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Aviation in the United States is an essential part of our nation's economic and transportation infrastructure. Every day, whether it is moving priority cargo, providing national defense and homeland security, or making sure tens of thousands of passengers reach their destinations, the role of aviation is critical.

The economic data offers conclusive proof. In the United States, Aviation and Aerospace account for 5.4 percent of the nation's gross domestic product. If this calculation is expanded to include aviation-related industries, that percentage exceeds nine percent. Aviation and aviation-related industries are responsible for 11 million jobs in the U.S. and provides America's largest source of exports.

These figures reinforce the point that aviation is a driving force in America's economic growth. If our air traffic system cannot meet future demands, and if it cannot accommodate changing business models, the cost to our nation in terms of delays, cancellations, and lost business opportunities will be dramatic.

We do not have to accept such constraints. The Next Generation Air Transportation System (NextGen) offers an approach to the management of our air transportation system that will lead to a far more dynamic, flexible, and scalable alternative for our national requirements.

A System That Is Reaching Its Limits

It can be argued that America's air transportation system has been a victim of its own success. Passengers using the system have been climbing steadily.

In 2006, passengers exceeded 750 million. It is likely that between 2012 and 2015, passengers carried could reach one billion each year. At that point, the system will be reaching its limits. We are already seeing evidence of this strain upon the system in the number of recurring delays and the difficulties we have in maintaining the pace of system operations in bad weather.

Some models project that the number of passengers could double or even triple by the year 2025. That is a staggering growth rate. Unfortunately, our present system simply cannot adjust to that kind of expansion.

The current infrastructure of the nation's air transportation system is inherently limited in its ability to grow and adapt. Our current air traffic system has served the nation well since the 1950s and it continues to be the basis of the world's largest and safest air transportation system. But if we are going to adapt to increasing demand, and to create a scalable and adaptable system, then we absolutely have to expand capacity while continually improving safety and reducing adverse impacts on the environment. This means we need to completely change our approach to the way the system will function in the twenty-first century.

What Is NextGen All About?

NextGen is a leveraging of technologies that already exist. The vision for NextGen is a system that is based on satellite navigation and control, digital non-voice communication and advanced networking. It is a shifting of decision making from the ground to the cockpit. Flight crews will have increased control over their flight trajectories and ground controllers will become traffic flow managers.

NextGen, while representing a continuum of research, investment and implementation activities, can be more easily explained if it is broken out into its three major phases. Each one involves careful, incremental planning, research and development, and carefully-timed implementation.

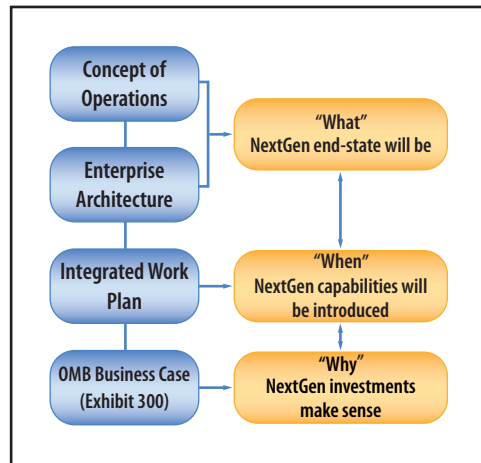
The first phase of NextGen focuses on the development and implementation of existing key NextGen foundational technologies and capabilities. These initiatives represent current FAA programs. Procedures allowing more precision navigation departures and arrivals will increase capacity and safety while reducing fuel consumption, noise and emissions.

This phase also includes the essential research and development needed to support the future development of NextGen – such as the development of advanced weather forecasting and traffic flow management tools.

The second phase builds on this foundation to begin critical implementation of NextGen capabilities. This is where many aircraft in the fleet will begin to operate, using on-board NextGen tools. This will allow greater expansion of precision navigation capabilities,

implementation of advanced weather capabilities, advanced data communications, and the development of the critical infrastructure for operations in high-density areas.

The third phase will be the maturation of core NextGen capabilities into an operational nationwide system. This is where aviation services are managed and operated in a way that achieves the NextGen transformation across the entire air transportation system.



NextGen Documents

How Nextgen and the JPDO Came To Be

In 2003, Congress passed Vision 100—Century of Aviation Reauthorization Act which chartered the Joint Planning and Development Office (JPDO) to begin work on the planning and implementation of the Next Generation Air Transportation System. What Congress envisioned, and what has developed since, is an unprecedented initiative. It involves not only the Federal Aviation Administration, but also the Departments of Transportation, Defense, Homeland Security, Commerce, NASA, and the White House Office of Science and Technology Policy.

But it is not solely a government program. To ensure that industry plays a role at every stage of NextGen’s development, Congress directed steps to create a close relationship with private sector partners.

Industry representatives, through the NextGen Institute which has over 200 industry members, are directly involved in the development of the JPDO’s major planning products. Rarely have government and industry worked so closely together in the development of such a large scale initiative.

However, what is most intriguing is not just the scope of the collaboration, but also its duration. NextGen is about the transformation of the National Airspace System, not just in the short term, but over the long term as well and covers a period of nearly two decades. This is no small challenge and requires commitment and collaboration across government and industry to achieve a critical national objective.

Laying A Solid Foundation

An undertaking as substantial and long term as NextGen requires a highly deliberate and integrated planning process. Given the collaborative nature of NextGen, this planning needs to be developed in full cooperation among partner agencies and with industry.

The Portfolio Approach

By its very nature, an initiative of this size, involving so many different interconnected research efforts, major projects, and various programs, needs to apply a portfolio-based management approach. Essentially, the portfolio approach is a process that integrates the development and implementation of a wide range of technologies and programs.

While it is possible to view much of the work that goes into the NextGen initiative as a host of separate initiatives, in fact, they are highly interdependent. To achieve the benefits of safety, capacity and improved environmental performance, it is necessary that all the components of the portfolio be integrated into a single national system. That is why JPDO and its partner agencies have taken a portfolio approach to managing the NextGen initiative.

Costs: The Price Tag of NextGen

A natural question is, how much is NextGen going to cost? This is important in making budget and programmatic decisions and in evaluating investments in the NextGen portfolio. In 2006, JPDO delivered the initial cost estimates for NextGen. The expected short-term cost of NextGen through 2012 is estimated at \$4.6

billion. This estimate is based on the expected cost of identified programs and research activities. These costs are included in current budgets.

Mid- and long-term cost estimates were also developed based on the current five-year picture. Total federal spending will range from \$8-\$10 billion through 2017, and \$15-\$22 billion through 2025.

Cost estimates for equipping aircraft with NextGen technologies range between \$14-\$20 billion through 2025. Estimates vary depending on the bundling of the technologies and the pace at which the current commercial aircraft fleet is replaced.

Benefits

As a part of developing NextGen's portfolio, JPDO is using modeling and simulation to measure and assess the benefits created by the new system. For example, as various NextGen capabilities become available, delays will drop substantially, and fuel use and emissions will be reduced.

In optimum weather conditions, delays at roughly the midpoint of NextGen development are reduced by half, and this reduction becomes even more substantial as the initiative matures. Delay reduction in adverse weather conditions, a major issue in today's operating environment, produces equally impressive results.

These improvements, when NextGen reaches its final, system-wide transformation phase, will result in large scale benefits. NextGen improvements on the ground at airports could create benefits ranging from \$328 million to \$1.3 billion a year.

In the low altitudes around airports, as NextGen moves to maturity, benefits could range from \$6.5 billion to \$19.7 billion a year. Benefits accrued through NextGen based operations in the high-altitude cruising environment could yield annual benefits of between \$5.5 billion to \$11.1 billion.

With such substantial economic benefits to the nation, it is clear that the investment in NextGen is worthwhile. In addition to the financial benefits, the environment also benefits as emissions, noise and fuel consumption are all reduced.

Implementation is Already Underway

Implementation of NextGen has already begun. Improvements in navigation performance allow equipped aircraft to take advantage of more precise take-off departures and landing approaches. These procedures save time and money, and reduce engine emissions. Satellite-based technology for navigation also improves safety. Early introduction of space-based navigation in Alaska has reduced general aviation accidents by 40 percent.

Network Enabled Operations Demonstration

Central to the improvements of the NextGen system is the real-time availability of information to the operators and users of the air transportation system. The Department of Defense has invested considerable resources in information sharing in complex systems involving many operators. Building on this experience in the military services, the Department of Homeland Security, the FAA and the Department of Defense are funding a demonstration project called Network Enabled Operations (NEO).

NEO demonstrates the capability to link together information from existing sources, on-demand and real-time, for all users of the system; civil, military, security and law enforcement. It is fundamental for improving security, efficiency, and safety and is a priority for the JPDO partner agencies.

Weather

It is well known that of all the delays encountered in the National Airspace System, the most common (about 70 percent) are those caused by weather. In the NextGen system, using advanced probabilistic forecasting techniques and a network-wide shared view of the weather can markedly reduce weather delays.

The key to this improvement in NextGen system performance is sharing weather information with all system users in the form of a forecast that assigns probabilities to development of disruptive weather. That way, dispatchers, pilots and controllers can make more efficient decisions in conditions that, in the current system, often severely constrain system operations. This will result in many fewer passengers waiting at gates or sitting aboard airplanes on taxiways.

The Environment

A key NextGen objective is to “develop environmental protection that allows sustained aviation growth.” In this regard, JPDO and its agency and industry partners are focusing on three primary environmental concerns. They are aviation noise, air quality, and fuel consumption.

Several aspects of NextGen have substantial environmental returns. The NextGen vision involves a significant reduction in flight time. Reduced flight times mean that aircraft engines operate less, burn less fuel, and generate less noise and fewer emissions.

Recent flight trials have tested new aircraft descent procedures for airport approaches that dramatically reduce fuel consumption, noise and emissions. Precision navigation procedures further allow for the design of airport departure and arrival paths that will reduce noise over populated areas.

Global Harmonization

NextGen is international in scope. There is an absolute need for the global harmonization of NextGen to allow operability across international lines. It is to our national benefit and also to that of the global economy that there be one seamless, global sky. Under this scenario, aircraft will operate with compatible equipment and procedures.

To achieve a harmonized, global air transportation system, JPDO and the FAA are working with other international organizations to guarantee the cooperation necessary to make this dynamic a reality. In 2006, FAA Administrator Marion Blakey concluded an agreement with Jacques Barrot, Vice President of the European Commission (EC), which formalized cooperation between the Next Generation Air Transportation System initiative and its European counterpart, the Single European Sky Air Traffic Management Research (SESAR) program.

Beyond Europe, JPDO and the FAA are seeking partnerships with other international counterparts. In 2006, steering groups were established with China, Japan, Canada and Mexico to facilitate cooperative activities on the design of compatible air transportation systems.

The NextGen Vision

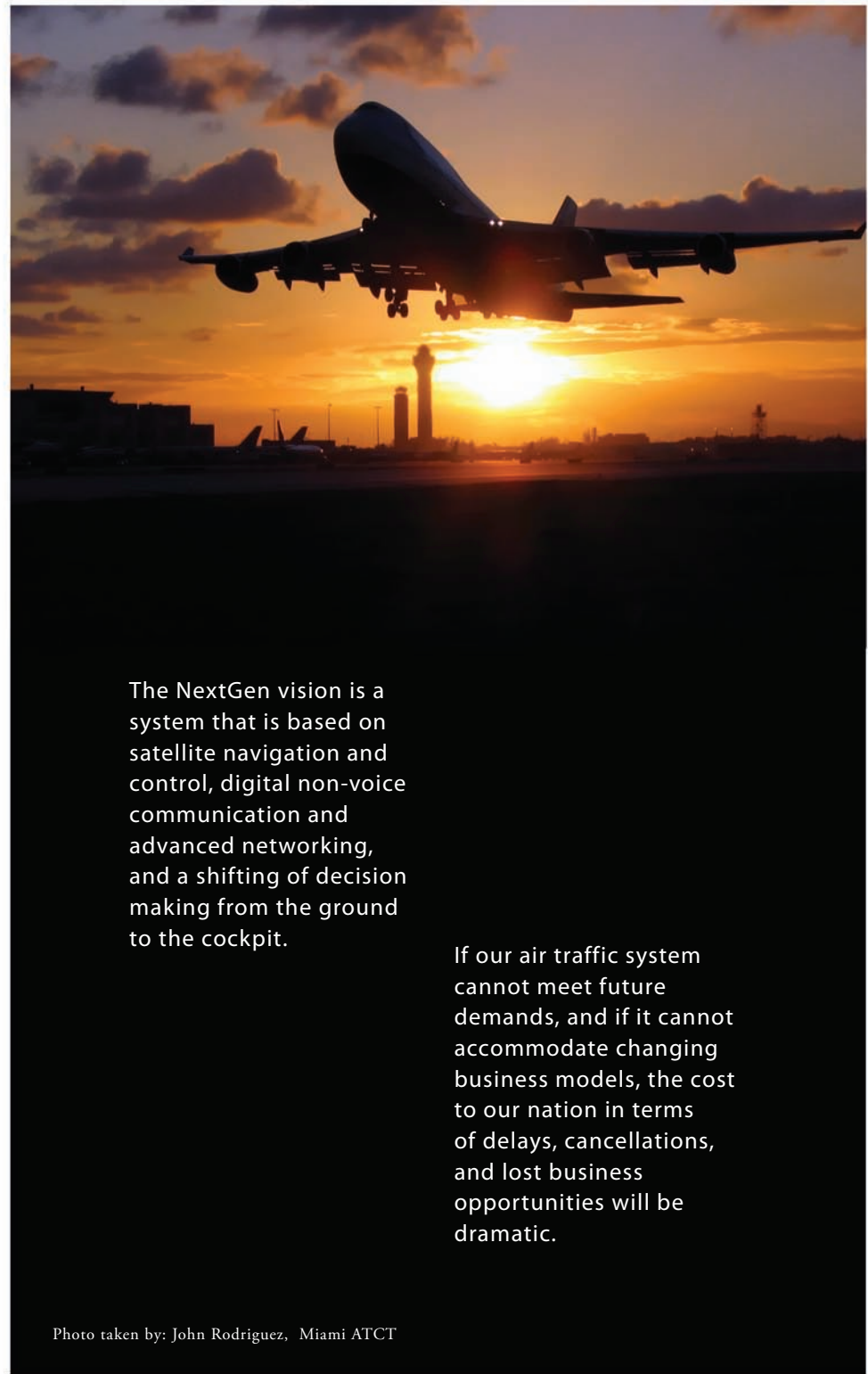
NextGen is not just a notional view of how things might be in the future. It is not simply a concept. NextGen is a real initiative, it is already underway, and a part of the budgeting and planning work of our partner agencies. It is an initiative coordinated with our global partners.

These are real programs that are being carefully and deliberately integrated into our NextGen portfolio to produce results. The returns from this commitment will be substantial. Delays in the system will be reduced, adverse weather will impact the system far less than it does today and, as the future unfolds, the system will become far more scalable and flexible. It will offer easier access to new kinds of aircraft, such as very light jets and automated vehicles. It will also allow increased access to the national airspace. Defense and Homeland Security applications will be facilitated and environmental effects will be improved.

But all of this requires commitment; not just from one agency of government, but from several. The same is true for industry. The success JPDO has had in developing the collaboration and cooperation to get NextGen underway must continue.

If we can do this, the NextGen vision, the future of aviation in the twenty-first century, will be bright.





The NextGen vision is a system that is based on satellite navigation and control, digital non-voice communication and advanced networking, and a shifting of decision making from the ground to the cockpit.

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