2006 have increased throughput and reduced delay with a measured capacity gain of 9-12 departures per hour. This equates to $30M annual benefit (at 2007 demand levels) and a calculated cumulative savings of $105M for the operators who flew these procedures through 2008. Similar procedures have been implemented at airports such as Dallas-Ft. Worth International Airport (DFW), Las Vegas – McCarran International Airport (LAS), Los Angeles International Airport (LAX) and Phoenix International Airport (PHX).

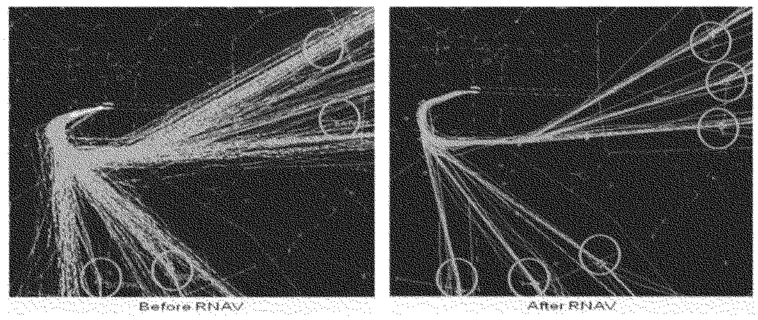


Figure 3 Atlanta Airport Departure Streams

RNP procedures improve the pilot's and the controller's situational awareness, and help to reduce pilot and controller workload and communication congestion through the use of precise, 3-dimensional instrument flight procedures. RNP systems on the aircraft are designed to monitor the current navigation performance of the aircraft. As a result, flight crews have a better understanding of how accurately the aircraft is flying and they are also alerted when the aircraft's navigation performance is inadequate for the desired procedure.

With the precision of RNP, aircraft can fly their planned routes precisely – and can do so reliably. As shown below (Figure 4), an analysis of arrivals at Portland International Airport (PDX) shows a significant reduction in the variability of flight tracks, resulting in both fuel savings and reduced emissions.

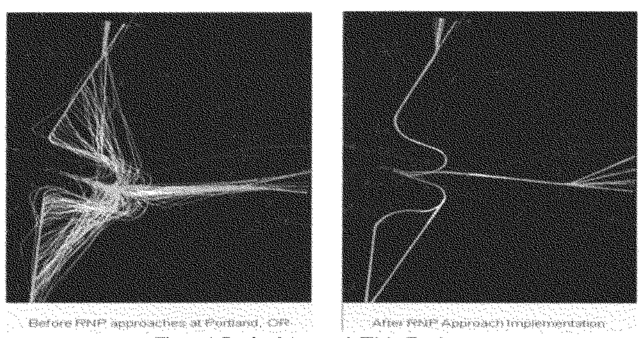


Figure 4 Portland Approach Flight Tracks

Similarly, at the Ronald Reagan Washington National Airport (DCA), RNP approach procedures have enabled aircraft to follow a precise path along the Potomac River, enabling flight operators who utilize this approach to more easily avoid accidentally entering prohibited airspace (see Figure 5).

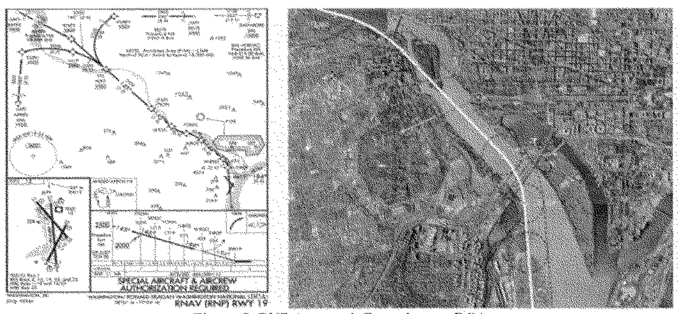


Figure 5 RNP Approach Procedure at DCA

In many metropolitan areas, arrival and departure paths at near-by airports can interfere with each other. This means that even in perfect weather conditions, an aircraft at one airport may be delayed on the ground while aircraft at a nearby airport are landing or departing. The greater precision and predictability of aircraft trajectories using RNP also makes it possible to address this problem by placing more arrival and departure routes in heavily congested airspace than would be possible using traditional navigation. For example, the use of an RNAV departure procedure at Chicago O'Hare International Airport (ORD) in combination with an RNP approach procedure for Chicago Midway Airport (MDW) allows both traffic streams to flow without interfering with each other (see Figure 6).

The FAA and industry have implemented over 300 RNAV arrival and departure procedures, and have now implemented more than 130 RNP Special Aircraft and Aircrew Authorization Required (SAAAR) approach procedures. The FAA is planning to implement more than 50 RNAV arrival and departure procedures (Standard Terminal Arrival Routes [STARs] and Standard Instrument Departures [SIDs]) per year and over 25 RNP SAAAR approaches[4] per year. RNP SAAAR approaches can provide an alternative means of access to runway ends that currently cannot support an instrument landing system (ILS). For example, at Palm Springs International Airport (PSP), the

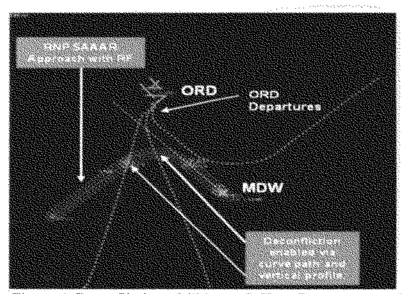


Figure 6 Deconfliction of Chicago O-Hare Departures and Midway Arrivals

[4] RNP Special Aircraft and Aircrew Authorization Required (SAAAR) approaches are limited to an individual flight operator who is authorized to execute the procedures. Often, SAAAR approaches are precursors to more generally available "public" RNP procedures.

RNP SAAAR approach enabled increased access by reducing the ceiling and visibility requirements. Since implementation in 2005, Alaska Airlines reported over 20 instances where they were able to land utilizing the RNP SAAAR approach to PSP rather than divert, cancel, or incur delay greater than 15 minutes.

RNAV and RNP procedures are now beginning to populate the NAS, and many of the major arrival/departure flows now have RNAV procedures that overlay the historical vector patterns. These procedures, while beneficial now, need to move beyond basic overlays to incorporate more optimized profiles and flight path patterns that better address our capacity and throughput needs, improve airport arrivals and departures in the presence of terrain, and enable improved and efficient traffic flows. The challenges to addressing these non-overlay operations include addressing environmental hurdles and airspace designs. To enhance the smooth flow of traffic, we also need to better connect or "network" these procedures. This "network of procedures" is expected to improve aircraft arrivals and departures, eliminate conflicting flows among nearby airports, and connect city pairs with new routes for seamless, efficient flight. The FAA's *Capacity Needs in the National Airspace System 2007-2025* study (also known as FACT 2), identified several major metropolitan areas that will need additional capacity in 2015, even after planned improvements are implemented. Areas such as New York/Philadelphia, San Francisco Bay, and Southern California should be priority areas for these RNAV/RNP procedural improvements.

New Wake Procedures for Dependent Approaches to Parallel Runways Spaced Within 2500 Feet

Today, significant delays occur when airports with closely spaced parallel runways (less than 2500 feet apart) experience low-visibility weather conditions. Up to 60% of the arrival capacity (achievable in visual conditions) can be lost because wake separation procedures for low visibility conditions result in the two runways being treated as one.

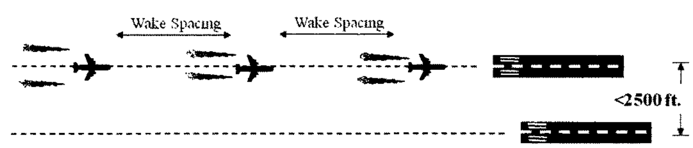


Figure 7 Airports with closely spaced parallel runways lose capacity in low visibility conditions

In September 2008, the FAA published a new Order that enables controllers at designated airports to run dependent operations (specifically, 1.5 nmi staggered approaches as illustrated in Figure 8) to parallel runways with centerlines less than 2500 feet apart, regaining some of the capacity lost in comparison to single-runway operations. This is a very low-cost operational improvement that requires no new avionics and no new airport ground equipment.

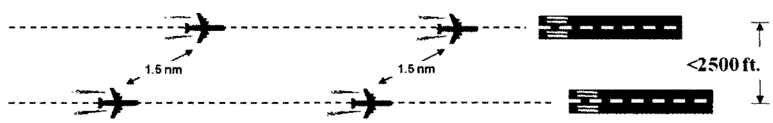


Figure 8 New procedures allow increased capacity for approved airports in low visibility conditions

The new procedure takes advantage of the arrival geometries to ensure the following aircraft does not encounter the wake turbulence generated by the lead aircraft. The airports that are approved in the Order to use this new procedure are Logan International Airport (BOS), Cleveland Hopkins International Airport (CLE), Philadelphia International Airport (PHL), Seattle-Tacoma International Airport (SEA), and Lambert-St. Louis International Airport (STL). Cleveland Hopkins International Airport, for example, experiences reduced visibility conditions about 23% of the time. With this new procedure, up to 16 additional aircraft will be able to land each hour during periods of low visibility.

Ninety percent of NAS delays are associated with the top ten delayed airports during non-visual conditions. Of those ten airports, this new wake procedure partially addresses the capacity losses due to low-visibility conditions at three of them (STL, BOS and PHL); this procedure currently applies only when leading aircraft are categorized as "large" or "small" (not "heavy" or B-757). Four other airports in the top ten for delays have closely spaced parallel runways but are not candidates for this procedure (ATL, SFO, EWR and LAX) due to both runway spacing and aircraft mix considerations. Work is in progress to identify other airports that may qualify for the 1.5 nmi staggered approach procedure. All indications are that these new procedures can be extended to aircraft categorized as Heavy or B-757. In addition, new approach procedures, such as changes in approach angle and glide slope, could enable reduced wake separations at additional airports.

Airspace Redesign is a Key Step in Reducing Congestion and Delays

Several ongoing airspace redesign projects are providing significant benefits by addressing growing congestion in the metropolitan areas most impacted by delay:

- The New York/New Jersey/Philadelphia Metropolitan Area Airspace Redesign is addressing congestion and delays in the airspace surrounding four of the most delayed airports in the U.S. (JFK, Newark, LaGuardia, and Philadelphia). The first stage of implementation began in late 2007; it included additional departure headings from Newark and Philadelphia. When the redesign is fully implemented in 2012, the projected benefits include a 20% reduction in delay and approximately $250 million in annual user benefits.

- The Chicago Airspace Project is improving the efficiency of the airspace surrounding Chicago's O'Hare and Midway airports. Eastbound and southbound departure routes were added in 2007 and 2008 to provide additional pathways out of the metropolitan area. In November 2008, at the same time the new Runway 09L/27R was commissioned, a dual arrival feed from the southeast was added to take advantage of the additional runway capacity. Ongoing airspace redesign efforts are focused on providing similar improvements to the north and west of Chicago in order to take advantage of the additional runway capacity provided by the proposed second new runway.

- In 2008 in the Houston metropolitan area, the Houston Area Air Traffic System (HAATS) project created a fifth northeast departure route that is reducing delays in an area of extreme congestion. By 2010, terminal airspace expansion to the east and west, new departure routes to the east and west, and dual corner post arrival routes will improve access to and egress from the Houston area and provide much-needed flexibility during severe weather events.

In addition to these projects, redesign efforts are focusing on the airspace in the southwest U.S. between Las Vegas, Phoenix, and southern California, as well as the high-altitude airspace linking major metropolitan areas throughout the country. All of these airspace redesign efforts are expected to reduce congestion, complexity, and delays throughout the NAS, and deliver benefits in annual operating costs for airspace users from $120 million annually in 2009 to $425 million annually by 2013.

Airspace redesigns improve the overall efficiency of the NAS, allow us to incorporate new capabilities (such as RNAV/RNP) and reduce delays. Other near-term needs for airspace improvements include the following:

- Expedite and expand enroute RNAV/RNP route ("Q"-route) development between key metropolitan areas that enable RNP-capable aircraft to fly more efficient routes
- Expand the Western Corridor airspace design to include terminal redesign for southern California and Phoenix
- Redesign terminal airspace at Denver and Dallas to address immediate needs identified by customers by extending the use of terminal separation standards further into enroute airspace

For many airspace redesign activities, the benefits achievable with the restructuring of routes and airspace are often delayed as local community concerns over environmental impacts are raised. For example, it took nearly seven years to complete the environmental review of the New York/New Jersey/Philadelphia Metropolitan Areas Redesign, and despite the FAA Record of Decision in September 2007, the project still faces a number of legal challenges, as well as numerous challenges related to implementation complexities. Given the critical need for improvements in areas of highly congested airspace, it is important that FAA continue efforts to streamline and accelerate the environmental review process and resources are directed to resolving environmental issues and implementation challenges as quickly as possible.

Improved Access to Aviation Services for Small Communities

New area navigation procedures also are being put in place to serve small communities and the General Aviation (GA) operations that are often a major contribution to the communities' broader needs. To facilitate GA operations at these community airports, new RNAV approach procedures with vertical guidance are providing low-visibility access for airports similar to what can be achieved using an Instrument Landing Systems (ILS). These procedures, which are made possible by GPS and the Wide Area Augmentation System (WAAS), do not require ILS equipment. There are currently 1333 RNAV approaches with vertical guidance around the US at 833 airports; additional procedures are being developed at the rate of 500 approaches per year. The FAA plans to continue developing these procedures until all qualified runways are served.

Improving access for small communities will allow further efficiencies to be gained, but more needs to be accomplished before implementation can be accelerated. Many of the runways that serve these smaller communities currently are not equipped with the standard instrument runway markings, lighting, and equipment found or required on our precision approach runways. We must determine the solutions that enable these RNAV precision-like operations to be functional on our non-precision runways, while achieving the highest levels of safety and minimizing expensive runway change requirements.

Automatic Dependent Surveillance – Broadcast (ADS-B) Improvements and Benefits

In 1999, the FAA started a program in Alaska, called Capstone, with the goal of lowering the high rate of fatal accidents for General Aviation and Air Taxi flights. The results of the Capstone program were dramatic—a 49% reduction in fatal accidents in that region for equipped aircraft. One of the key elements in the Capstone avionics suite was ADS-B avionics improving situational awareness for pilots as well as enabling surveillance services where radar was impractical to install. Additional operational experience with ADS-B was gained through the FAA's SafeFlight 21 program, which worked with the Cargo Airline Association and its members to demonstrate the benefits of ADS-B for air transport airlines. United Parcel Service (UPS) has since equipped their entire fleet with ADS-B and is reaping efficiency benefits today and demonstrating early NextGen benefits using a combination of ADS-B broadcasts plus avionics to display positions of other ADS-B-equipped aircraft.

Building on the knowledge gained, the FAA has established a program to implement the ground infrastructure needed to deliver ADS-B services and enable ADS-B applications nationwide. The national ADS-B ground infrastructure will provide several services that will benefit General Aviation. First, the FAA will transmit weather and NAS status information to the cockpit. This service, called Flight Information Services-Broadcast (FIS-B), will result in better decision making and reduce weather-related accidents, as well as reducing incursions into restricted airspace. The ADS-B ground infrastructure will also transmit information about nearby aircraft, derived from radar, to the cockpit. This service is called the Traffic Information Services-Broadcast (TIS-B). Equipped aircraft will also be able to display the positions of other ADS-B equipped aircraft transmitting their current position. TIS-B, in combination with received ADS-B data, will improve pilot situational awareness and reduce the likelihood of mid-air collisions. FIS-B and TIS-B services have been available to GA pilots in southern Florida since November 2008; such services will be available nationwide by 2013.

Part of the ADS-B program includes ground infrastructure de yed on oil platforms in the Gulf of Mexico to provide ATC surveillance where there is none t day. Because of the lack of ATC surveillance over large areas of the Gulf, commercial aircraft flying between North America and Mexico, Central America, and South America must fly using large separations (approximately

100 nmi), which results in delayed flights or flights flying at sub-optimal, less-efficient altitudes. This new ADS-B infrastructure closes the current radar surveillance gap. As a result, air traffic controllers will be able to provide much closer separations than presently achieved, thus greatly increasing capacity. This new surveillance capability will also enable new, more efficient routes across the Gulf that were not practical with the current, limited radar coverage. New routes are expected to be in place by the end of this year. The increased capacity resulting from closer spacing, in combination with the better routes, is estimated to cumulatively deliver $18M through 2015 in benefits for flight operators in Gulf of Mexico high-altitude airspace.

Another group of users flying in the Gulf is the large fleet of helicopters that service the thousands of off-shore oil platforms. Operators of these aircraft receive few ATC services due to lack of low-altitude surveillance, and there is also a high incidence of weather-related accidents and mid-air collisions. Furthermore, most of the helicopter fleet is unable to operate during periods of poor visibility. Using the same ADS-B ground infrastructure deployed on the oil platforms, FIS-B and TIS-B services will be provided, improving pilot situational awareness and safety. Furthermore, with ADS-B surveillance available to controllers, these helicopters will be able to receive ATC services during all visibility conditions, further improving safety. ADS-B surveillance will also enable expanded ATC flight following and improved search and rescue operations in the Gulf. This improved low-altitude service for the helicopters is estimated to achieve $26M of benefits cumulatively through 2015 by improving capacity and safety.

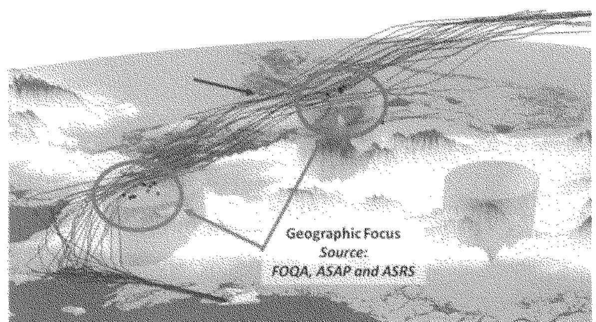
The key to achieving ADS-B national benefits is equipage. About half of U.S. commercial aircraft are equipped with ADS-B avionics today. However, most of these aircraft are not compliant with the standards that are included in the FAA's mandate, planned for 2020. Without early equipage or other mitigation of the difference in standards, most benefits will not be realized until that date is nearer. In the longer term, with the addition of cockpit displays and substantial ADS-B equipage, the potential benefits pool is much larger and equipage will be less of an issue, as costs are expected to drop substantially in the future.

Beyond the Gulf of Mexico, there are other needs that can be met with ADS-B surveillance to increase safety and efficiency of operations. ADS-B will enable ATC services in other non-radar areas, support expanded ATC flight following, and will improve search and rescue operations. Ultimately, the transition to ADS-B for surveillance will reduce ground radar infrastructure costs.

Near-Term Safety Initiatives

Important initiatives are underway that promise to deliver near-term safety benefits while also enabling many of NextGen's efficiency and capacity improvements. Fundamental to safety improvement is the implementation of data-driven safety management systems that enable identification and mitigation of evolving system risks. One of the key concepts for NextGen is the transformation from a forensic safety environment to one that is prognostic – to reduce the likelihood of accidents before they occur. Application of rigorous safety principals and methods across air traffic control, air carrier operations, aircraft maintenance, and airport operations holds the promise of more fully identifying causal factors, reducing error rates, and catching system risks prior to serious consequences.

An important recent initiative in early identification of risks is Aviation Safety Information Analysis and Sharing (ASIAS). ASIAS is a NextGen program sponsored by the FAA that integrates public and privately held aviation safety data from government and industry for the purpose of identifying safety trends and detection of systemic risks *before* they contribute to accidents. This voluntarily provided safety-related information, along with other publicly and non-publicly available data, is being used by MITRE at the request of FAA and industry stakeholders to proactively identify, analyze, and correct safety issues that affect commercial aviation. MITRE plays a central role in integrating the complex, disparate safety data from across industry and FAA, conducting national-level safety analyses, and ensuring fundamental protection of sensitive data.



A recent ASIAS study on Terrain Alerts integrated a wide range of data, including airport and airspace procedures and minimum vectoring altitude information from Air Traffic Control, weather data from FAA and NOAA, Terrain data is from the NASA Space Shuttle survey and actual tracks of traffic are from the FAA National offload program.

Figure 9

All major U.S. air carriers are currently participating in ASIAS, as is a growing set of regional air carriers and international carriers. A set of safety metrics is currently under development based on this unique safety data repository. Items such as location, frequency, and contributing factors for unstabilized approaches, Traffic Alert and Collision Avoidance System (TCAS) alerts, runway excursions, and Terrain Awareness Warning System (TAWS) alerts are just a few examples of safety analyses under way in ASIAS. Based on the TAWS analysis, several airports in the western half of the U.S. were identified as having substantial numbers of flights receiving terrain warnings. Contributing factors have been analyzed and turned over to the Commercial Aviation Safety Team who, with help from MITRE, the FAA, and other key members of the community, is developing recommended changes to avionics, airspace designs, and flight deck procedures.

Runway and surface safety capabilities are also being pursued aggressively. One activity with near-term safety impact involves analysis of alternatives for the Runway Status Lights, which is a runway safety warning system in development by the FAA that provides a visual warning to flight crews. The initial configuration for this system was validated in MITRE's integrated Air Traffic Management laboratory and field tested at Dallas-Fort Worth International Airport (DFW), leading to a deployment decision in mid-2008. Extensions to this initial configuration that cover a greater number of surface risk scenarios continue to be evaluated. The Runway

Status Light system will significantly reduce runway incursions by mitigating the primary cause of incursions, which is erroneous runway crossings, whether due to pilot or controller error, at many of the largest airports.

Runway status light deployment begins at Phoenix airport, commissioning in Sept 2010, followed quickly by Baltimore/Washington International Thurgood Marshall Airport (BWI), Houston George Bush Intercontinental Airport (IAH), and others. Improvements for a total of 21 airports are currently funded. Other airports should also be candidates for this important safety improvement, including Memphis International Airport (MEM) and Cleveland-Hopkins International Airport (CLE).

In addition to runway status lights, more needs to be pursued to improve airport surface safety. For example, Electronic Flight Bag (EFB) technology is being enhanced to inform pilots about the safety status of runways and taxiways. There are public-private initiatives to expedite the development of this capability, and an initial field evaluation with prototype avionics is on track for mid-2010. This capability has the potential to reduce pilot errors and provide an additional safety net to mitigate controller errors at all airports throughout the NAS.

Efficiency Initiatives with Environmental Impact Benefits

Increased environmental awareness and volatility in jet fuel prices have stimulated the implementation of methods for reducing air transportation fuel consumption, pollutant emissions and noise. Two major international partnerships and many independent research programs are currently underway to investigate methods for reducing fuel burn, emissions, and noise in air transportation. These efforts span two oceans and include collaboration between industry, government and academia. In the Atlantic Ocean region, the Atlantic Interoperability Initiative to Reduce Emissions (AIRE) was formed with the goal to hasten development of environmental improvements for all phases of flight. In the Pacific Ocean region, the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) was formed to extend this goal to flights to and from Asia and the South Pacific. The results of one ASPIRE flight show a savings of 1173 gallons (3552 kg) of fuel and 11,214 kg of carbon dioxide emissions for a "perfect" flight that was given priority over others in the airspace for this evaluation. The savings resulted from a combination of steps, including just-in-time refueling, max climb power, user-preferred route, dynamic airspace reroute, and the definition of an arrival path to the destination airport that was optimized for the flight (called a "tailored arrival"). The tailored arrival portion of this flight alone was estimated to have saved 200 gallons of fuel with carbon dioxide emissions reduction estimated at 1912 kgs.

Within the descent phase of flight, an operational strategy for reducing these variables is to redesign arrival routes and procedures such that descending aircraft can reduce the application of thrust. By maintaining idle or near-idle engine speeds during descent, aircraft can minimize the fuel burned, the exhaust gases vented, and the noise generated by the engines. A general term for the broad class of descent routes and procedures, which are designed to reduce the application of thrust during descent, is Optimized Profile Descents (OPDs). Tailored arrivals, as mentioned above, are one kind of OPD.

Several domestic trial implementations of regularly scheduled flights have clarified the benefits and operational challenges of implementing OPDs. Four such trial implementations are the United Parcel Service (UPS) nighttime implementation at Louisville International-Standiford Field Airport (SDF) and the Standard Terminal Arrival Route (STAR) implementations at Los Angeles International Airport (LAX), Hartsfield-Jackson Atlanta International Airport (ATL), and Miami International Airport (MIA). These trials have also demonstrated fuel and emissions reduction benefits. The AIRE initiative's OPD trials at ATL and MIA, for example have demonstrated fuel saving benefits of 38-52 gallons of fuel per flight and a reduction of carbon dioxide emission savings of 360-500 kg per flight. Significant economic and environmental benefits can be gained if these procedures can be applied to a fraction of the 1280 daily arrivals at ATL, the 350 daily arrivals at MIA, as well as to other airport arrivals across the nation.

Overall, U.S. commercial aviation has improved its fuel efficiency over 23% in just the past 8 years. Optimal Profile Descents may allow further efficiencies to be gained, but more needs to be learned before implementation is accelerated. Accommodating OPDs may require airspace and sector redesigns and operational changes that account for the removal of the historical and planned level offs. Consequently, depending on site specific traffic flows, this may adversely affect overall airport and system efficiency in periods of high density or complexity.

<u>Positioning the NAS to Meet Mid-Term and Long-Term Needs</u>

To be ready for the mid-term, the FAA and the aviation community will need to put in place new capabilities that address both the growing demand and the increasing complexity of operations. The near-term initiatives described earlier are an important start, but will not fully resolve the problems the NAS will experience in the coming years. The FAA and the aviation community will need to invest in new technologies, procedures, and in some cases new policies to more completely address these future needs.

- **Achieving Aircraft Operations Closer to Today's Separation Standards.** Aircraft typically are separated at greater distances than prescribed by the minimum separation requirements defined in FAA procedures and standards. Buffers are added by controllers to address the uncertainty in actual aircraft positions (from surveillance and navigation uncertainty) as well as to reduce the likelihood of violating the separation minima. If these buffers can be reduced by reducing the uncertainty in aircraft position, capacity and efficiency benefits can immediately be gained. This translates into improved aircraft spacing on final approaches, improved transitions to and from airports to en route streams, expanding the use of runways that cannot be used in low-visibility conditions today, and reducing miles-in-trail and lateral spacing typically used today.

- **Closely Spaced Parallel Runway Operations.** Other procedures and additional technology are needed that go beyond wake-based procedures. For example, procedures using information about prevailing winds and wake drift calculations are in development and should continue to be pursued; these will increase the number of airports that regain a portion of the capacity lost during low visibility operations. Work is on-going to develop new runway spacing and airport design standards accommodating future procedures that leverage a combination of RNAV/RNP, enhanced surveillance (ground-based and aircraft-based), advanced avionics including ADS-B and new pilot tools, and new air traffic automation capabilities.

- **Surface Traffic Management and Surveillance.** Another major area for improvement at the busiest airports is to increase the efficiency of operations on the airport surface, and to better manage arrival and departure flows. Surface surveillance (ASDE-X) implementation is in progress for 35 airports, covering taxiways and runways. The FAA needs to accelerate surface surveillance coverage for ramp areas, accelerate the integration of surface event data into Traffic Flow Management (TFM) / departure management systems, and expedite data sharing with flight operators. In addition, there is little automation today supporting the efficient management of surface traffic, and operations are still highly reliant on direct human observation of aircraft movements. New surface management procedures and technologies can have a significant impact on overall delays, 20% of which occurs during the taxi out phase of flight. These improvements, expected to be in place by 2018, include real-time exchange of data between flight operators and ATC, airport configuration tools to assess optimal airport runway configurations to address changing weather and air traffic demand patterns, improved departure scheduling capabilities that smartly sequence departing aircraft in the context of the overall traffic patterns and constraints, and better tools for selection, assignment, and monitoring of taxi routes on the airport surface.

- **Air-Ground Data Communications.** Air Traffic Control involves exchanging information, clearances, and instructions between pilots and controllers. In the current ATC environment, the principal means for this communication is voice transmission via radio. The evolution from a voice-only system to a system that includes both air-ground voice and data communications is a major enabler for NextGen benefits, including greater capacity and safety levels than can be achieved today. To implement a modernized data communications environment, the NAS needs to evolve into a system that can: 1) enhance current voice-only operations to provide early benefits, 2) integrate data communications with emerging automation capabilities, and 3) enable longer-term, more-advanced trajectory clearances that incorporate vertical, horizontal and time components (which is called 4D trajectory operations). Taking the first step is critical. FAA and flight operators need to work together to implement Data Communications Segment 1, while continuing to develop concepts and standards for advanced data communications capabilities.

- **New Decision Support Tools for Controllers and Traffic Flow Managers.** As traffic density and complexity increase, additional automation tools will be needed to help controllers and traffic flow managers maintain today's level of services while increasing their productivity. Decision support aids include conformance monitoring tools to alert controllers if an aircraft leaves an assigned route; tools to assist with traffic metering, merging and spacing; tools to provide strategic solutions to anticipated separation or traffic management problems; and new congestion management tools that minimize overall impacts to traffic and that better anticipate the impacts of changing weather conditions. Traffic Flow Management (TFM) tools will support collaboration between the FAA and flight operators, and allow us to better anticipate the impacts of severe weather on traffic flow and quickly plan strategies for affected traffic in collaboration with operators. These capabilities need to be expedited to ensure that capabilities are in place in a timely manner.

- **New Decision Support Tools for Pilots and Flight Crews.** As we move towards NextGen, the efficiency of the NAS will increasingly rely on capabilities in the aircraft. In the mid-term (2012 – 2018), new cockpit tools (leveraging on ADS-B) to support delegated spacing and merging will complement ATC automation and new RNAV/RNP procedures. Cockpit capabilities to extend highly efficient visual approach operations to lower visibility conditions are also in development.

The capabilities described above are not only necessary components for mid-term NextGen, they also lay the foundation for the long-term NextGen envisioned for 2025 and beyond. By then, traffic densities and complexities are expected to be significantly more challenging than in this decade, and MITRE believes that to meet this long-term challenge there will need to be an increased role for automation; new technologies; new policies and procedures; and changes to the roles of controllers, pilots, and dispatch personnel to support new concepts and increase overall productivity and efficiency. Maturing these ideas is an important research task. It is important, however, to not let postulated solutions to achieve the long-term NextGen vision delay needed progress in the near-term and mid-term time frames.

The Need for Collaboration among Government and Industry Stakeholders

There are a number of ways the FAA and the aviation community are collaborating today that are making important contributions to NextGen. For example, the Performance-Based Aviation Rulemaking Committee, or PARC, has added tremendous value over the years both in developing RNAV/RNP concepts and procedures and in developing FAA/aviation community consensus on priorities. The Commercial Aviation Safety Team, or CAST, has made numerous contributions to overall aviation safety, due to its collaborative nature. RTCA is also important, both for the development of avionics standards and for its overall work with FAA in understanding NextGen concepts and aviation community priorities.

By the 2014 to 2018 time frame, many major improvements in capacity and system-wide efficiencies will depend on flight operator investments in additional avionics equipage; this is more so for the far term. Planning for these new aircraft capabilities, however, needs to consider realistic lead-times for development of standards, creation of products, training, and aircraft installation, as well as the development of new procedures and complementary ATC automation.

One important venue for collaboration between the FAA and the aviation community is the RTCA NextGen Implementation Task Force. The Task Force was recently convened at the request of the FAA to establish a dialog with the aviation community on overall priorities and strategies to implement near-term and mid-term improvements that provide benefit both to individual operators as well as the FAA. The Task Force will be a valuable venue for gaining clarity on the several concerns related to investments needed both for avionics and for the NAS as a whole:

- The FAA's NextGen Implementation Plan is the first step to developing common plans among the FAA and flight operators, who are concerned about ensuring adequate return on investment for avionics. FAA and operators need to work closely together in setting specific goals, in planning, and in execution. Joint plans must reflect all the needed elements and be synchronized so that they will be ready at the same time and place, and so that when avionics are installed they can be used as intended and deliver improved operations and benefits. Executing these plans will require coordination at the working level, but equally important will be joint on-going oversight of progress so that stakeholders can hold each other accountable.

- As part of this, a well thought-out, integrated avionics evolution plan is needed to achieve timely benefits for individual operators and for the system as a whole. One essential element of this is coordinated planning within the FAA for all programs that involve changes to deliver new benefits to avionics. Aligning plans across programs will help avoid having to take aircraft out of service multiple times for installations and upgrades, multiple revisions (and re-certification) to key aircraft elements such as the wiring harness or the Flight Management System, and training and re-training on incremental changes in procedures.

- FAA and operators also will need to work together on policies and procedures so that those who invest in new avionics can gain benefits without having to wait for a majority of the fleet to equip. FAA has proposed to shift the policies and practices of "first come - first served" toward "best equipped - best served" *when doing so will improve the operation of the system as a whole*. An important example of this is data communications, which allows large capacity improvements in the ATC system – thereby benefiting all aircraft whether equipped or not. By changing procedures to get these equipped aircraft through and out of constrained areas first (which is easier to do because of their equipage), the system as a whole will benefit, but a larger share of that benefit will be directed to the equipped aircraft.

Collaboration to achieve near-, mid-, or far-term NextGen benefits is not limited to the FAA and flight operators, however. The value of our National Airspace System depends on the contributions of multiple government agencies and departments. NASA is researching new technologies and concepts; their work on engines and fuels, for example, is important both in terms of efficiency and environmental impacts. The DOC is partnering with the FAA in moving weather information into an integrated automation environment and in developing the 4D Weather Cube. The aviation community is looking to the DOD, with their experience in net-centric operations, to help apply that technology for interagency collaboration and enhanced data exchange. Expanding needs across multiple agencies for the use of Unmanned Aircraft Systems (UAS) will require new innovation to balance those needs with other traffic demands and will require FAA to work closely with both DOD and DHS.

<u>Summary</u>

I would like to close this testimony by summarizing some of the major initiatives that support near-term goals for NextGen. There are many near-term improvements that make a real difference in the performance of the NAS and in serving communities, large and small. These include:

- Procedures that reduce delays at major airports, some building on aircraft equipage with RNAV/RNP and others taking advantage of new wake avoidance procedures for parallel runways.
- Reductions in the airspace congestion through innovative airspace redesigns in major metropolitan areas.
- New RNAV approach procedures with vertical guidance to serve small communities by providing improved access to airports in low-visibility conditions.
- The ADS-B program to serve a broad set of General Aviation users with improved traffic and flight information services (TIS-B and FIS-B) and commercial operations in the Gulf of Mexico.
- Safety initiatives, such as ASIAS and new electronic flight bag capabilities to improve pilot situational awareness, in order to make our already safe system even safer despite increasing traffic levels at congested airports.

There are also steps that the FAA and the aviation community need to start now so that we are ready to face the challenges of 2015 and beyond. This includes increasing capacity by better achieving today's separation standards and by reducing the separation between aircraft where needed and still be operationally safe. Closely spaced parallel operations are one example where continued progress will be needed if we are to meet the traffic demands in the future. Other critical areas needing continued emphasis include surface traffic management and implementation of air-ground data communications for air traffic control. These investments will take us a long way towards meeting the NextGen needs in the 2018 timeframe while laying the foundation for the long-term NextGen vision.

And finally, it is important to recognize that implementing NextGen will require significant collaboration and investment across multiple government agencies, as well as private industry. Without this collaboration, the gains achieved in the near-term will be overshadowed by the challenges that are coming in the future.

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

U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

James L. Oberstar
Chairman

David Heymsfeld, Chief of Staff
Ward W. McCarragher, Chief Counsel

John L. Mica
Ranking Republican Member

James W. Coon II, Republican Chief of Staff

April 6, 2009

Dr. Agam N. Sinha, Sr.
Senior Vice President and General Manager
The MITRE Corporation
7515 Colshire Drive
McLean, Virginia 22102-7539

Dear Dr. Sinha:

On March 18, 2009, the Subcommittee on Aviation held a hearing on **"ATC Modernization and NextGen: Near-Term Achievable Goals."**

Attached are questions to answer for the record. I would appreciate receiving your written response to these questions by May 4, 2009 so that they may be made a part of the hearing record.

Sincerely,

Jerry F. Costello
Chairman
Subcommittee on Aviation

JFC:pk
Attachment

MARCH 18, 2009
SUBCOMMITTEE ON AVIATION
HEARING ON

ATC MODERNIZATION AND NEXTGEN: NEAR-TERM ACHIEVABLE GOALS
QUESTIONS FOR THE RECORD
TO:

DR. AGAM N. SINHA, SR.
SENIOR VICE PRESIDENT AND GENERAL MANAGER
THE MITRE CORPORATION

Dr. Sinha, the "NextGen Implementation Plan for 2009" lists avionics equipage items that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, and the most ready for immediate deployment and why?

Dr. Sinha, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage to solve the biggest capacity issues in the next 3-5 years, which technologies hold the most immediate potential for accelerating NextGen benefits, what percentage of aircraft would need to be equipped to reap a sufficient level of benefits, and at which locations in the National Airspace System should new equipage and procedures be targeted?

CAASD
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May 4, 2009
F010-L-247

The Honorable Jerry F. Costello
Chairman, Subcommittee on Aviation
U.S. House of Representatives
Committee on Transportation and Infrastructure
2251 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Costello:

Enclosed is my response to the Questions for the Record for the Subcommittee on Aviation hearing on March 18, 2009, regarding ATC Modernization and NextGen: Near-Term Achievable Goals.

Please call me at 703-983-6410 if you have any questions regarding this response.

Sincerely,

Agam Sinha

Dr. Agam N. Sinha
Sr. Vice President and General Manager
Center for Advanced Aviation System
Development (CAASD)

ANS/cfv

Enclosure

MITRE

Questions for the Record

Dr. Agam N. Sinha
Sr. Vice President and General Manager
Center for Advanced Aviation System Development
The MITRE Corporation

March 18, 2009
Subcommittee on Aviation
Hearing on "ATC Modernization and NextGen: Near-Term Achievable Goals"

Question 1: Dr. Sinha, the "NextGen Implementation Plan for 2009" lists avionics equipage items that the FAA is targeting for mid-term NextGen operations. Of the avionics listed, which are the most mature, and the most ready for immediate deployment and why?

Answer: The "NextGen Implementation Plan for 2009" lists aircraft capabilities for the mid-term NextGen, which are enabled by avionics. **All the aircraft capabilities discussed below have avionics that are mature, certified for installation on aircraft, and ready for deployment now or in 2010. Except where noted, the avionics are broadly available both as "forward-fit" in the production of new aircraft as well as more costly "retrofit"**, which involves taking aircraft out of service to add new avionics software or hardware. To realize benefits from these aircraft capabilities, new ATC procedures, airspace designs, or FAA automation often are needed; major dependencies are noted.

Navigation and Approach Capabilities

- Area Navigation (RNAV 1 & 2) capability enables aircraft to navigate flight paths specified anywhere within a broad area rather than to navigate only flight paths directly toward or away from ground-based navigation aids. RNAV 1 & 2 use receivers for space-based or ground-based navigation signals, and either an autopilot or navigation display for the flight crew. RNAV decreases flight costs, and can increase capacity if sufficient equipage exists and if the FAA implements enabling airspace designs and procedures.

- Required Navigation Performance (RNP 1 & 2) enhances RNAV with the capability to monitor the quality and availability of the navigation signals to ensure the aircraft has accurate position information to fly with the required precision. RNP enhances RNAV functions by alerting the flight crew if the required precision is lost, which allows RNP to be used for more-beneficial arrival and departure paths. As with RNAV capability, sufficient equipage, airspace design accommodation, and procedures are necessary to realize RNP benefits.

- Curved Path or RNP-Radius-to-Fix (RNP-RF) capability enhances RNP by enabling aircraft to precisely fly curved flight paths. RNP-RF uses additional autopilot or display functions for guiding the aircraft through turns that are consistent for all aircraft. **RNP-RF presently is available only with special authorization; the capability is not yet incorporated into public airspace and procedure designs.** The FAA is developing new authorizations to allow simpler approval for Curved Path capability. RNP-RF can increase capacity if sufficient equipage exists and FAA implements enabling airspace designs and procedures.

- Vertical Navigation (VNAV) capability enables aircraft to be guided to climb or descend on a defined vertical profile within specified margins. Barometric VNAV senses air pressure-based altitude for input to an autopilot or a guidance display for the flight crew. (Space-based vertical guidance is addressed separately, immediately below.) Barometric VNAV can decrease flight costs, and can increase capacity if sufficient equipage exists and FAA develops new enabling airspace designs and procedures.

- "LPV" (Localizer Performance with Vertical Guidance) vertically guided approach capability enables aircraft to conduct instrument approaches to decision heights as low as 200' at locations without ground-based instrument approach aids. LPV uses space-based navigation and altitude information. LPV capability includes the monitoring of signal availability and integrity, and can be used to improve airport access in poor visibility where the FAA has designed and implemented LPV approaches. **Avionics that enable LPV capability are available for smaller commercial and general aviation aircraft; larger aircraft will continue to use ground-based Instrument Landing Systems.**

Communications Capabilities

- Data Communications to aircraft en route and at airports enables flight crews to receive and reply to air traffic control clearances via electronic text messages. This uses VHF digital radio transceivers and aircraft computers, software, and displays that are based on **existing oceanic avionics (FANS-1A+) or are compatible with the European data communications mandate that begins in 2011 (for which avionics will be available in 2010).** Data communications can increase capacity and efficiency in en route airspace and at airports if sufficient equipage exists and if the FAA implements automation enhancements and new ATC procedures.

Surveillance and Information Display Capabilities

- Electronic Flight Bags (EFBs) provide electronic charts, manuals and other applications to aid flight crews. They range from portable designs to designs permanently installed and certified as part of the aircraft. Some higher-capability EFBs can incorporate information from space-based navigation receivers to display the aircraft's location on a moving map of the airport surface. Still higher-capability EFBs can incorporate information from ADS-B (Automatic Dependant Surveillance - Broadcast) transceivers to also show the location of other aircraft in the air or on the airport surface. **EFBs integrated with ADS-B are not yet broadly available as standards have been approved only recently.**

- Flight Information Services – Broadcast (FIS-B) capability uplinks weather maps and status reports to aircraft over the Universal Access Transceiver (UAT) link for display in the cockpit. **Avionics for FIS-B are primarily available for smaller commercial and general aviation aircraft; larger aircraft will continue to use existing sources of weather information.** Following demonstration in Alaska, nation-wide FIS-B service began in some locations in 2008 and will be fully available by 2013.

- ADS-B "out" capability enables aircraft to transmit their identity, position, velocity, and other information to nearby aircraft and to air traffic control systems for surveillance purposes. **Avionics to meet expected ADS-B "out" mandate requirements are not yet available since design requirements will not be finalized until later this year.**

- ADS-B "in" capability enables aircraft to receive ADS-B "out" transmission information from nearby aircraft, Traffic Information Services – Broadcast (TIS-B) from the ground, and the aforementioned FIS-B. This information can then be viewed on a cockpit display. **Avionics for ADS-B "in" are certified for a limited set of applications on select airframes (UPS Louisville 757/767 fleet), but should become more broadly available as the standards recently were approved.**

Question 2: Dr. Sinha, if the FAA were to provide targeted incentives or subsidies for NextGen avionics equipage to solve the biggest capacity issues in the next 3-5 years, which technologies hold the most immediate potential for accelerating NextGen benefits, what percentage of aircraft would need to be equipped to reap a sufficient level of benefits, and at which locations in the National Airspace System should new equipage and procedures be targeted?

Answer: The largest acceleration of avionics-driven capacity benefits on a **nation-wide basis** would come from equipping aircraft for en route and airport data communications. Data Communications will help relieve congested or constrained en route airspace by increasing ATC automation system effectiveness and decreasing air traffic controller workload. The FAA has estimated that 20% equipage in initial locations will be required to enable meaningful benefits. Aircraft targeted for equipage should be those most frequently flown in congested airspace at the top 35 airports (in terms of number of operations), and in the triangle of en route airspace formed by Chicago / Florida / New York, in Southern California and Las Vegas airspace, and (for summer thunderstorms) in the Midwest. To realize these benefits, updates to ATC automation systems, controller training, and new ATC procedures will be required.

The largest acceleration of avionics-driven capacity benefits in **congested, multi-airport metropolitan areas** would be from equipping aircraft for RNP-RF capability. Increasing the number of aircraft with this capability would allow airspace to be redesigned to expand and remove conflicts between arrival and departure flows for multiple airports in dense metropolitan areas. While some equipage currently exists, equipage must be increased to approximately 80% in the targeted locations to enable this airspace de-confliction. Aircraft targeted for equipage should be those most frequently flown into the Chicago, Southern California, New York, and Las Vegas metro areas. To realize these benefits, updates to airspace design, controller training, and ATC procedures will be required.

Significant but **localized avionics-driven capacity benefits in non-radar airspace** could be accelerated by equipping aircraft to meet ADS-B "out" requirements for ATC surveillance in non-radar airspace. This allows equipped aircraft to be separated by as little as 5 nautical miles rather than being procedurally separated. A minimum threshold of equipage has not been set – benefits can accrue whenever more than one equipped aircraft is operating in the same non-radar area. Aircraft targeted for equipage should be those flown under instrument flight rules most frequently over the Gulf of Mexico or to one-in/one-out airports beneath current radar coverage. To realize these benefits, updates to ATC automation systems, airspace design, controller training, and ATC procedures will be required.

In addition to increasing capacity within five years, equipping aircraft with avionics to enable the three capabilities mentioned above also increases efficiency and fuel savings, and builds a foundation for later NextGen capabilities. Data Communications will decrease delays and fuel use while increasing predictability and schedule integrity, and leads to greater benefits as ATC and flow management systems and procedures are enhanced and integrated to take greater advantage of this capability. RNP-RF capability will decrease flight time and fuel use, and will lead to additional benefits as it is incorporated into the re-design of more terminal airspace and is procedurally integrated with VNAV, data communications, and improved aircraft metering capabilities. ADS-B "out" leads toward equipage with ADS-B "in", with much larger benefits as airborne, pair-wise separation is realized, enabling low-visibility landing capacities nearly equal to the capacities achievable in clear weather.

March 24, 2009

Dr. Agam N. Sinha, Sr.
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Dear Dr. Sinha:

On March 18, 2009, you appeared as a witness before the Subcommittee on Aviation hearing on NextGen. I thank you for your participation and ask that you provide written responses to the Committee on the following questions-for-the-record:

- How will the air traffic controllers' role change with modernization and automation of the system? Has MITRE considered human factor impacts of the changing role?

- In your written statement, you indicate that MITRE believes that to meet the long-term challenge of increasing traffic densities and complexities "...there will need to be an increased role for automation...." Others have expressed concern with the switch to increased automation and self-separation, citing serious safety implications, such as slower detection of a problem when monitoring versus actually controlling traffic and the eventual lack of controllers with active air traffic control experience. How do you respond to these concerns?

Thank you for your kind attention to this letter and please contact Holly Woodruff Lyons or Bailey Edwards at (202) 226-3220 if you have any questions.

Sincerely,

Thomas E. Petri
Ranking Republican Member
Subcommittee on Aviation

CAASD

Dr. Agam N. Sinha
Senior Vice President
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April 1, 2009
F010-L-245

Mr. Thomas E. Petri
Ranking Republican Member
Subcommittee on Aviation
U.S. House of Representatives
Committee on Transportation and Infrastructure
2251 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Petri:

Enclosed is my response to the Questions for the Record for the Subcommittee on Aviation hearing on March 18, 2009, regarding ATC Modernization and NextGen: Near-Term Achievable Goals.

Please call me at 703-983-6410 if you have any questions regarding this response.

Sincerely,

Agam Sinha

Dr. Agam N. Sinha
Sr Vice President and General Manager
Center for Advanced Aviation System
Development (CAASD)

ANS/cfv

Enclosure

MITRE

Questions for the Record

Dr. Agam N. Sinha
Sr. Vice President and General Manager
Center for Advanced Aviation System Development
The MITRE Corporation

March 18, 2009
Subcommittee on Aviation
Hearing on "ATC Modernization and NextGen: Near-Term Achievable Goals"

Question 1: How will the air traffic controllers' role change with modernization and automation of the system? Has MITRE considered human factor impacts of the changing role?

Answer: One aspect of National Airspace System (NAS) modernization is the introduction of advanced decision support system capabilities (or "automation aids") to help controllers make better air traffic management decisions and to improve controller efficiency. These capability advancements will be necessary for controllers to safely manage more complex traffic flows and significantly more aircraft.

Although the controllers' tools and activities will change as the NAS is modernized and NextGen is implemented, the controllers' role will <u>not</u> fundamentally change. Controllers will still be responsible for assuring safe aircraft operations in all phases of flight. Automation aids will alert controllers to potential conflicts, suggest potential conflict resolutions, and enable delivery of flight plan adjustments (or "re-routes") to aircraft flight crews via an air/ground data communications link. Automation aids also will reduce the amount of time controllers spend on routine activities (e.g., handing off and accepting aircraft) and the amount of time spent verbally communicating with pilots, allowing them more time to focus on their primary role of assuring safe aircraft operations. The controllers will still be "in the loop" of actively managing the traffic, as they will be watching the overall situation, addressing identified conflicts, and issuing directives to flight crews. These actions will occur more strategically (with greater lead time) than today.

MITRE has performed some human-in-the-loop simulation experiments designed to address human factors concerns, in particular the mental workload that could be placed on controllers. In our experiments, front-line supervisors (all of whom are qualified to control traffic) were used as controller subjects. Our experiments showed that controllers, with today's automation aids, will have great difficulty handling the increased traffic levels and traffic flow complexities expected for the mid-term time frame (~2015). As their workload grew, the subject controllers had significant difficulty maintaining their situational awareness and assuring overall system safety under today's system, but were able to manage it safely with the additional NextGen automation aids.

Although experiments conducted by MITRE and others have shown significant promise, much more human factors research is required before implementation of these automation aids.

Question 2: In your written statement, you indicated that MITRE believes that to meet the long-term challenge of increasing traffic densities and complexities "...there will need to be an increased role for automation..." Others have expressed concern with the switch to increased automation and self-separation, citing serious safety implications, such as slower detection of a problem when monitoring versus actually controlling traffic and the eventual lack of controllers with active traffic control experience. How do you respond to these concerns?

Answer: More automation aids will be needed for controllers to safely handle the expected increased traffic levels and traffic flow complexities. These automation aids will be introduced over time. All changes to the National Airspace System (NAS) will be made in accordance with the FAA's Safety Management System (SMS), which requires rigorous safety assessments and very high safety levels. Because of the controllers' increased dependency on automation aids, the hardware and software system architectures, designs and implementations likely will need to be more robust than they are today. Also, procedural changes to address system failure modes will be required. Both human-in-the-loop and analytic safety studies will be performed to demonstrate that overall system safety will not be compromised as changes are made. The NAS already has seen an increase in overall system safety with the introduction of current automation aids such as the Converging Runway Display Aid (CRDA), the User Request Evaluation Tool (URET), and the Minimum Safe Altitude Warning (MSAW) capability.

The new automation aids planned for NAS modernization and NextGen follow this strategy of better enabling controllers to perform their primary role of assuring safe aircraft operations. Not only will problems be detected earlier, potential problem resolutions will be developed and presented to controllers for their consideration long before problems become critical and require immediate action by controllers or flight crews. The controllers still will have an active role in assuring safe aircraft operations, and they will maintain the needed level of experience in managing traffic using the available automation aids just as today's controllers do.

With respect to the concerns about self-separation, this operation is performed extensively today in visual conditions for approaches and departures. Self-separation will only be used when and where it is needed and is feasible. This goal will be achieved through the introduction of new automation aids for controllers and pilots, well-defined flight paths (i.e., RNAV/RNP procedures), and the requisite training and operational procedures to enable use of these capabilities.

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Testimony on Federal Aviation Administration
NextGen Workforce Study

Committee on Transportation and Infrastructure
Subcommittee on Aviation
United States House of Representatives

Robert M. Tobias, Fellow
National Academy of Public Administration

March 18, 2009

Statement of Robert M. Tobias,
Panel Member for the National Academy of Public Administration's
Study for the Federal Aviation Administration:

"Identifying the Workforce to Respond to a National Imperative...The Next Generation Air Transportation System (NextGen)"

Before the Subcommittee on Aviation,
Committee on Transportation and Infrastructure,
House of Representatives

March 18, 2009

Mr. Chairman and Members of the Subcommittee, thank you for inviting the National Academy of Public Administration to testify at this hearing on Air Traffic Modernization and the Next Generation Air Transportation System (NextGen). I served as a member of the National Academy Panel that issued the September 2008 report entitled: "Identifying the Workforce to Respond to a National Imperative....the Next Generation Air Transportation System (NextGen)."

In response to ongoing concerns raised by the Government Accountability Office (GAO), the Air Traffic Organization (ATO) of the Federal Aviation Administration (FAA) engaged the National Academy in June 2007 to perform two tasks: (1) identify the mix of skills needed by the non-operational workforce to design, develop, test, evaluate, integrate, and implement NextGen and (2) identify strategies to acquire those skills.

As you know, NextGen envisions a major redesign of the air transportation system that will take the nation into a new paradigm of aviation by replacing ground-based radar technology with satellite-based navigation and surveillance; digital networked communications; and an integrated weather system that uses a single, authoritative source. These changes will result in major operational improvements and advances in technology that will reduce the environmental impact of aviation as the transportation system grows, while maintaining high safety standards and improving security.

Achieving NextGen goals will demand the highest level of organizational excellence, and ATO will need to ensure that it has employees with the right mix of skills to make NextGen a reality by the year 2025. That is why ATO sought the assistance of the National Academy to help it identify the skills needed by its non-operational (acquisition) workforce and strategies to acquire those skills.

In order to gather a full understanding of NextGen and respond to our tasks, the Panel conducted extensive research including: (1) a literature review to identify the elements of success and validate competencies, (2) benchmarking against other organizations, (3) interviews with FAA officials and stakeholders, (4) colloquia with subject-matter experts, (5) a roundtable discussion with ATO's Vice Presidents, and (6) focus groups with employees.

The Panel learned early in its research that ATO will rely primarily on its acquisition workforce (which is the largest group of the non-operational workforce) to design, develop, test, evaluate, integrate, and implement the numerous systems and procedures that comprise NextGen. ATO defines its acquisition workforce broadly in accordance with a policy letter issued by the Office of Management and Budget (OMB) in April 2005, "Developing and Managing the Acquisition Workforce." In this policy, OMB established a governmentwide framework for creating and developing a federal acquisition workforce with skills needed to support agency missions.

OMB's policy guidance permits agencies to include in the acquisition workforce employees who perform not only traditional contracting functions, but also, requirements definition, measurement of contractor performance, and technical and management direction.

When the National Academy started its study, ATO had already accomplished a significant amount of work to implement the provisions of the OMB policy, including identifying skills required by this workforce. However, the work that ATO had done was not specifically focused on NextGen. The Panel learned that ATO's acquisition workforce was grouped into five broad occupational families which embraced the full scope of the acquisition workforce as defined by OMB. These are:

- Program/Project Management
- Systems Engineering
- Research
- Business/Financial Management
- Contracting

In designing the study approach, the Panel considered whether it could successfully identify the full scope of skills needed for the NextGen transition, since NextGen is envisioned as a long-term transformation, and many of the systems and procedures that will comprise NextGen are yet to be defined. In light of this fact, the Panel concluded that it would not be possible to define skills needed to implement all NextGen systems and procedures, and decided to focus on identifying competencies for the five occupational groups, with the underlying premise being that the same competencies would be needed within each occupational family, regardless of the

NextGen system involved. After confirming that ATO intended to retain the five occupational families for workforce planning purposes, the National Academy Panel conducted research to identify the skills needed by these five groups.

The Panel found that ATO had identified and documented many of the critical competencies needed by its acquisition workforce, but that some competencies were either missing from ATO's documents or require more emphasis for NextGen. For example, the Panel determined that ATO will need to develop stronger competencies in-house to support two key functions: (1) research and development (R&D) and (2) software engineering/development. The Panel learned that ATO relies heavily on contractors and other external entities for this work, which may not serve the organization well in the future. Additionally, the Panel found that the following acquisition workforce competencies, among others, will be critical as NextGen unfolds:

- Requirements Analysis,
- Risk Management,
- Systems Thinking and Integration,
- Human Factors Engineering,
- System Safety,
- Business Case Development,
- Financial Budget and Data Analysis,
- Benefit-Cost Analysis,
- Contractor Performance Management, and
- Contract Administration.

To acquire the necessary competencies needed by the acquisition workforce, the Panel recommended a comprehensive approach that includes: (1) reviewing existing human resource flexibilities made possible under FAA's 1996 Human Resources Reform legislation, (2) reviewing all of the Governmentwide flexibilities available, and (3) creating new flexibilities to address ATO's unique needs. Within this framework, the Panel recommended several key strategies, targeted to the career stage, to acquire the skills needed by the ATO acquisition workforce. Two specific strategies included in our report were:

- **Aggressively marketing the NextGen vision and mission.** The Panel found that FAA's efforts to market and communicate the NextGen vision may not be adequate and concluded that ATO could do more to generate excitement and interest around the NextGen vision to make the work more attractive to prospective candidates.

- **Developing a more strategic approach to recruitment pipeline issues.** Entry-level employees are the fundamental source for building a pipeline, and the ability to hire entry-level employees in Science, Technology, Engineering, and Mathematics (STEM) occupations will be critical to NextGen's success. ATO needs to take a more strategic approach to creating a pipeline of talent to meet its future NextGen workforce needs. ATO could look to NASA for best practices in this area.

Mr. Chairman, now I would like to move to a discussion what the Panel believes is the most important and impactful area of our report. While the Panel provided a comprehensive response on the acquisition workforce competencies, our research revealed that **leadership** is the single most important element of success for large-scale systems integration efforts like NextGen. Our research highlighted leadership as a NextGen implementation challenge, which led the Panel to examine in detail the FAA Leadership Program along with several current perspectives on leadership to identify specific leadership competencies critical to NextGen. In addition to reviewing the FAA Leadership Program, the Panel conducted two colloquia with senior experts to obtain their insights on leadership competencies needed for NextGen, reviewed General Electric's Leadership Model, examined the new Complex Project Management Competency Standard, and conducted research on Collaborative Public Management.

The Panel found the FAA program to be very comprehensive in its approach. It considers all employees of the agency—from entry-level staff through executives. It also provides ample means for any employee to access the support needed to improve leadership competencies. So, the Panel concluded that the *platform* exists within this program to provide the appropriate training and professional experience needed by NextGen leaders. However, to be successful, the Panel concluded that the program needs to be tailored to focus on some key competencies already included in the program as well as some aspects of leadership development included in other programs.

Based on its research, and building on the FAA leadership competencies, the Panel identified the leadership competencies critical to NextGen and developed a Leadership Competency Model. These critical leadership competencies include:

- Accountability and Measurement
- Problem Solving

- Business Acumen
- Customer Focus
- Building Teamwork and Cooperation
- Communication
- Building Alliances
- Interpersonal Relations and Influence
- Integrity and Honesty
- Vision
- Strategy Formulation
- Agility
- Public Sector Savvy
- Complex Project Management

Because of the importance of leadership to NextGen success, the Panel recommended that leadership development be given top priority.

In addition to ***leadership***, the Panel identified several other implementation challenges that may impede the progress of NextGen. These included:

- **NextGen Plans**: The Panel recommended that ATO complete its work to develop a detailed NextGen Implementation Plan and communicate it to the workforce, stakeholders, and Congress. We were told that this Plan would be issued in January 2009, and we commend FAA for meeting this important milestone.

- **Labor-Management Relations**: As you know, FAA's workforce is highly unionized, and ATO's ability to successfully transition to NextGen will require that the agency develop and implement a "break-through" strategy to successfully engage the unions that represent its employees, who are in some cases, the end users of NextGen technology. While some progress has been made over the last four years, more needs to be done to ensure that FAA's labor-management relations do not adversely impact the NextGen transition.
- **Integration of NextGen Programs**: The Panel found that ATO service units which have a role in the NextGen transition may not have clear, straightforward business processes that support the transition. Rather, the business processes in place may be more supportive of ATO's operational mission than its long-term NextGen vision. Therefore, the Panel recommended that ATO evaluate the business processes embedded in service unit operations to ensure that they also support the integration of NextGen programs.
- **Human Resources (HR) Operations**: The National Academy learned that human resources (HR) services for NextGen are shared between FAA's Assistant Administrator for Human Resources and HR staff in ATO, with neither group fully understanding or embracing the roles and responsibilities of the other. Additionally, senior managers in ATO expressed concerns about the availability of adequate HR support to staff NextGen positions. Therefore, the Panel recommended that FAA and ATO evaluate the structure and content of their HR operations and services to ensure that both are optimally designed to support NextGen. We are pleased to report that FAA has already agreed to implement this recommendation.

Additionally, as our study neared completion, the Panel learned that FAA and ATO were already taking steps to address other findings and recommendations included in our draft report, and these efforts were fully acknowledged in our final report. For example, we found that FAA and ATO were:

- Working to improve communication efforts for NextGen,
- Reviewing the ATO governance structure for NextGen,
- Planning an evaluation of the ATO culture to be supported by programs to help ATO leaders understand the desired behaviors needed for success, and
- Examining the NextGen governance structure.

In conclusion, the Academy Panel is confident that FAA will take the necessary steps to meet its near-term goals with respect to the transition to NextGen. The Panel believes that its recommendations provided clear guidance on the right mix of competencies ATO needs to acquire and retain to meet the agency's NextGen goals. However, the Panel is much less optimistic that ATO has created the right organizational environment to retain those competencies. Until ATO fully addresses its implementation challenges, **especially its leadership issues,** the Panel is concerned that these issues may derail the agency's NextGen plans.

America's air transportation system is vital to the continued health of our nation's economy, and it has an important role in maintaining our global economic standing. Successful transition to

NextGen is critical and will require resources, internal leadership and unwavering commitment--not only from FAA but also from Congress and the new Administration.

Mr. Chairman, that concludes my statement. Thank you for inviting the National Academy to testify at this hearing.

I would be happy to respond to questions.

March 24, 2009

Mr. Robert M. Tobias
Director
Public Sector Executive Education
American University
4400 Massachusetts Avenue, NW
Washington, D.C. 20016

Dear Mr. Tobias:

On March 18, 2009, you appeared as a witness before the Subcommittee on Aviation hearing on NextGen. I thank you for your participation and ask that you provide written responses to the Committee on the following questions-for-the-record:

- Does FAA have flexibility under its human capital systems to offer competitive salary and benefits packages to recruit skilled employees with the competencies required to deliver NextGen?

- In your testimony, you cite a more aggressive marketing strategy for the NextGen mission to potential employees as a possible tool to recruit quality employees. Could you elaborate on that?

- In your testimony, you state that FAA needs to develop a more strategic approach to recruitment of entry-level employees in Science, Technology, Engineering, and Mathematics (STEM) occupations. Could you elaborate on how the FAA might be able to attract this seemingly shrinking pool of applicants?

- With the looming retirement of the baby-boomer generation, the entire government will face the challenge of senior civil servants with decades worth of knowledge leaving the government. What are some of the "departing employees' knowledge retaining management strategies" the FAA might employ?

Thank you for your kind attention to this letter and please contact Holly Woodruff Lyons or Bailey Edwards at (202) 226-3220 if you have any questions.

Sincerely,

Thomas E. Petri
Ranking Republican Member
Subcommittee on Aviation

Questions for the Record
Testimony of Robert M. Tobias
Subcommittee on Aviation
March 18, 2009

1. **Does FAA have the flexibility under its human capital systems to offer competitive salary and benefits packages to recruit skilled employees with the competencies required to deliver NextGen?**

Yes. In 1995, FAA was granted statutory authority to develop a new human resources (HR) management system that would be exempt many of the provisions of Title 5, United States Code, which is applicable to federal positions in the federal service. The legislation directed the agency to create a new HR system with the objective of increasing the flexibility of line managers to recruit, hire, compensate, train and deploy employees to meet the unique mission of FAA. The new system, implemented in 1996, introduced flexibilities in a number of critical HR areas: compensation, staffing, benefits, and performance management.

The most significant change created was the Core Compensation Plan, which was designed to improve the agency's ability to recruit, motivate, and retain high-quality employees and support the transition to a performance-based culture. The system is based on three major features and reflects best practices of public/private sector organizations:

- **Broad pay bands** that replaced the 15-grade General Schedule to allow for maximum pay flexibility
- **Market-based band adjustments** to ensure competitiveness in recruitment and retention of well-qualified candidates
- **Performance-based pay adjustments** to recognize employees for organizational and individual performance contributions

In addition, FAA has implemented policies that provide additional pay flexibilities, to include:

- **Promotion Increases**: These increases can range from 0% to 15%, or the minimum rate of the new band, whichever is higher.
- **In-Position-Increases**: In rare situations when employees remain in the same position, they are eligible for base pay increases ranging from 1% to 7%.
- **Reassignment Increases**: In some circumstances, base pay increases of 1% to 7% are allowed when an employee is permanently reassigned.
- **Reassignment bonuses**: With this tool, employees may be granted a lump sum payment of 1% to 7% when reassigned to a new position.

FAA also has the authority to pay recruitment incentives up to 25% (and in limited cases, up to 50%) of basic pay, as well as retention and relocation incentives in the same amount.

These compensation and pay flexibilities are in addition to the standard Federal benefits available to FAA employees: health insurance, life insurance, leave, and retirement.

In short, FAA managers have an extensive set of pay and benefits flexibilities that can be used attract, recruit, and retain top talent. In talking to FAA managers we learned the ability to offer competitive salaries was not as much a concern as finding employees with the right skills to perform the complex work that NextGen requires.

2. **In your testimony, you cite a more aggressive marketing strategy for the NextGen mission to potential employees as a possible tool to recruit quality employees. Can you elaborate on that?**

Transforming the nation's air transportation system is probably one of the most exciting and relevant missions in the federal government today. Not since the NASA space mission was launched has the government been engaged in more exciting and vital work, but unfortunately, FAA does not seem to be communicating a clear and engaging message about NextGen. In our report, we offered a few strategies on how FAA could market NextGen. One strategy is to enhance the quality of the vacancy announcements used to recruit for NextGen positions, so as to highlight the importance of NextGen work and generate interest and excitement for potential applicants. Imagine the impact of a discussion of how NextGen will contribute to the nation's continuing economic viability, reduce environmental impact, enhance our national security, and improve the safety of air travel. We think including some of this information in vacancy announcements to support recruitment efforts could go a long way in generating interest. The current pool of potential new applicants (young and old) wants to believe in what they are doing, so FAA needs to find a way to communicate the importance of NextGen.

Another strategy would be to work with the Office of Personnel Management (OPM) to identify ways to market NextGen through OPM's governmentwide tools, in an effort to reach a larger and more diverse applicant pool. In our report, we mentioned that OPM used a television recruitment campaign to increase awareness of the exciting and rewarding careers available in the federal government. This effort resulted in heightened interest in Federal jobs and could possibly be modeled for NextGen.

3. **In your testimony, you state that FAA needs to develop a more strategic approach to recruitment of entry-level employees in Science, Technology, Engineering, and Mathematics occupations. Could you please elaborate on how FAA might be able to attract this seemingly shrinking pool of applicants?**

   To attract entry-level employees, FAA needs to strategically market the compensation, benefits, and workplace flexibilities that are important to entry-level employees. Although there are a number of important flexibilities available governmentwide that may be useful in this regard, we did not find that FAA is using these tools in a systematic way to the agency's benefit. In Appendix J of our report, we identified the compensation, benefits, and flexible work arrangements that are most attractive to entry-level professional employees. These include:

   - Recruitment and relocation incentives
   - Flexible work schedule and leave policies
   - Student loan repayment program
   - Tuition reimbursement
   - Thrift Savings Plan match

   FAA should design an integrated approach using vacancy announcements, outreach and recruitment activities, and interviews to market these and other benefits that are attractive to entry-level employees. Additionally, under its own its unique HR system, FAA should consider designing its tools to attract entry-level employees. To identify the tools that are needed to fill the gaps, FAA could hold a focus group of recently hired entry-level employees to gather information.

4. **With the looming retirement of the baby-boomer generation, the entire government will face the challenge of senior civil servants with decades worth of knowledge leaving the government. What are some the "departing employees" knowledge retaining strategies" that FAA might employ**?

   There are several knowledge retention approaches that FAA could consider. First, the agency could establish a program for retirees to remain "on call" as consultants if a current employee needs to tap into their expertise. Second, FAA could establish a unique mentoring program to provide a formal mechanism for potential retirees to share their knowledge before they leave the agency. Third, FAA could develop a library or database to capture critical work products reflecting the application of critical knowledge of long-term employees. Finally, a videotaped interview is another tool that could be used to capture and retain critical knowledge of potential retirees.

   As an alternative to focusing on a knowledge retention program, FAA, like other Federal agencies should also consider ways to retain older workers as productive members of the workforce. In 2007, the Government Accountability Office

(GAO) convened a forum on engaging and retaining older workers and issued a report ("Engaging and Retaining Older Workers, GAO-07-438SP, February 28, 2007) describing obstacles, best practices, lessons learned, and strategies to address some of these obstacles and promote work at older ages. Some specific strategies mentioned that might be of benefit to FAA include:

- Employ flexible work situations and adapt job designs to meet the preferences and physical constraints of older workers
- Offer the right mix of benefits and incentives to attract and retain older workers, such as time off for elder care
- Provide employees with financial literacy skills to ensure they have a realistic plan to provide for retirement security
- Treat all employees in a fair and consistent manner and employ a consistent performance management system to prevent age discrimination complaints.

We are aware of legislation from last session introduced by the Chairman of the Senate Special Committee on Aging designed to address the large number of retiring baby boomers. Of potential benefit to FAA is the bill's requirement to establish, through the Department of Labor, a clearinghouse of best practices in the private and public sectors for hiring and retaining older workers. Therefore, FAA should not only look for strategies to retain the knowledge of its departing employees, but should consider designing workplace tools to encourage those employees to work longer so as to enable them to impart their knowledge to a pool of qualified replacements for the potentially large number of retiring baby boomers.

STATEMENT OF DR. KARLIN TONER, DIRECTOR, STAFF TO THE SECRETARY AND SENIOR POLICY COMMITTEE ON NEXTGEN COORDINATION, OFFICE OF THE ASSISTANT SECRETARY FOR BUDGET AND PROGRAMS/CFO, U.S. DEPARTMENT OF TRANSPORTATION, ON ATC 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 and Members of the Subcommittee:

Thank you for the opportunity to discuss the leadership role of the Senior Policy Committee in setting the strategic direction for the Next Generation Air Transportation System or "NextGen."

To introduce myself, I am currently assigned on detail from the Federal Aviation Administration to the Department of Transportation as an advisor on NextGen coordination. I am an aerospace engineer with more than 15 years of prior experience leading NASA research programs involving government, industry and academia. My publications include topics ranging from the design of aircraft to analysis of air traffic management concepts.

LEAD NEXTGEN STRATEGICALLY

NextGen will completely transform our Nation's air transportation system. Our system will be safe, more capable, more environmentally responsive and more effective at achieving our security and defense needs. NextGen requires rethinking air transportation. We must consider the capabilities of aircraft, airports and operations, looking at the system as a whole and integrating safety from the earliest conceptual design. For example, satellite-based measurements of location together with aircraft performance models will better anticipate flight paths and enable proactive air traffic management. Effective security will protect people, goods and airspace in a system with increased capacity. Operations will be harmonized on a global scale. Delays introduced by adverse weather will be reduced by integrating weather forecasts and observations into operational traffic flow planning.

Meeting the civil aviation, homeland security, economic, environmental protection, and national defense needs for NextGen, requires the alignment and integration of the air-transportation-related vision and activities among several federal agencies. For this reason, the Vision 100 – Century of Aviation Reauthorization Act of 2003 (Public Law 108-176) established the Senior Policy Committee (SPC) and the NextGen Joint Planning and Development Office (JPDO), chartering them to jointly transform the U.S. air transportation system by 2025.

Five "SPC partners" lead the transformation: the Departments of Transportation, Commerce, Defense and Homeland Security and the National Aeronautics and Space Administration. The SPC members, heads of these partnering agencies, advise the Secretary of Transportation on national goals and strategic objectives for NextGen to meet future United States' aviation needs. Members provide policy guidance for the integrated work plan created by the JPDO, identify resource needs and make recommendations for funding for planning, research and development activities within their respective organizations.

ENABLE ACCOUNTABILITY FOR NEXTGEN

The Secretary of Transportation and the SPC are accountable for NextGen, a national effort with a broad scope of policy, economic and technological complexity. They need to have the tools to do this difficult interagency leadership job. Two new additions to the toolbox enable effective participation: a direct SPC support staff and an advisory committee, both of which were mandated by a recent Executive Order. As Staff Director, I will lead the action to insure that these two new tools are ready for the task.

PROVIDE SUPPORT STAFF

One of my first responsibilities as Staff Director is to establish, lead and direct a full support staff. I am working with the SPC partners to fill the staff positions, insuring that the duties for each position are needed at the department level. At the Department of Transportation, I serve as the senior staff advisor to the Secretary and Deputy Secretary concerning all NextGen matters. The staff leads the coordination and resolution of high-level interagency policy issues related to NextGen transformation; provides oversight of the development of the interagency cross-cutting budget documentation and high-level performance measures; and monitors progress toward interagency deployment of NextGen demonstrations and capabilities.

It is imperative to stress that the coordination staff will have an interagency focus. ıe Staff Director is a liaison between the Secretary and the SPC partnering agencies.

The support staff will work with the SPC to deliver a biennial report that measures collective progress toward NextGen.

ENGAGE PRIVATE SECTOR DISCUSSION

Work is underway to establish a Federal Advisory Committee that has a broad spectrum of representatives including general aviation, commercial aviation, and aviation labor. Through public discussions, the committee will aim to identify areas where the aviation community can forge the consensus that will inform SPC decisions in setting a path forward. The advisory committee will focus on NextGen policy, planning and performance measures. Specific details regarding the charter, membership and tasking are in formulation now.

RECOGNIZE THE MAGNITUDE OF THE NEXTGEN CHALLENGE

The expeditious transportation of people and goods has made great societies grow and flourish, beginning with roads and expanding to shipping, to railways, to highway systems and to aviation. The traveling public expects an aviation system that is safe, secure and convenient. Despite the current economic downturn, forecasts continue to predict growth in demand for air travel. This growth must be sustainable, addressing environmental protection. To realize sustainable growth, airspace system users want to introduce new modes of travel bringing greater complexity to operations.

Quite simply stated in the FAA's NextGen Implementation Plan 2009 (http://www.faa.gov/nextgen), "NextGen means flying more passengers, more cargo, more types of aircraft, more safely, more precisely, and more efficiently, using less fuel, making less noise and creating less environmental impact."

The SPC's top-level strategic direction is needed to direct such an ambitious transformation. A plan, with a clear timeline and deliverables, must integrate roadmaps 'or policy, technology and capabilities across the broad spectrum of research, engineering ıd development, implementation and operation. Execution of the plan requires ɔperation and collaboration among government and the private sector. Further, the ıplexity of NextGen demands clear accountability and rigorous oversight of its lopment and implementation.

CONCLUSION

Establishing and maintaining a national air transportation system that meets the present and future civil aviation, homeland security, economic, environmental protection and national defense needs of the United States is not easy. To get there, we have to do a superior job addressing national policies, executing interagency plans and gauging progress against performance measures. And, the SPC must lead us there. Again, thank you for the opportunity to testify today.