



Agenda Item 7: Other Matters

NEXTGEN MODERNIZATION AND ITS ALIGNMENT WITH THE AVIATION SYSTEM BLOCK UPGRADE PROGRAM

(Presented by the United States of America)

SUMMARY

FAA NextGen programs, plans and activities are moving the United States' air traffic system from a ground-based system to a satellite-based system of air traffic management. The FAA completed the installation of Automatic Dependent Surveillance – Broadcast (ADS-B) radio stations, a new automation system for high-altitude air traffic and other foundational infrastructure. Furthermore, the United States has developed satellite-based navigation and on-board aircraft equipment to navigate via Performance Based Navigation (PBN), is moving from voice communications to primarily digital data exchange through Data Communications (Data Comm), streamlining weather and other information, and implementing an information-sharing platform to support SWIM. The NextGen programs are developed in line with ICAO's Aviation System Block Upgrade (ASBU) program, which provides a template for the modernization of air traffic based on specific blocks and modules.

Air traffic management (ATM) modernization is worldwide and collaborative. The FAA and its representatives around the world work closely with ICAO, air navigation service providers and global industry partners to establish a harmonized framework for ATM modernization and ensure interoperability with NextGen.

In collaboration with its international partners, the FAA and the NextGen framework supported the technologies and procedures approved in the GANP and block upgrades. The GANP and block upgrades together serve as the framework and roadmap for the standardization and harmonization of ATM systems, and as a template for NextGen and other modernization programs.

References:

- For more information on the FAA's NextGen program, please visit: <https://www.faa.gov/nextgen/> and the following websites:
- FAA's NextGen Update 2014: <http://www.faa.gov/nextgen/media/NextGenUpdate2014.pdf>
- Air Traffic Organization International Strategic Plan: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/ato_intl/media/pdf/2014_ato_int_strategic_plan_core.pdf

ICAO Strategic Objectives:

- A – Safety*
- B – Air Navigation capacity and efficiency*
- D – Economic development of air transport*
- C – Environmental protection*

1. **Introduction**

1.1 NextGen continues to make great strides in transforming the National Airspace System (NAS) and in delivering the benefits of satellite-based technology and procedures, digital communication and new air traffic management tools. Current NextGen capabilities showcase the realization in improved efficiencies in time and fuel costs and the reduction of emissions. Over the coming years, the FAA will continue to roll out NextGen improvements that are in line with International Civil Aviation Organization (ICAO) requirements and ASBU guidelines.

2. **Discussion**

2.1 There are many facets to the Global Air Navigation Plan (GANP) and its supporting Aviation System Block Upgrade (ASBU) Program. Likewise, NextGen, and other modernization programs throughout the world are both complex and multi-faceted. In alignment with ICAO, the FAA continues to improve upon the United States' Performance Based Navigation (PBN) program. According to FAA's NextGen Update 2014, PBN offers more efficient procedures. These new procedures allow flexibility in determining more efficient arrival and departure paths. At Atlanta Hartsfield Airport (ATL), in the United States, for example, enhanced PBN procedures have saved operators millions of dollars. The FAA has found a one and one-half minute reduction in departure queue delays and Delta airlines projects to save \$14 million-\$19 million in operating costs over a one-year period.

2.2 Automatic Dependent Surveillance – Broadcast (ADS-B) is another fundamental component of the transformation of the United States' National Airspace System (NAS) from a radar-based to a satellite-based system. ADS-B uses GPS signals to determine an aircraft's location, and it relies on two main systems: ADS-B Out and ADS-B In. ADS-B Out avionics enable an aircraft to transmit its position, airspeed information and other data directly to other properly equipped aircraft and to ground receivers. These ground stations relay the information to controllers and other aircraft equipped with ADS-B In. ADS-B In refers to an aircraft's capability to receive data from ground stations and other ADS-B-equipped aircraft, as well as flight advisories and real-time weather information. The FAA has mandated that all aircraft flying in U.S. airspace above 10,000 feet must be equipped with ADS-B Out by January 1, 2020. Multiple campaign efforts have been undertaken by the FAA and its community partners to ensure that industry and operators are well aware of this requirement. PBN and ADS-B development are both aligned with the ASBU's Performance Improvement Area "Optimum Capacity and Flexible Flights" and "Efficient Flight Operations".

2.3 Along the lines of communication, today, controllers and pilots communicate verbally through analog radios. Data Communications, or Data Comm, is changing this by allowing controllers and pilots to communicate with digitally delivered messages. With the push of a button, controllers will be able to send routine instructions, such as revised departure clearances (DCL) and weather-avoidance reroutes, via electronic messages directly to the flight deck. This reduces the possibility of human error.

2.4 The FAA is encouraging Data Comm equipage on the flight decks of 1,900 aircraft by 2019. Under the Data Comm equipage incentive program, eight airlines have agreed to equip their aircraft with Data Comm avionics with the first aircraft being so equipped in 2015.

2.5 Since 2013, the FAA has conducted successful Data Comm trials at Memphis and Newark, resulting in 60-80 operations per day that use Data Comm at both airports. The FAA plans to deploy Data Comm to towers at 56 airports starting in 2016, with a completion date of 2019. In alignment with recommendations from multiple stakeholders, the FAA has recently deployed Data Comm tower services at Salt Lake City, Houston Intercontinental and Houston Hobby airports, with the remaining tower deployments planned for 2016. Data comm aligns with the ASBU Performance Improvement Areas

“Optimum Capacity and Efficient Flights” and “Airport Operations”.

2.7 Information management also remains a cornerstone of NextGen modernization. System Wide Information Management (SWIM) is the data-sharing backbone of NextGen, and serves as the digital data-sharing backbone of NextGen. SWIM enables increased common situational awareness and improved NAS agility to deliver the right information to the right people at the right time. This information-sharing platform offers a single point of access for aviation data, with producers of data publishing it once and users accessing the information they need through a single connection.

2.8 The FAA also continues to work with many international partners to develop the next stages of Flight Information Exchange Model (FIXM), Weather Information Exchange Model (WXXM), and Aeronautical Information Exchange Model AIXM. These modern information protocols decrease the need to update systems whenever the message format changes as we need to do today with the old teletype message formats. The modern formats also reduce the cost to develop new and enhanced applications. Demonstrations have provided States and operators the opportunity to develop and test new programs, such as FIXM, WXXM, and AIXM. The 2014 Mini-Global Demonstration, for example, allowed its international participants to observe the benefits of using up-to-date modes of communication to transmit data, paving the way for a more efficient ATM system.

2.9 Information Management programs developed in the United States align with Performance Improvement Area “Globally Interoperable Systems and Data”.

2.10 Foundational infrastructure remains a fundamental component of NextGen, as well. En Route Automation Modernization (ERAM) technology is the heart of NextGen and the pulse of the NAS, as it helps to advance the transition from a ground-based system of air traffic control to a satellite-based system of air traffic management. ERAM is vital to the future of air navigation, providing the foundational platform required for FAA to enable NextGen solutions, via modernization programs such as SWIM, Data Comm, and ADS-B. ERAM increases capacity and improves efficiency in United States’ airspace. En Route controllers are able to track 1,900 aircraft at a time instead of the previous 1,100 flight capability. Additionally, coverage now extends beyond facility boundaries, enabling controllers to handle traffic more efficiently. This extended coverage is possible because ERAM can process data from 64 radars versus the 24 radars processing with the legacy system. ERAM aligns with “Optimum Capacity and Flexible Flights” Performance Improvement Area” in the ASBU Program.

2.11 A key NextGen goal is to safely improve the overall efficiency of the NAS by increasing efficiencies at metropolitan areas, or metroplexes, with multiple airports and complex air traffic flows. The FAA's goal is to improve the way aircraft navigate these complex areas to make flight routes and airport access more efficient. This new way of operating has the potential to reduce fuel burn and emissions, and improve on-time performance at the metroplex and between the departure and arrival airports, known as city pairs.

2.12 Each metroplex includes two or more commercial airports with shared airspace that serves at least one major city. In collaboration with the aviation industry, the FAA has identified 21 metroplexes where improved performance could benefit not only the region, but the entire national airspace system. Through the Metroplex program, the FAA collaborates with aviation stakeholders to improve regional traffic movement by optimizing airspace and procedures built on precise satellite-based navigation.

2.13 The metroplex initiative supports the ASBU concept of “Optimum Capacity and Flexible Flights.”

2.14 The FAA’s implementation of NextGen includes elements which are targeted to our most dense traffic environment as well as hundreds of other airports and more remote locations. The modernization of information, the use of lower cost flexible surveillance via ADS-B, and implementation of PBN procedures to well over 3000 runways at secondary and smaller airports highlight the more universal aspects of the ASBUs and GANP that the FAA has embraced. The GANP provides the blueprint for implementing those elements that meet and individual nation’s needs per the GANP guidance.

3 Suggested action

3.1 The Conference is invited to note the information contained in this Paper;

- a) recommend ATM Modernization in line with the GANP and ABSU guidance;
- b) encourage other States to recognize ICAO recommendations and tailor a modernization plan to meet their individual and regional requirements.

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