U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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September 7, 2012

MEMORANDUM

TO: Members, Subcommittee on Aviation

FROM: The Honorable Thomas E. Petri, Chairman, Subcommittee on Aviation

SUBJECT: Hearing on "A Review of and Update on the Management of FAA's NextGen Program"

Wednesday, September 12, 2012, 10:00 a.m. in room 2167 Rayburn House Office Building

Purpose

The Subcommittee on Aviation will receive testimony from federal government and aviation industry witnesses regarding the management and status of the Federal Aviation Administration's (FAA) air traffic control modernization program known as the Next Generation Air Transportation System (NextGen).

Background

The national airspace system (NAS) consists of en route[1] airways, much like an interstate highway grid in the skies. Airways are routes in space between fixed points that include

[1] The FAA uses three types of facilities to control traffic: *Airport towers* control airport surfaces and the airspace immediately surrounding airports; *Terminal Radar Approach Control Facilities* (TRACONs) sequence and separate aircraft in terminal airspace (i.e., as they approach and leave airports, beginning roughly 5 nautical miles and ending roughly 50 nautical miles from the airport and generally up to 10,000 to 14,000 feet above the ground); and *Air Route Traffic Control Centers* control aircraft in high-altitude en route airspace (i.e., in transit and during approach to some airports, generally controlling the airspace around and above terminal areas).

navigational radio beacons and waypoints defined by latitude and longitude coordinates and unique names. Because aircraft operating at high altitudes must follow these airways, they often cannot fly the most direct routing from their departure points to their destinations.

Surveillance and separation of aircraft is largely provided by a broad 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, not so different from the technologies used during World War II.

Under the current system, controller workload, voice communication congestion, limitations of air traffic control (ATC) radar accuracy, and the coverage and accuracy of ground-based navigational signals impose limitations on the capacity and efficiency of air traffic, particularly in busy terminal areas near major airports and metropolitan areas.

The U.S. air transportation system transports roughly 730 million passengers each year, and combined with general aviation activity, results in roughly 70,000 flights over a 24-hour period. The FAA predicts that by 2025, increases in passengers (up 42 percent to 1 billion per year) and general aviation activity will result in air traffic increasing to more than 79,000 flights every 24 hours.[2] It is widely acknowledged that our current air transportation system will not be able to meet the future air traffic demands.

Next Generation Air Transportation System (NextGen)

The NextGen plan will transform the national air traffic system by transitioning from a ground-based radar system to a satellite-based surveillance system; developing data communications capabilities between aircraft and the ground to reduce controller and pilot workload; improving aviation weather forecasting and monitoring systems; and creating shared and distributed information technology architectures. NextGen will also benefit many communities, as well as passengers and operators, by reducing the environmental impacts of aviation, providing greater system efficiencies, and improving safety.

In 2003, Congress created the Joint Planning and Development Office (JPDO) within the FAA.[3] The JPDO is tasked to plan for, in coordination with federal and non-federal stakeholders, the transformation from the current ATC system to the NextGen system to meet anticipated air traffic demands of 2025. The *FAA Modernization and Reform Act* [P.L. 112-95*(FAA Reform Act)*] elevated the position of JPDO Director to Associate Administrator, and established additional responsibilities for the new JPDO Associate Administrator.[4]

The *FAA Reform Act* also established a Chief NextGen Officer within the FAA. This position is responsible for, among other things, implementing NextGen activities and budgets across the FAA; coordinating the implementation of NextGen activities with the Office of Management and Budget; reviewing and providing advice on the Administration's

[2] FAA Email to Mike Matousek, Aviation Subcommittee Staff, 8/24/12
[3] P.L. 108-176, Section 709, Air Transportation System Joint Planning and Development Office
[4] P.L. 112-95, Section 208, Next Generation Air Transportation System Joint Planning and Development Office

modernization programs, budget and cost-accounting system with respect to NextGen; and developing an annual NextGen implementation plan. However, at this time the FAA has not put in place a permanent JPDO Associate Administrator or Chief NextGen Officer.

In order to evaluate the FAA's progress in implementing NextGen, the *FAA Reform Act* requires the agency to establish and track several national airspace system performance metrics.[5] These metrics include: 1) actual arrival and departure rates per hour measured against the currently published aircraft arrival rate and aircraft departure rate for the 35 operational evolution partnership airports, 2) average gate-to-gate times, 3) fuel burned between key city airports, 4) operations using the advanced navigation procedures, 5) the average distance flown between key city airports, 6) the time between pushing back from the gate and taking off, 7) continuous climb or descent, 8) average gate arrival delay for all arrivals, 9) flown versus filed flight times for key city pairs, 10) implementation of NextGen Implementation Plan, or any successor document, capabilities designed to reduce emissions and fuel consumption, 11) the Administration's unit cost of providing air traffic control services, and 12) runway safety, including runway incursions, operational errors, and loss of standard separation events.

The FAA is also required to work with aviation industry stakeholders to establish baselines for each individual metric and provide Congress, by August 12, 2012, with a report describing the metrics to be used, information on any additional metrics developed, and a process for holding the Administration accountable for meeting or exceeding the metrics. While the FAA is making progress in establishing metrics and baselines, the agency failed to meet the reporting deadline.

Estimated NextGen Benefits

The FAA has promised efficiency gains through the implementation of NextGen by optimizing performance and improving operational productivity in the NAS. However, before many airspace users are likely to invest in the expensive avionics from which the benefits of NextGen are derived, they must have confidence in both the business case (i.e., the cost accounting of benefits) and the FAA's ability to manage the NextGen program so the agency can deliver the benefits in a timely manner (i.e., within the needed return on investment window). To encourage equipage, the *FAA Reform Act* authorizes the FAA to establish an equipage incentive program for certain avionics equipment, which the agency is currently discussing and developing with stakeholders.[6]

The FAA estimates that by 2020 NextGen air traffic management improvements will reduce total delays, in flight and on the ground, by roughly 38 percent (dependent on some factors, such as the amount of air traffic) compared with what would happen if no NextGen program was pursued. This delay reduction could provide as much as $24 billion in cumulative benefits to aircraft operators, the traveling public, and the FAA over this period (dependent on some factors, such as the cost of fuel). The NextGen program is also expected to save 1.4 billion gallons of aviation fuel and reduce carbon emissions by 14 million metric tons.[7]

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[5] P.L. 112-95, Section 214, Performance Metrics
[6] P.L. 112-95, Section 221, Public-Private Partnerships
[7] FAA email to Mike Matousek, Aviation Subcommittee Staff, 8/17/12

NextGen will also improve aviation safety by enhancing the situational awareness of pilots and controllers, primarily through the use of Automatic Dependent Surveillance-Broadcast (ADS-B) technology. ADS-B technology will broadcast and receive more precise and frequent situational data that will be available to both pilots and controllers. In today's operating environment, pilots depend heavily on controllers to identify the location of other aircraft in the NAS.

Further, NextGen will benefit airports and communities. With new technologies, NextGen will increase access to commercial and general aviation airports, guide aircraft in and out of airports more efficiently, and enable pilots, controllers, and airport operators to share surface surveillance data. Many surrounding communities will also experience reduced carbon emissions and less noise interference due to more precise aircraft arrival and departure procedures. Ultimately, this will allow a community to make better use of their airport and enjoy many economic benefits that aviation can bring, including job creation.

NextGen Task Force

In January 2009, the FAA requested that RTCA[8], a Federal Advisory Committee, establish a government-industry task force to forge community-wide consensus on the recommended NextGen operational improvements to be implemented during the transition to NextGen between 2009 and 2018.[9] The task force was also asked to focus on maximizing NextGen benefits and facilitating the development of the business case for industry investment. More than 300 people participated in the task force, representing nearly every sector of aviation, and in September 2009 the task force released its recommendations.[10]

A recent audit conducted by the U.S. Department of Transportation (DOT), Office of the Inspector General (IG),[11] assessed the extent to which the FAA is responding to the consensus recommendations made by the task force and addressing barriers that may hinder implementation. The DOT IG report found that while the FAA was quick to endorse the task force recommendations, it has made limited progress in implementing them. The DOT IG outlined several issues with FAA's implementation of the RTCA Task Force's near-term NextGen recommendations. These issues are discussed in more detail below:

a. <u>RTCA Recommendation Regarding Metroplex</u>

The task force recommended that FAA pursue an operational capability program to relieve congestion and tarmac delays at major metropolitan airports and increase efficiency at satellite airports. This program is commonly referred to as the "metroplex" initiative. To

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[8] 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 system issues. It functions as a Federal Advisory Committee.

[9] http://www.faa.gov/nextgen/media/nextgen_progress_report.pdf

[10] RTCA, "NextGen Mid-Term Implementation Task Force Report," September 2009.

[11] Challenges with Implementing Near-Term NextGen Capabilities at Congested Airports Could Delay Benefits," a report by the DOT IG, August 2012.

implement metroplex at the 21 identified metroplex sites[12], the task force recommended that the FAA leverage Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures and integrate procedure design to de-conflict airports and expand the use of terminal separation rules.[13] The FAA has extended the expected completion date for the metroplex sites by 15 months, from June 2016 to September 2017.

There is concern that the FAA's effort may not deliver all planned or desired benefits since the FAA has focused only on near-term airspace and procedure improvements rather than maximizing new technologies and advanced procedures as recommended by the task force. Airspace users want the FAA to focus its efforts on developing new flight paths that provide for more precise and efficient approaches, rather than designing procedures that overlay existing flight paths.

b. RTCA Recommendation Regarding Data Communications

Currently, communications between pilots and air traffic controllers is largely voice communications over two-way radio. Pilots are required to read back instructions from controllers to confirm that they have properly understood the instructions. Even with this requirement, errors are made that can jeopardize aviation safety, and frequency congestion can interfere with a pilot's ability to contact controllers, or for controllers to contact pilots. Voice communications are also more time consuming and limit an air traffic controller's productivity.

The task force recommended that the FAA address these challenges, and the FAA's answer is the Data Communications (DataComm) program. According to the FAA, DataComm will improve safety and efficiency by replacing voice communications with text message instructions, which for controllers would be generated by automated platforms. This will provide for far more complex maneuvers and allow complicated instructions to be transmitted and confirmed electronically. However, due to delays in modernizing related automation that controllers use to manage high-altitude air traffic, the FAA's timeline for initial service of DataComm has been delayed from 2014 to 2016, with full deployment not expected until 2019.

c. RTCA Recommendation Regarding Equipage Incentives

The task force recommended that the FAA incentivize industry investments in NextGen technologies by providing financial incentives and assistance, by providing a timely, unwavering certainty that operational benefits will justify the cost, or by developing a "Best-Equipped, Best-Served" policy (i.e., prioritizing air traffic control services for those users equipped with new systems). While the *FAA Reform Act* requires the FAA to develop a financial program to

[12] Washington, DC; North Texas (Dallas); Charlotte; Atlanta; Northern California; Houston; Southern California; NewYork/Philadelphia; Chicago; Seattle; Las Vegas Valley; South Florida; Boston; Denver; Orlando; Detroit; Memphis; Phoenix; Minneapolis-St. Paul; Cleveland; and Tampa.

[13] RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or spaced-based navigation aids, within the limits of the capability of the self-contained systems, or a combination of both capabilities. RNP is RNAV with the addition of an onboard performance monitoring and alerting capability. A defining characteristic of RNP operations is the ability of the aircraft navigation system to monitor the navigation performance it achieves and inform the crew if the requirement is not met during an operation.

incentivize aircraft equipage, airspace users still remain reluctant to equip with new avionics due to FAA's program implementation delays and a lack of defined or meaningful NextGen benefits.

For example, the FAA is designing many procedures to accommodate the performance capability of the least capable aircraft which offers little operational or financial benefits to airlines. According to the DOT IG, implementing a "best-equipped, best-served" policy will require the FAA to update air traffic control policies and procedures to incorporate the increased capabilities of NextGen technology and to improve interagency coordination. The FAA's training for air traffic controllers on existing and emerging procedures has also been limited and often only consists of briefings rather than comprehensive training on RNAV and RNP. In addition, FAA's Flight Standards Service is responsible for approving new procedures, yet it is unclear what Flight Standards' role is, or will be, in the design and implementation of new procedures.

Status of Key NextGen Programs and Initiatives

a. Automatic Dependent Surveillance–Broadcast (ADS-B)

Often characterized as the "backbone of NextGen," ADS-B is the satellite surveillance and tracking method that the FAA has chosen to replace radar.[14] The FAA claims eventually ADS-B, for the first time in aviation history, will allow both controllers and pilots to simultaneously see nearby aircraft. ADS-B is meant to provide enhanced and shared situational awareness for controllers and pilots with far more enhanced precision information, including air traffic location, aircraft type, heading, altitude, and speed. ADS-B is expected to enhance safety, capacity, and reduce fuel burn and emissions. While far more complex, ADS-B is a bit like having GPS in your car.

There are two key components to ADS-B implementation. One is the FAA's deployment of ground infrastructure for controllers. The agency awarded this contract to ITT Corporation in August 2007 and expects to complete this task by 2014. According to the FAA, 456 radio stations have been installed throughout the NAS, of which 400 are currently operational. These radios provide traffic and weather information to nearly 800 properly equipped aircraft on the East Coast, West Coast, and Alaska; support ATC separation in Louisville, Philadelphia, Houston, New Orleans, El Paso, the Gulf of Mexico, and Alaska; and support surface advisory services at Louisville, Philadelphia, Orlando, Seattle, Boston, San Diego, Ft. Lauderdale, and Newark. The FAA estimates that a total of 730 ADS-B radio stations will be needed to meet coverage requirements.

The second part of ADS-B implementation is avionics equipage on aircraft. While radar simply collects radar information from ground-based radar stations, ADS-B technology relies on avionics in the aircraft to broadcast information to ADS-B ground stations. This is a change from the passive surveillance where radars send out a signal that bounces off of the aircraft skin and is collected again by the radar station, to an active surveillance system where aircraft actually broadcast more precise and extensive information from the aircraft. Because avionics

[14] *ADS-B Out* will enable an aircraft to broadcast its position using GPS and *ADS-B In* will enable air traffic controllers and other properly equipped aircraft to receive it.

equipage is critical to ADS-B implementation and given the financial hardships facing aircraft owners, it is important for the FAA to develop operational or financial incentives, or a combination of both.

b. En Route Automation Modernization (ERAM)

The computer system used at the FAA's high altitude en route centers processes flight radar data, provides communications, and generates display data to air traffic controllers. The current system, called the "Host", is being replaced by ERAM, a key automation platform built with NextGen in mind that will enhance air traffic controller productivity.

ERAM is a platform program for NextGen. It will help to advance the transition to NextGen, and many programs, such as ADS-B and DataComm, depend on the successful deployment of ERAM.[15] As ERAM evolves, it will provide benefits to pilots, controllers, and the flying public. For pilots, ERAM increases flexible routing around congestion, weather, and other restrictions. For controllers, ERAM will allow the tracking of roughly 1,900 aircraft at a time instead of the current 1,100 flight capability. Finally, for the traveling public, ERAM will result in improved safety, efficiency, and consistency.

According to the FAA, the ERAM system is fully commissioned in Salt Lake City and Seattle, and the legacy Host system has been decommissioned. Seven additional sites have achieved Initial Operating Capability (IOC) on ERAM (i.e., ERAM is used to manage live traffic at these locations). Three of these sites are continuously operating on ERAM, while the remaining four sites conduct limited and extended operational runs on the system. Most recently, these nine sites have transitioned to a version of ERAM software that will process ADS-B information. The FAA expects to achieve IOC at the remaining eleven centers in Fiscal Year 2013.[16]

The original contract for ERAM was in 2002 and the system was scheduled to be fully implemented in 2010. The FAA now expects ERAM to be operating at all twenty en route centers in Fiscal Year 2013. According to the DOT IG, in part this delay is due to the FAA accepting a system that was not yet ready to be deployed (i.e., data tags were pairing with the wrong aircraft and flights were being dropped). There are also several unknowns, such as the overall cost and eventual capabilities of the system. This is alarming because from January 2010 to June 2012 the FAA spent more than $641 million on ERAM, which averages to more than $21 million per month. The DOT IG is expected to publish a report in the coming weeks highlighting concerns with ERAM and making recommendations to address them.

c. Greener Skies

The Greener Skies project is a collaborative project between the FAA, airlines, the Port of Seattle, and Boeing Corporation, intended to make the skies over Seattle quieter and greener.[17] The FAA is expanding the use of Optimized Profile Descents (where the airplane essentially

[15] http://www.faa.gov/air_traffic/technology/eram
[16] FAA email to Mike Matousek, Aviation Subcommittee Staff, 8/28/12
[17] http://www.faa.gov/nextgen/snapshots/slides/?slide=6

glides in idle to the runway threshold), RNAV arrivals, and RNP approaches. The FAA anticipates these procedures will be available to any properly equipped aircraft in Spring 2013.

Alaska Airlines is partnering with the FAA to develop and implement the Greener Skies project. On June 11, 2012, an Alaska Airlines flight was the first passenger flight to approach the airport using a satellite-based navigation arrival procedure, ultimately resulting in fuel savings and emissions reductions. Alaska Airlines estimates the Greener Skies procedures will cut fuel consumption by 2.1 million gallons annually and reduce carbon emissions by 22,000 metric tons, the equivalent of taking 4,100 cars off the road every year. It will also reduce overflight noise exposure for an estimated 750,000 people living within the flight corridor.

The Greener Skies flight trials will verify air traffic control processes, procedures, and traffic flow management. When Greener Skies is completed the FAA will have a template for how to implement these kinds of airspace improvements across the country. The *FAA Reform Act* requires the FAA to submit a report to Congress regarding the agency's strategy for the implementation and acceleration of the operational capabilities produced by the Greener Skies project as recommended by the RTCA task force.[18] The FAA was required to submit the report to Congress on August 12, 2012. However, it has yet to submit the report.

Other NextGen program mandates and requirements included in the *FAA Reform Act* are outlined in Appendix A.

[18] P.L. 112-95, Section 225, Reports on Status of Greener Skies Project

Witnesses:

Panel I:

The Honorable John D. Porcari
Deputy Secretary
U.S. Department of Transportation

The Honorable Michael P. Huerta
Acting Administrator
Federal Aviation Adminstration

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

Dr. Gerald Dillingham
Director, Physical Infrastructure Division
Government Accountability Office

Panel II:

Ms. Sue Baer
Director of Aviation
The Port Authority of New York and New Jersey

Mr. David J. Barger
President and CEO
JetBlue Airways

Mr. Craig Fuller
President and CEO
Aircraft Owners and Pilots Association

Mr. Paul Rinaldi
President
National Air Traffic Controllers Association

Appendix A

Section Number	Section Title	Descriptions	Due date	
208	Next Generation Air Transportation System Joint Planning and Development Office	Within 6 months of enactment, the head of each Federal agency referred to in paragraph shall execute a MOU with office carrying out activity	August 14, 2012	
209	NextGeneration Air Transportation Senior Policy Committee	Within 1 year of enactment the Committee shall submit its annual report, and every year thereafter	February 14, 2013	
211	Automatic Dependent surveillance-Broadcast Services	DOT IG shall conduct a review which will be submitted periodically	Periodically	
211	Automatic Dependent surveillance-Broadcast Services	FAA will initiate rulemaking proceedings to issue guidelines and regulations within 1 year of enactment	February 14, 2013	
211	Automatic Dependent surveillance-Broadcast Services	Within 18 months of enactment Administrator shall develop plan for use of ADS-B technology	August 14, 2013	
212	Expert Review of Enterprise Architecture for NextGen	Within 1 year of enactment submit report of review to Congress	February 14, 2013	
213	Acceleration of NextGen Technologies	Within 18 months 30% of required procedures at OEP airports must be completed	August 14, 2013	
213	Acceleration of NextGen Technologies	Within 36 months of enactment 60% of all required procedures at OEP airports must be completed	February 14, 2015	
213	Acceleration of NextGen Technologies	Prior to June 30, 2015, 100 percent of required procedures at OEP must be completed	June 30, 2015	
213	Acceleration of NextGen Technologies	Within 6 months Administrator shall publish report for non OEP airports after consultation with industry and labor on RNP procedures	August 14, 2012	

213	Acceleration of NextGen Technologies	Within 18 months of enactment 25% required procedures at non-OEP airports to be completed	August 14, 2013	
213	Acceleration of NextGen Technologies	Within 36 months of enactment 50% non-OEP airport required procedures completed	February 14, 2015	
213	Acceleration of NextGen Technologies	Prior to June 30, 2016 100% of required procedures at non-OEP procedures must be completed	June 30, 2016	
213	Acceleration of NextGen Technologies	Deployment Plan for Nationwide Data communications systems within 1 year of enactment	February 14, 2013	
214	Performance Metrics	Within 180 days of enactment Administrator of FAA shall establish and begin tracking NAS performance metrics	August 12, 2012	
214	Performance Metrics	Within 180 days Administrator shall submit a report with descriptions of metrics	August 12, 2012	
217	Inclusion of Stakeholders in Air Traffic Control Modernization Projects	Within 1 year of enactment, submit report on implementation to Congress	August 14, 2012	
218	Airspace Redesign	Within 1 year following 1st day of completing of NY/NJ/Philly airspace redesign submit a report to Congress	TBD	
219	Study on Feasibility of Development of a Public Internet Web-Based resource on locations of potential aviation obstructions	FAA will issue the report within 1 year of enactment	February 14, 2013	
222	Operational Incentives	Administrator shall issue report either within 6 months of enactment or on the date aircraft a required to be equipped with ADS-B pursuant to rulemaking in section 211	August 14, 2012	

224	Air Traffic Controller Staffing Initiatives and Analysis	Within 1 year of enactment Administrator shall ensure sufficient number of contract instructors, space and simulators; distribute placement of certified professional AITC training and development controllers at facilities, initiate analysis of scheduling and practices, provide priority to certified professional air traffic controllers in training, assess training programs at failing ATC facilities and prioritize efforts to address recommendation facilities in DOT IG's AV-2099-047	February 14, 2013	
225	report on status of greener skies project	Within 180 days of enactment, FAA shall submit to Congress a report on the strategy of the Administrator for implementing NextGen operational capabilities	August 12, 2012	
225	report on status of greener skies project	Within 180 days of prior report being submitted, FAA shall submit a report on the progress by the Administrator in carrying out the strategy	August 12, 2012	