STATEMENT OF MICHAEL G. WHITAKER, DEPUTY ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, BEFORE THE SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION, SUBCOMMITTEE ON AVIATION, NEXTGEN: A REVIEW OF PROGRESS, CHALLENGES, AND OPPORTUNITIES FOR IMPROVING AVIATION SAFETY AND EFFICIENCY, JUNE 25, 2014.

Chairman Cantwell, Ranking Member Ayotte, members of the Subcommittee:

Thank you for the opportunity to appear before you today to discuss the Next Generation Air Transportation System (NextGen). Through NextGen, the FAA is changing the way the National Airspace System (NAS) operates to achieve greater efficiency and predictability in air travel. NextGen will improve safety and support environmental initiatives such as reducing congestion, noise, emissions and fuel consumption through increased efficiency. NextGen will also allow the NAS to expand to meet future demand, manage a more complex set of users, and support the economic viability of our country's aviation system.

NextGen was a key component of the 2012 FAA Reauthorization. We recently released the Chief NextGen Officer's Report to Congress detailing the progress we have made in NextGen programs and capabilities. Since I became Chief NextGen Officer in June 2013, the FAA has made significant progress toward completing the technological foundation that allows us to operate the NAS with greater efficiency and predictability and reduced environmental impact. We have strengthened our partnerships with key stakeholders, coming to an agreement on a set of near-term capabilities that both the FAA and industry will concentrate on over the next three years. And we have concrete evidence that demonstrates how NextGen works.

We are on the cusp of finishing several key programs that underpin NextGen. We have completed installation of the ground infrastructure for Automatic Dependent Surveillance – Broadcast (ADS-B), the new surveillance system that uses GPS signals to determine an aircraft's location. We are on track to have all 20 en route centers operating with En Route Automation

Modernization (ERAM) by Spring 2015, which will replace HOST, the computer system the FAA has been using to control traffic in high-altitude airspace since the 1970s. ERAM enables many new NextGen capabilities that could not be accommodated by HOST.

By the end of 2016, we expect to have made substantial progress deploying Terminal Automation Modernization and Replacement (TAMR), a program that upgrades the automation platform used in FAA facilities that control low-altitude traffic approaching and departing from our nation's airports. ERAM and TAMR will be coupled with ADS-B and other NextGen programs still in development, such as Data Communications and a suite of traffic management and decision support tools, to provide new ways to move users safely and efficiently through the NAS.

NextGen Benefits Are Being Delivered Today

Passengers are already enjoying the benefits of NextGen through shorter flights, better on-time performance, and fewer missed connections. Air carriers are saving precious minutes and fuel and reducing aircraft exhaust emissions by taking advantage of more precise routing. General aviation pilots and other small aircraft operators are enjoying greater access to more airports across the country, particularly during poor weather. And air traffic controllers have access to new tools to help them make the critical decisions necessary to keep the world's busiest airspace system working as safely and efficiently as possible.

ADS-B

Automatic Dependent Surveillance–Broadcast (ADS–B) is a key component of NextGen, which will move air traffic control (ATC) from a radar-based system to a more precise satellite-

derived aircraft location system. ADS-B equipment combines an aircraft's positioning source, aircraft avionics, and a ground infrastructure to create an accurate surveillance interface between aircraft and ATC. ADS–B provides air traffic controllers with more accurate information to help keep aircraft safely separated in the sky and on runways.

ADS–B consists of two different services: ADS–B Out and ADS–B In. ADS-B Out periodically broadcasts information about each aircraft operating within the NAS, such as identification, current position, altitude, and velocity, through an onboard transmitter. With ADS-B, controllers get an update of aircraft position almost continuously, compared to every five seconds or longer with radar. The real-time position information provided to controllers through ADS-B Out is, in most cases, more accurate than the information available with current radar-based systems. With more accurate information, ATC will be able to position and separate aircraft with improved precision and timing, which leads to enhanced safety, greater efficiency, and ultimately results in a smoother flow of air traffic.

All users operating in designated airspace must be equipped with ADS-B Out avionics by January 1, 2020. By that date, all aircraft flying in designated airspace must be equipped with avionics that meet performance requirements. The designated airspace includes Class A, B, and C airspace, as well as Class E airspace areas at or above 10,000 feet mean sea level (MSL) over the 48 contiguous United States and the District of Columbia, excluding the airspace at and below 2,500 feet above the surface. This airspace is more complex with relatively diverse users. The rule also requires that aircraft operating in the airspace within 30 nautical miles (NM) of the nation's busiest airports be equipped with ADS-B Out capabilities. This will enhance safety, efficiency, and performance around those airports.

Since ADS-B relies on information transmitted from ADS-B Out equipped aircraft operating in designated airspace, all users operating in that airspace must be equipped in order for ATC to rely on it. That is why the FAA has set a firm date by which all aircraft operating in designated airspace must be equipped. We made a significant investment in ground infrastructure, and now that installation is complete and we are finalizing ADS-B connections to the air traffic control automation platforms, industry equipage is necessary for the full benefits of ADS-B technology to be achieved.

While only ADS-B Out is required under the rule, many users are seeing the benefits of universal equipage with ADS-B In and ADS-B Out. ADS-B In technology allows pilots to see what air traffic controllers see: displays showing the location of aircraft in the sky around them. This creates an environment of shared situation awareness that allows for greater safety and efficiency. Traffic and weather information is now being sent directly to the cockpit of properly equipped aircraft. This information alerts them to in-flight hazards and helps prevent accidents. The three types of ADS-B broadcast services now deployed are:

- Traffic Information Service–Broadcast (TIS-B): This air traffic advisory service provides the altitude, ground track, speed and distance of aircraft flying in radar contact with controllers and within a 15-nautical-mile (nm) radius, up to 3,500 feet above or below the receiving aircraft's position. An aircraft equipped with ADS-B In can also receive position data directly from other aircraft broadcasting on the same ADS-B Out frequency. In addition, TIS-B enables pilots to see aircraft equipped with transponders flying nearby even if those aircraft are not equipped with ADS-B Out.
- Automatic Dependent Surveillance–Rebroadcast (ADS-R): ADS-R takes position information received on the ground from universal access transceiver (UAT)-equipped aircraft and rebroadcasts it on the 1090 MHz frequency. Likewise, ADS-R rebroadcasts 1090 MHz data to UAT users. In concert with TIS-B, ADS-R provides all ADS-B In-equipped aircraft with a comprehensive airspace and airport surface traffic picture. ADS-R delivers traffic data within a 15-nm radius 5,000 feet above or below relative to the receiving aircraft's position.
- Flight Information Service–Broadcast (FIS-B): This service broadcasts graphical weather to the cockpit based on what ground-based weather radar is detecting. In addition, FIS-B broadcasts text-based advisories including Notice to Airmen messages and reports on everything from significant weather to thunderstorm activity. UAT-equipped general

aviation aircraft can receive this information at altitudes up to 24,000 feet.

The costs of TIS-B and FIS-B services are absorbed by the FAA, so NAS users, unlike in the airspace controlled by other Air Navigation Service Providers around the world, do not pay any subscription or usage fees for traffic, weather, or aeronautical information services.

We are continuing to develop and deploy ADS-B capabilities that will benefit the aviation community and, by extension, the public in oceanic, en route and terminal airspace. In 2015, the FAA will implement ADS-B-enabled In-Trail Procedures in oceanic airspace that will help airlines save fuel and reduce separation distances. ADS-B is already being used in the en route environment in Houston and Alaska. The last en route site will achieve ADS-B IOC by September 2015. Ground-based Interval Management-Spacing capitalizes on ADS-B to streamline traffic flows into terminal airspace while Flight Interval Management-Spacing uses ADS-B to enable more precise spacing between aircraft.

Performance Based Navigation

Performance Based Navigation (PBN) is a blanket term for more precise GPS-based navigation methods that allow optimal routing in all phases of flight. The FAA has been working with stakeholders for many years on PBN implementation, and today there are more PBN procedures and routes than there are conventional ones. The agency is now employing a more systematic and collaborative approach to PBN deployment through our Metroplex initiative. A metroplex is a geographic area with several airports and high volume air traffic that interact in the same airspace. The FAA is actively working to improve how air traffic flies into, out of and through 13 targeted metroplexes rather than dealing with airports one at a time. Lessons learned from this approach are now being applied to all PBN projects across the National Airspace

System (NAS).

We are seeing concrete benefits through this approach. In the Denver PBN project, the FAA worked with aircraft operators and nine area airports to create one of the most comprehensive operational networks of NextGen satellite-based arrivals and departures in the nation. This network enables more flexibility and better access to the airports, which the FAA estimates will save operators approximately 3.2 million gallons of fuel. Overall, approximately 80 percent of all aircraft that fly in and out of Denver International are equipped to take advantage of the new procedures, which includes 51 satellite-based procedures designed to provide more direct routes, de-conflict the airspace, save fuel and reduce emissions. The project introduced 21 arrivals procedures with optimized profile descents, which allow aircraft to reduce thrust and glide down to the runway using less fuel and creating less noise, and two GPS approaches. Twelve additional sophisticated approach procedures, known as Required Navigation Performance Authorization Required (RNP AR), went into operations in late June 2013. These RNP AR procedures provide a more stable but curved approach, equaling a shorter flying distance. Flying these approaches requires specific aircraft instruments that direct the aircraft in a very narrow and precise corridor of airspace. The FAA has seen an approximate 35 percent decrease in the number of go-arounds caused by aircraft coming in too high or too fast. Aircraft on the new arrival procedures are more stabilized on their final approach as they usually arrive on a more predictable course and speed. That is only one example of success using a collaborative and systematic approach to delivering PBN benefits.

We recently completed the Houston Metroplex project, which includes strategies to streamline the airspace and reduce complexity for air traffic controllers and flight crews. As part of the program, the FAA developed 61 new procedures and amended or canceled over 40

existing procedures to take advantage of the precision of GPS technology. These improvements will reduce flight miles, save fuel, and reduce carbon emissions.

In addition to the Metroplex and the large-scale projects, the FAA continues to implement PBN at other airports across the country, including Wide Area Augmentation System Localizer Performance with Vertical guidance procedures that increase access to airports in lower visibility conditions and are especially helpful to general aviation pilots.

System Wide Information Management

System Wide Information Management (SWIM) is the digital data delivery backbone of NextGen, ensuring the right people have the right information at the right time. Since 2010, NAS users — particularly airline operations centers — have been accessing weather and other flight planning information via SWIM, enabling airline dispatchers and traffic managers to collaborate on the routing and rerouting of traffic based on real-time information. Users benefit by having access to a single, comprehensive data feed that contains management initiatives, airport runway configurations and which airports are in deicing.

In August 2013, Miami Terminal Radar Approach Control (TRACON) became the first facility to begin distributing data from the towers included in its coverage area to an airline via the SWIM Terminal Data Distribution System (STDDS). STDDS takes raw surface data and converts it into easily accessible information. The system sends surface information from airport towers to the corresponding TRACON, which makes the information available via SWIM messaging services. Airlines and airports can use this information to streamline surface operations and increase efficiency. Ultimately, 136 airports will provide surface information via STDDS at 39 TRACONs to users via SWIM services. The FAA is planning to unveil several

new SWIM capabilities next year, including Flow Information Publication, which provides subscribers with access to traffic flow information.

DataComm

Another exciting capability underway is Data Communications (Data Comm). Data Comm allows us to communicate through written instructions to pilots, which reduces the possibility of error with radio communications. More importantly, Data Comm allows us to communicate highly complex and lengthy clearances, which are currently conveyed over the radio with read-backs between controllers and pilots to verify accuracy, by automatically uploading the information digitally into the aircraft's flight management system. This will ultimately save operators time and money, and will improve the flexibility and efficiency of our operations. The FAA has awarded the Data Comm Integrated Services contract, which will provide for data communications between airport towers and appropriately equipped aircraft in 2016. Operational Data Comm trials for departure clearances are underway in Memphis and Newark.

Reporting NextGen Progress and The Future of NextGen

We have made consistent progress in delivering NextGen in key areas, first having laid the foundation with ADS-B, ERAM, and TAMR, and we will be deploying new capabilities through 2020. We will continue to work closely with stakeholders and industry to ensure that that we are delivering the operational benefits and taking their input into account as we set NextGen priorities. We have expanded our public reporting of NextGen performance through success stories and performance snapshots on our website. The FAA publishes NextGen-specific metrics at the local level in order to isolate and identify NextGen improvements at site-

specific locations. Core airports, key city pairs, distance/time/fuel reduction, runway safety, the implementation and use of NextGen technology and procedures will continue to be important to understanding the value and benefits of modernization. Taken together, these metrics reveal the nationwide impact of NextGen development, which is already showing benefits.

Next year will be pivotal for the next stage of NextGen, as we make investment decisions, which are supported in our FY 2015 Budget and out-year planning documents. We look forward to working with you on NextGen planning and the upcoming Reauthorization.

Ms. Chairman, this concludes my prepared statement. I would be pleased to answer any questions you may have.