

NextGen Technologies Shape the Future of Aviation

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ABSTRACT

Today, wireless technology forms the communications backbone of many industries—including aviation, transportation, government, and defense. The era of the Next Generation Air Transportation System, (NextGen), is upon us. The Federal Aviation Administration, in collaboration with industry, is deploying NextGen technology on the ground, in the air, at air traffic control facilities and in the cockpit. These new technologies in aviation represent a global, transformative change. NextGen blends new and existing technologies, including satellite navigation and digital communications, to improve safety outcomes, increase on time performance, offer reduced fuel burn and positively impact aviation's adverse environmental concerns. Significant growth in technologies like global connectivity and cloud computing over the last few years has begun to unlock potential for seamless wireless communications, improved training processes, real-time weather and navigational displays. While technology has spurred improvements in aviation, basic hands-free wireless communication between flight attendants and pilots is still viewed as inadequate by industry professionals.

Keywords: Air Traffic Control Facilities, Aviation, Federal Aviation Administration (FAA), Next Generation Air Transportation System (NextGen), NextGen Technology, Wireless Technology

INTRODUCTION

Digitizing aviation can take many forms depending on the airlines IT maturity and willingness to adopt new technologies. As demand for our nation's increasingly congested airspace continues to grow, NextGen improvements are enabling the FAA to guide and track aircraft more precisely on more direct routes. NextGen efficiency enhances safety, reduces delays, saves fuel and reduces aircraft exhaust emissions. NextGen is also vital to preserving aviation's significant contributions to our national economy. Part of the movement to the next generation of aviation is being enabled by a shift to smarter, satellite-based and digital

technologies and new procedures that combine to make air travel more convenient, predictable and environmentally friendly. In addition to new technologies many of existing systems require upgrades before the full Next Gen program is in place- such as the generation of geostationary weather satellites (GOES-R). While progress is made with many of these next Gen technologies, weaknesses in scheduling, contingency planning amidst government shutdown has been recognized by the Government accountability office (GAO, 2012). On poignant example is the GOES-R series which is to replace the current series of satellites (called GOES-13, -14, and -15), which will likely begin to reach the end of their useful lives in 2015. This new series

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is considered critical to the United States' ability to maintain the continuity of satellite data required for weather forecasting through 2036 (GAO, 2012).

NEXTGEN TRANSFORMATIONAL & SUPPORTING TECHNOLOGIES EXPLAINED (FAA, 2013)

Automatic Dependent Surveillance-Broadcast (ADS-B)

The satellite-based successor to radar. ADS-B makes use of GPS technology to determine and share precise aircraft location information, and streams additional flight information to the cockpits of properly equipped aircraft.

Collaborative Air Traffic Management Technologies (CATMT)

A suite of enhancements to decision-support and data-sharing tools used by air traffic management personnel. These enhancements will enable a more collaborative environment among controllers and operators, improving efficiency in the national airspace system.

Data Communications (Data Comm)

Enable controllers to send digital instructions and clearances to pilots. visual messages that appear on a cockpit display interact with an aircraft's flight computer. Offering reduced opportunities for error, Data Comm will supplant voice communications as the primary means of communication between controllers and flight crews.

Nextgen Network Enabled Weather (NNEW)

Cost-effective LOW LATENCY, accurate weather information. Through the sharing of common weather data, NNEW will enhance safety and support collaborative decision

making. gOES-R: next generation of geosynchronous environmental satellites which will provide atmospheric and surface measurements of the Earth's Western Hemisphere.

The National Airspace System Voice System (NVS)

State-of-the-art digital technology. NVS will standardize the voice communication infrastructure among FAA facilities, and provide greater flexibility to the air traffic control system.

Swim System Wide Information Management (SWIM)

NextGen digital information network. real-time data exchange and sharing among users of the National Airspace System.

The Atlantic Interoperability Initiative (AIRE)

(AIRE) is a cooperative agreement to reduce emissions -between the United States and the European Commission to promote and harmonize environmental initiatives and procedures in European and North American airspace.

SURVEILLANCE TECHNOLOGY

Automatic dependent surveillance-broadcast (ADS-B) is the main surveillance technology for tracking aircraft- to incorporate both air and ground aspects. ADS-B provides air traffic control (ATC) with a more accurate picture of the aircraft's three-dimensional position in the en route, terminal, approach and surface environments.. The aircraft provides the airborne portion in the form of a broadcast of its identification, position, altitude, velocity, and other information. The ground portion is comprised of ADS-B ground stations which receive these broadcasts and direct them to ATC automation systems for presentation on a controller's display. In addition, aircraft equipped with ADS-B In capability can also receive these broadcasts and display the information

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