The basis for the next generation air transportation system (NextGen) is a set of evolving air traffic control and aircraft navigation technologies designed to transform the U.S. air traffic control system from a ground-based system to a satellite-based system. When fully implemented, NextGen will allow aircraft to safely fly closer together on more direct routes, thus reducing aircraft operating times and delays, and providing benefits for the environment through reductions in carbon emissions, fuel consumption, and noise exposure. While NextGen is often referenced in terms of its enabling technologies and capabilities, its achievements will depend to a large degree on the local solutions proposed by airport and airline management and approved by the airport community.

What NextGen Means for Airports

NextGen’s impacts will vary by airport, depending on the number and complexity of aircraft operations and local constraints on airport capacity. NextGen’s meaning for airports can best be explained by the potential realization of procedural and physical benefits:

• The **procedural benefits** would include shorter, more fuel-efficient, conflict-free, all-weather flight paths leading to and from the runways at the nation’s airports. These benefits would result from the greatly improved navigation accuracy using cockpit-based global positioning system (GPS) receivers and flight management system computers. Neighborhoods surrounding airports would receive the air quality and noise benefits of optimal profile descents where landing aircraft descend at idle thrust from cruise altitude to the runway without having to level off. Departing aircraft could use unrestricted climb profiles. One downside to these more precise flight paths is that noise levels could increase under the more concentrated flight paths, which could be a problem if those paths could not be shifted to overfly areas that are less noise sensitive.

• The **physical benefits** would include reduced centerline-to-centerline spacing between parallel runways for independent operations, reduced dependence between and among airports that share limited airspace, and reduced congestion on the ground at airports as a result of departure queue management and optimal taxiing procedures.
Airports Are Catalysts For NextGen

Although NextGen is intended to transform the national airspace system, at the end of the day, all solutions are local.

NextGen provides airport operators with new tools to solve local physical and environmental capacity constraints. Using these tools, airport operators can define new procedures unique to their airports and, at the same time, contribute to identifying the real benefits that can be achieved with NextGen technologies while being at the forefront in achieving community acceptance and environmental approvals of the new procedures via local stakeholder involvement mechanisms.

New efficient aircraft approach procedures under development at Seattle-Tacoma International Airport illustrate how airport operator and stakeholder partnerships can be formed to solve local problems. The “Greener Skies over Seattle” program was initiated by Alaska Airlines, in partnership with the Port of Seattle and the Federal Aviation Administration (FAA), and resulted in the establishment of new Required Navigational Performance (RNP) procedures. These new procedures shortened the downwind flight path over neighborhoods from 25 miles to 10 miles, resulting in reduced noise exposure, flight time, fuel burn, and emissions. The challenge is to develop procedures for conducting these approaches simultaneously (or dependently) with approaches to an adjacent parallel runway; the FAA is currently working with airlines and airport operators to develop such procedures.

The FAA recently issued a waiver, approving triple simultaneous independent instrument approaches to the parallel runways at Bush Intercontinental Airport/Houston (IAH), which can be used by any combination of instrument landing system (ILS), RNP, and area navigation (RNAV) approaches with vertical guidance. Initially, all of these processes are being treated exactly as ILS approaches are treated today. However, in the future, the implementation of NextGen technologies at IAH, and other airports with parallel runways, will enable steeper aircraft approach profiles, shorter traffic patterns, and reduced separation standards, which could result in increased capacity and reduced flying time, fuel burn, emissions, and noise exposure. Thus, NextGen has the potential of being “the gift that keeps on giving.”

Integrating NextGen into Airport Planning

New planning approaches are needed to evaluate the uncertainties associated with the timing and benefits of NextGen compared with its potential benefits of capacity enhancement and cost reduction.

One of the challenges of integrating NextGen into airport planning is overcoming the pervasive view that NextGen is “too uncertain” to plan for, and that there would be severe adverse consequences to airport operators and stakeholders if anticipated NextGen benefits were not achieved. The FAA plans to update Advisory Circular 150/5070-6, Airport Master Plans, in late 2011 to include a section on NextGen. In practice, NextGen could be incorporated into nearly every task of an airport master plan.

- **Facility requirements**—Trade-offs between facility needs and NextGen capacity improvements can be identified and used to balance requirements for and costs of airside and landside facilities.
- **Analysis of alternatives**—The costs and benefits of alternative NextGen scenarios can be estimated, including the risks and uncertainties of NextGen, using sensitivity tests and identifying “what’s at stake” for airport operators, stakeholders, and the FAA.

- **Preferred plan and implementation strategy**—Projected NextGen implementation schedules can be included in phasing plans for airport improvements, and required FAA determinations on air traffic control (ATC) rules/procedures, funding and procurement policies, and airport design standards can be documented.
- **Environmental review and NEPA strategy**—Local environmental issues and constraints can be identified as a basis for engaging the FAA Air Traffic Organization on a plan and strategy for obtaining National Environmental Policy Act (NEPA) approvals.
• Financial analysis and plan—Sources of funds can be identified and recommended and potential local incentives for aircraft equipage can be explored.

The Implications of FAA Policy and Funding Challenges

Notwithstanding the widespread support for NextGen among the FAA, airlines, and airport operators, budgetary constraints will continue to challenge federal funding for the FAA overall and programs supporting NextGen.

In April 2011, the Future of Aviation Advisory Committee (FAAC) released its final report. The FAAC consisted of a diverse group of aviation stakeholders—including airlines, airport operators, academics, and government officials—convened by U.S. Secretary of Transportation Ray LaHood to make recommendations for the future of the aviation industry. FAAC members recommended new investments in aircraft equipage, implementing FAA policies and procedures to deliver NextGen benefits, and accelerating research and development initiatives supporting NextGen.

Even with this consensus, the nation’s record level of sovereign debt, together with projected annual budget deficits exceeding $500 billion for the next 5 years, have placed severe cost-cutting pressures on all federal agencies and programs, including the FAA and NextGen. For over 20 years, the Airport and Airway Trust Fund (the Trust Fund) has provided a stable flow of revenue to support FAA capital programs, including the Airport Improvement Program (AIP), the Facilities and Equipment (F&E) account, and specific initiatives connected to NextGen. However, the same financial pressures that have affected the airlines over the last decade have reduced the share of the FAA budget provided by the Trust Fund. Consequently, more of FAA programs now rely on General Fund or taxpayer dollars.

For Federal Fiscal Year 2011, for example, Congress appropriated over $500 million below that requested in the FAA budget. As a result, the FAA reduced NextGen programs by over $450 million, including a $23 million reduction in NextGen priority programs. Similar reductions in the future would compound the challenge and inevitably lead to a slowdown of NextGen implementation.

The U.S. House of Representatives and Senate have each passed multiyear bills reauthorizing the FAA and its programs, but it is unlikely that more stable funding for the Trust Fund and FAA programs will be available in the near future. While, between them, the bills would expand grant eligibility for the assessment of new terminal area flight procedures that could be connected with NextGen and a new program to transfer terminal area navigation equipment to airport operators, the most likely and significant outcomes of the reconciliation process will be reduced AIP grant money, cost pressures on the F&E account, and uncertainty surrounding the capital and implementation needs of NextGen.

Therefore, airport operators will have to carefully pay attention to those initiatives enabling NextGen and related funding to determine if programs will proceed and their benefits will be realized. Much of the responsibility for funding associated with eligible NextGen-related airport improvements will likely have to be borne by the airport operator and airport users. In turn, close consultation with the airlines will be necessary to understand how the airlines will invest in NextGen and their views about how airport costs are to be recovered.
Realizing the Benefits of NextGen

NextGen technologies are already being applied, but the full benefits can only be realized with the broad-based involvement of airport operators and their stakeholders.

NextGen preparations for specific airports will vary, but airport operators and their stakeholders can advance NextGen applications in several ways:

- **Get involved**—Airport operators can provide local perspectives on NextGen benefits, requirements, and priorities by being involved in initiatives such as RTCA’s NextGen Advisory Committee and the Airports Council International-North America’s NextGen Working Group.

- **Do your homework**—The development of local solutions will be facilitated by assessing the capacity of the existing airfield relative to forecast demand, developing capacity-enhancement alternatives that assume both today’s ATC rules/procedures and anticipated NextGen technologies and capabilities, and by analyzing airspace obstruction clearances to meet more demanding NextGen requirements.

- **Integrate NextGen**—Working with the FAA and local stakeholders, airport operators can integrate NextGen technologies and capabilities into ongoing airport planning and environmental analyses.

- **Make the business case**—Airport operators can have a role in making the business case for NextGen by evaluating the potential effects and timing of NextGen improvements on airport capacity and determining whether or not NextGen enhancements can translate into future capital cost avoidance, service improvements, and economic benefits.

- **Develop local partnerships**—The most effective local solutions are developed through partnerships among airport operators, airlines, and local FAA ATC and planning specialists.

Making the Business Case for NextGen:

Many airlines and corporate aircraft owners have been hesitant to invest in equipping aircraft until the FAA can deliver the promised benefits to the aviation community. Until airlines equip their aircraft appropriately, NextGen benefits will not be achieved. One of the major approaches being considered to overcome this equipage issue is the proposed “NextGen Equipage Fund,” which would be used to retrofit “up to 75% of the U.S. commercial air transport fleet” by paying for the equipment, making it available to aircraft owners, and deferring the owners’ obligation to repay the loans until the FAA has actually “turned on” or delivered the promised NextGen services. This proposed fund would be seeded by a public-private partnership that would incentivize early equipage by leveraging private capital and providing loans backed by government guarantees to reduce the private partners’ risk and financing costs.