Testimony of

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"NextGen: A Review of Progress, Challenges, and Opportunities
for Improving Aviation Safety and Efficiency"

The National Air Traffic Controllers Association (NATCA) is the exclusive representative of close to 20,000 aviation safety professionals, including more than 14,000 air traffic controllers serving the Federal Aviation Administration (FAA), the Department of Defense (DOD) and the private sector. In addition, NATCA represents FAA's Alaska flight service specialists, FAA engineers, traffic management coordinators, aircraft certification professionals, agency operational support staff, regional personnel from FAA's logistics, budget, finance, acquisitions, and information technology divisions, as well as agency occupational health specialists, and medical program specialists.

Air traffic controllers are dedicated to ensuring that our National Airspace System (NAS) is the safest and most efficient in the world. In order to maintain that safety and efficiency, our controllers work to improve safety procedures, modernize the NAS, and promote new technology. We have professional controllers involved in nearly every modernization and Next Generation Air Transportation System (NextGen)-related program the FAA is currently working on. Controller skills are put to work every day as they handle an impressive volume of flights – air traffic controllers separate more than 70,000 flights each day, safely moving nearly two million passengers through our skies daily. Air traffic controllers handle these flights in the busiest and most complex airspace in the world with roughly 5,000 planes in the sky at any given moment.

Executive Summary

NATCA is a strong supporter of the NextGen modernization projects currently underway. We believe these programs are much-needed improvements that will increase the safety and efficiency of the NAS. NATCA is proud to be an actively involved stakeholder, and applauds this Committee for its work in including a stakeholder involvement provision in the 2012 FAA Reauthorization Act. The success of our collaboration with the FAA and other aviation stakeholders has greatly improved the efficiency of the NextGen modernization process.

At the same time, NATCA is concerned about the lack of stable funding for these important NextGen modernization projects. In the past year, mandatory sequestration cuts have resulted in furloughs at the FAA that slowed and halted several essential NextGen projects, including En Route Automation Modernization (ERAM), Data Communications (DataComm), and Terminal Automation Modernization and Replacement (TAMR). ERAM is the backbone of NextGen modernizations. When ERAM is delayed, other projects are also delayed in a domino effect. Funding uncertainty has also created a stop-and-go pace that adds cost overruns as air traffic controllers must be retrained each time a project is halted – lost time becomes lost money, and lost opportunity to reap the benefits of these modernizations.

Today we would like to highlight the immediate effects that unstable funding has had on NextGen. Specific projects such as ERAM, TAMR, DataComm, and Performance Based Navigation (PBN) have all faced setbacks in the last year due to the April 2013 furloughs and the October 2013 government shutdown. These projects rely on stable funding in order to plan for test dates, training, and implementation of new procedures. Without stability, they lose time and money.

This testimony will also provide an overview of several NextGen projects that are already showing beneficial results. NATCA believes that with the benefit of stable funding we will continue to reap the benefits of NextGen modernization projects, such as: the Optimization of Airspace & Procedures in the Metroplex (OAPM); Automatic Dependent Surveillance-Broadcast (ADS-B); Wide Area Multilateration (WAM); PBN; Re-Categorization of Separation Standards (RECAT); DataComm; and the Equivalent Lateral Spacing Operations (ELSO).

The successes of these projects demonstrate the benefits of NextGen and why Congress should prioritize stable funding that allows for the projects to be completed. For example, Houston has successfully

implemented a total of 61 new procedures through OAPM (this includes 50 new procedures and 11 modified or amended procedures). These procedures will affect the airspace around Houston and allow aircraft to be flown more efficiently with fewer altitude holds and speed restrictions. The airlines' fuel savings from the implementation of Houston's OAPM are projected to be $9.2-$26 million dollars each year.

ADS-B in the Gulf of Mexico is already improving safety and efficiency. Controllers and pilots have benefitted tremendously from ADS-B. Aircraft flying westbound from Florida have been able to reduce delays because they can now remain in radar control when deviating south of course due to weather. In addition, helicopters flying to the oil platforms in the Gulf are delayed less frequently during poor weather because controllers are able to see them on radar now instead of working a manual non-radar grid system. Newark Airport has been conducting a trial of issuing clearances via DataComm. We anticipate benefits such as more efficient communication between pilots and controllers, fewer mistakes, and faster communication time, which saves valuable time when an aircraft is being rerouted.

Again, NATCA believes that NextGen will increase the safety and efficiency of the NAS, and hopes that Congress adequately funds the programs so all aviation stakeholders reap the benefits of modernization.

Next Generation Air Traffic Control System
NextGen is the FAA's effort to modernize the nation's air traffic control system. NATCA fully supports NextGen modernization, which will allow the FAA to meet increased demand while improving the safety and efficiency of the NAS, reducing delays, and protecting the environment. According to the FAA's vision, NextGen will enable more aircraft to safely fly closer together on more direct routes, reducing delays, carbon emissions, fuel consumption, and noise.

NextGen projects are transforming the national air transportation system by using new and existing technologies including satellite navigation and control of aircraft, advanced digital communications, and enhanced connectivity between all components of the NAS.

NATCA is proud to be involved in all aspects of the process as an essential stakeholder. NATCA and the FAA both recognize that stakeholder involvement is the key to continued success to NextGen. We applaud the Committee for their efforts to ensure this collaboration through the stakeholder involvement provision in the 2012 FAA Reauthorization Act. In addition to being present on NextGen projects, NATCA is represented as a member of the RTCA, the FAA Management Advisory Council (MAC), and the NextGen Advisory Committee. Our presence, as well as that of other industry leaders, has been an important addition to the discussion on modernization.

Full Funding Is Essential for NextGen
NATCA supports NextGen modernization projects and believes controllers and end users, including the traveling public and airlines, are already seeing benefits from these projects. Recent improvements in collaboration among all aviation stakeholders have resulted in smoother planning, development, testing, and implementation of many projects.

However, while collaboration has greatly improved, it cannot overcome the negative consequences of unstable funding. We continue to see cost overruns and delays, which are certainly compounded when Congress is unable to provide stable, predictable funding. The April 2013 furloughs, created by sequestration-mandated across the board budget cuts, created significant delays not just to aircraft, but also to important NextGen projects. The October 2013 government shutdown further compounded those delays. In order to continue benefiting from these modernization projects and seeing the results, Congress must provide stable and predictable funding to the FAA.

In addition to unstable funding, NextGen is also hindered by an aging physical infrastructure. The FAA has had difficulty keeping up with repairs for the physical air traffic control towers, and lagging maintenance creates difficulties to teams working to develop and deploy NextGen technology.

Between the week-long furlough of employees at the FAA in April 2013 and the federal government shutdown in October 2013, the FAA lost time and money on several of its key projects. In both cases the FAA was required to suspend activities on many key programs, sending controllers working on these projects back to their facilities to work traffic or in some cases furloughing them. Timetables had to be pushed back, which increased costs and delayed other project timelines.

Specific Delays Due to Funding Lapses in 2013
- **En Route Automation Modernization (ERAM)**: ERAM, which is the backbone of NextGen modernization, will replace the 40-year-old En Route Host computer and backup system used at 20 FAA Air Route Traffic Control Centers nationwide. The FAA has been spending a significant amount of money to maintain and update two systems simultaneously in order to continue running the NAS at full capacity. ERAM was initially scheduled to fully replace the old system in August 2014. As a result of the April 2013 furloughs, that completion date has been pushed to March 2015, a delay that will cost in excess of $42 million.

  With the funding uncertainty of the last 12 months, the FAA has attempted to reduce delays to ERAM for as long as possible by stretching budgets in an effort to avoid cancelling testing and training. They also sought to save money by cancelling controller training trips to the FAA Technical Center (Tech Center). By October 2013, the FAA had to cancel several tests at key centers because previous delays made them impossible to go forward. For example, if Fort Worth Air Route Traffic Control Center (ARTCC or Center), Boston Center, and Memphis Center were unable to complete their tests in October, the training that had been completed by their controllers would go stale, meaning that all participants would need to be retrained. The retraining takes time and adds significant additional cost. For example, New York and Washington Centers had begun training their workforce for ERAM Operations prior to the shutdown. They were scheduled to begin ERAM operations in December 2013. The delay in their training has affected the entire program by adding up to four additional months to the current completion date of March 2015. The delays in implementation cost $6 million per month.

- **Terminal Automation Modernization and Replacement (TAMR):** This program is modernizing the air traffic control systems at the nation's major airports as well as every Terminal Radar Approach Control (TRACON) in the country. TAMR is scheduled to replace some radar systems that are nearly 50 years old. Nearly all of the nation's 253 terminal facilities will be affected by TAMR. TAMR's mission is to combine and upgrade multiple air traffic control technologies to a single, state-of-the-art platform called the Standard Terminal Automation Replacement System (STARS), which will maintain the safety and increase the efficiency of the NAS.

  Sequestration cuts and the 2013 government shutdown caused a ripple effect for TAMR testing and deployment. Several projects were delayed by months, and installations were postponed as a result. The TAMR project team worked with a skeleton group during the October 2013 shutdown. Due to economic uncertainty, the FAA sent its subject matter experts back to controlling traffic, which halted installations and tests, training development, and training. All of these aspects were expensive to shut down, reschedule, and finally restart. Essentially, the cost and ramifications of the shutdown are just now being fully realized. The consequences of installation and procurement delays, along with the rescheduling of nearly every program activity is far-reaching, and the cost has been estimated at as much as $10 million per month. However, since the shutdown ended the program has worked feverishly to recover lost time through collaboration.

TAMR is now in full deployment and technical refresh mode in all three phases, having recently installed STARS at Dallas, Boise, Kalamazoo, and Allentown, and conducted technical refresh upgrades at Philadelphia and Miami. NATCA subject matter experts (SMEs) are working in all areas of this program and finding solutions to problems that have plagued modernization efforts in the past. Installation of equipment as well as modernization efforts are underway at literally dozens of TRACON facilities across the country including: Northern California, Southern California, New York, Atlanta, Denver, Chicago, Louisville, St. Louis, Minneapolis, Potomac, Austin, Billings, Tampa, Seattle, Salt Lake, Orlando, and more. NATCA SMEs have contributed to the success of this program and an incredible number of acquisition program baseline goals are being reached on or ahead of schedule as a result.

The reasons for TAMR's recent successes are many, but can only be accomplished with a steady funding commitment. The program and FAA are poised for monumental success like never before provided that the adequate resources continue to be made available. Staying the course and finishing this project is vital to facilitate many NextGen programs.

- **Optimization of Airspace & Procedures in the Metroplex (OAPM):** Also known as Metroplex, OAPM works to increase the efficiency of airspace by improving procedures. These changes will provide economic benefits for airlines, as well as fuel savings that are beneficial for the environment. We know from initial testing at the Washington, D.C. location, for example, that annual fuel savings are exceeding estimates and could be as much as $19 million each year, and a reduction of 75,000 metric tons of carbon. Thus the real cost is the lost opportunity for efficiency and sustainable economic benefits for end users such as airlines. The shutdown halted progress that was being made at nine test sites across the country. Listed below are two examples of the impacts of the April 2013 (which lasted one week) sequestration furloughs and the October 2013 shutdown (which lasted 16 days).

  The Southern California test site was due to begin final implementation of procedure changes in December 2014. Due to the April and October 2013 stand down of the teams, the implementation date was delayed to February 2016. Those delays prevent estimated savings of $10-16 million dollars a year in fuel, and 34,000-78,000 metric tons of carbon. A significant part of the delays due to the fact that although the teams may have been on hold for only one or two weeks at a time, they require months to reassemble.

  The Houston test site was due to begin final implementation in December 2013. That was delayed until May 2014 due to the April 2013 furloughs. Houston has just begun using its new procedures (discussed later), but without the shutdown and furloughs, it could have begun cost and fuel savings six months earlier.

When Fully Funded, NextGen is Already Showing Results
While NextGen has struggled with funding uncertainty, there are also success stories of modernization projects that have already been implemented across the country. These changes assist our controllers in increasing efficiency and capacity of the NAS while maintaining the highest safety standards. Below are a few such examples of how NextGen projects are already benefiting the NAS:

1. **Houston – Optimization of Airspace & Procedures in the Metroplex (OAPM):** OAPM study teams rely on current aircraft navigation capabilities to enhance airport arrival and departure paths, provide diverging departure paths to get aircraft off the ground more quickly, and add more direct, high-altitude Area Navigation (RNAV) navigation routes between metroplexes. These changes reduce fuel consumption, providing economic benefits for airlines as well as benefits for the environment.

Houston is an example of a success story. However, while the Houston test site was due to begin final implementation in December 2013, it was delayed until May 2014 due to the April 2013 furloughs. Through the collaboration and hard work of the facilities in the Houston area, a new type of air traffic control began on May 28, 2014. A total of 61 new procedures (50 new procedures and 11 modified or amended procedures) were implemented for Houston Center (ZHU), Houston TRACON (I90), Houston Intercontinental Airport (IAH), and the satellite airports including David Wayne Hooks Memorial (DWH), William P. Hobby (HOU), George Bush Intercontinental (IAH), and Sugar Land Regional (SGR).

United Airlines is the main carrier at IAH, with Southwest being the focus carrier at Houston Hobby Airport (HOU). These airlines will see the most benefits from the implementation of procedures that allow aircraft to be flown more efficiently with less altitude holds and speed restrictions. The deployment of the Houston OAPM should be the playbook for future implementations. The airlines' fuel savings from the implementation of Houston's OAPM are projected to be $9.2-$26 million dollars each year.

1. **Gulf of Mexico – Automatic Dependent Surveillance-Broadcast (ADS-B):** ADS-B, one of the cornerstone components of NextGen, is a form of surveillance that will replace traditional radar as the primary surveillance method in the NAS. ADS-B involves the broadcast of the GPS-derived position report of an aircraft or vehicle. As this technology continues to evolve and aircraft equip with ADS-B Avionics, controllers will see an increase in surveillance coverage not provided by traditional radar sources. At this time, the FAA has completed the physical infrastructure of the ADS-B network. Even more importantly, they have successfully integrated ADS-B data into existing ATC automation systems, meaning that air traffic controllers can see the new ADS-B information.

2.

The benefit of having increased surveillance coverage is limited to the number of aircraft that have certified Minimum Operational Performance Standards (MOPSB) avionics (this meets the certification requirements in the FAA ADS-B Mandate of 2020). As of May 31, 2014, the installation of FUSION has reached over 30 facilities and Houston ARTCC (ZHU) is using ADS-B in the Gulf of Mexico.
For many years non-radar control was the only option for controllers when working air traffic through and in the Gulf of Mexico. As ADS-B became a reality, controllers and pilots have benefitted tremendously from this technology. Aircraft flying westbound from Florida have been able to reduce delays because they can now remain in radar control when deviating south of course due to weather. In addition, helicopters flying to the oil platforms in the Gulf are delayed less frequently during poor weather because controllers are able to see them on radar now instead of working a manual non-radar grid system.

3. **Colorado – Wide Area Multilateration (WAM):** WAM is an independent, cooperative surveillance technology based on the same time difference of arrival principles that are used on an airport surface. Several ground-based receiving stations listen to signals transmitted from an aircraft and then mathematically calculate its position in three dimensions. This data is transmitted to screens viewed by air traffic controllers for separation of aircraft. WAM can interface to terminal or en-route automation systems.

WAM is beneficial in locations with limited visibility. For example, controllers at Denver Center (ZDV) were handicapped when providing air traffic control services because they lacked radar services below 17,000 feet. With the deployment of WAM, controllers can actually see the aircraft moving on the surface of many airports and aircraft remain in radar control for their entire flight. This has two very significant consequences for controllers: controllers are able to reduce separation due to the elimination

of non-radar procedures and new procedures that reduce departure delays are being created thanks to better surveillance.

4. **Phoenix – Performance Based Navigation (PBN):** The development and implementation of PBN will create more defined routing for aircraft, which ultimately increases the number of aircraft that controllers can direct. These new procedures will improve the fuel efficiency for the airlines and create safer and more efficient procedures for air traffic.

   In Phoenix, aircraft arriving from the east were being delayed or given excessive vectors due to traffic congestion. Teams consisting of the FAA, NATCA, and the users met to establish PBN/RNP procedures that have shown benefits to the airlines, business jets, and general aviation aircraft by modifying the flight routes and avoiding that congestion.

   While Phoenix is a case study in the benefits that PBN can give to the aviation industry as a whole, the government shutdown had a tremendous effect on PBN projects across the country because the schedule for designing and implementing PBN procedures is precise and any delay causes procedures to slip to future production dates. Every time this happens the new benefits are lost for that time period and it affects other procedures in a domino effect. A lot of time and effort - and therefore money - was spent in assessing what procedures could be developed and implemented along with their timelines.

   As a result, everything had to be rescheduled. Some projects slipped and some procedures were cancelled. Each time something like this happens, funding has been wasted because the work has to be redone to meet requirements. Many benefits have already been lost and will continue to be lost due to unstable funding.

5. **Memphis – Re-Categorization of Separation Standards (RECAT):** Experts in wake turbulence, safety, and risk analysis have determined that decreasing separation between similar type aircraft is as safe, or safer than, current standards and increases efficiency and capacity, meaning that like other NextGen projects, RECAT has the capacity to enhance safety, reduce delays, save fuel, and reduce aviation's environmental impact.

   Memphis Tower and TRACON were the first facilities to apply the new standards on November 1, 2012. The recategorization of Wake Turbulence is one of the most beneficial improvements when comparing the cost of implementation with the savings by the users. In Memphis, FedEx has been pleased with the results. Departure delays were reduced by 74 percent in the first week of implementation. Controllers have been very supportive of this technology and the tools provided to them identifying the weight category of each aircraft.

6. **Newark –Data Communications (DataComm):** DataComm will reduce frequency congestion by allowing the controller and pilot to communicate directly via digital communication (much like a text message). It will also reduce confusion because the message will be in print form and not copied over the frequency. A majority of these messages will be integrated into the flight deck avionics to help save time and remove issues of incorrect data entry.

   One beneficial application of DataComm is evident during severe weather, when an aircraft may receive several different routes within a period of 30 minutes. With DataComm, revised routes can be sent with a few clicks to the flight deck, saving valuable time as the aircraft is rerouted. This is especially helpful when there is a language barrier that could occur with non-English speaking pilots. DataComm also benefits surface operations by saving time, which reduces the backlog that could otherwise occur when aircraft are holding for a departure clearance.

Newark Airport (EWR) has been conducting a trial of issuing clearances via DataComm. While the program has a long way to go, it is apparent the benefits of this initiative will be substantial for controllers and users.

The 2013 government shutdown affected ERAM implementation, which in turn affected the schedule of implementation of DataComm functionality at the NAP (National Application Processor) Realm in Atlanta ARTCC (ZTL). The NAP Realm contains the logic for aircraft logons. There are two NAP Realms, one at Salt Lake Center and the other at Atlanta Center. If one fails, the other is used as a backup. This means that the key site, Salt Lake City Tower (SLC), will not have logon redundancy in the event of a failure, and controllers would have to abandon DataComm functionality and revert to voice communication.

7. **Atlanta –Equivalent Lateral Spacing Operations (ELSO):** ELSO is a procedure that enables the world's busiest airport to depart aircraft on diverging course much closer than in the past. ELSO, developed by the Mitre Corporation in 2011, added two departure routes at Hartsfield–Jackson Atlanta International Airport (ATL) due to an updated separation standard. The introduction of ELSO at ATL enables simultaneous and successive diverging departure operations by creating two departure tracks for each runway end during normal runway operations. When the weather is not conducive or the pilots are unwilling or unable to fly the RNAV routes, controllers revert back to the standard divergence. The angle between departure routes decreased from 15 degrees to 10 degrees, and the time between departures was reduced from two minutes to one minute, taking advantage of RNAV technology. Controllers at ATL now clear between eight and twelve more planes for departure each hour. Controllers rely on ELSO to expedite departures at this busy airport. The airlines serving ATL have experienced reduced delays and controllers have a more predictable course that is set for the aircraft. Initial reports are positive from both pilots and controllers.

The advantages of ELSO have somewhat of a domino effect. Because ELSO reduces the need for a triple departure configuration at ATL, there is a reduction in controller workload. This also spurs fuel and time savings for departing aircraft.

NATCA Recommendations
The aviation community and the FAA all see the value and benefits of NextGen modernization projects. We are working collaboratively to complete testing and implementation of some key programs, as described above. At this time, NextGen needs assurances from Congress that it will provide stable and predictable funding for the duration of the projects. Below are NATCA's formal recommendations for how Congress can assist the FAA, NATCA, and other stakeholders in successfully completing NextGen modernization projects.

- **Stable and Predictable Funding:** NextGen must be fully funded through the regular appropriations process. Attempting to fund these projects with continuing resolutions, or worse, not at all, as happened during the October 2013 shutdown, has significant detrimental effect on NextGen progress.
- **Continued Collaboration:** Congress and the FAA should continue to focus on collaboration and stakeholder involvement in order to set and reach realistic deadlines.
- **Streamlining the Rulemaking Process**: The FAA's long and laborious rulemaking process costs valuable time. Changes are needed in order to streamline the rulemaking process to better implement new efficiencies.