National Airspace System Capital Investment Plan

FY2010–2014

2009-AJG-101

Federal Aviation Administration

(Page Intentionally Left Blank)

Table of Contents

Table of Figures

Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2010–2014

1 Introduction

1.1 The Capital Investment Plan

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) shows the planned investment to sustain the existing National Airspace System (NAS) for the next 5 years and to continue the transition to the Next Generation Air Transportation System (NextGen) based on the projected levels of funding. The CIP fulfills our obligation, that is contained in annual appropriations laws, to transmit to the Congress a comprehensive capital investment plan for the FAA which includes funding for each budget line item for 5 years, with total funding for each year of the plan constrained to the funding targets included in the President's Budget Request.

The planned project activities in this CIP are consistent with the President's Fiscal Year (FY) 2010 budget request. Funding estimates for budget line items are based on several factors. For the large capital investment projects, the estimated funding is the amount for fulfilling commitments in the acquisition contract and the associated project support costs. For infrastructure improvements, the estimated funding is either the estimated cost for specific locations or the annual amounts allocated to upgrade existing facilities and equipment based on facility condition surveys.

1.2 Strategic Planning and the CIP

FAA's Flight Plan 2009–2013 is our strategic plan. It is developed to articulate the most important goals for judging our performance in delivering services. These goals guide us in improving NAS performance and adjusting operations to meet the demands placed on the NAS by future growth. Our strategic goals are augmented by objectives, strategies, and supporting initiatives that define the actions to achieve them. The objectives have measurable performance targets to assess our progress. Our actual performance is regularly compared to the established targets to ensure that our strategies and initiatives are successful so that we can quickly make adjustments when they are not producing the expected results.

The current FAA Flight Plan identifies four specific goal areas:

- **Increased Safety —** To achieve the lowest possible accident rate and constantly improve safety;
- **Greater Capacity —** Work with local governments and airspace users to provide increased capacity and better operational performance in the United States airspace system that reduces congestion and meets projected demand in an environmentally sound manner;
- **International Leadership —** Increase the safety and capacity of the global civil aerospace system in an environmentally sound manner; and
- **Organizational Excellence —** Ensure the success of the FAA's mission through stronger leadership, a better trained and safer workforce, enhanced cost-control measures, and improved decision-making based on reliable data.

The CIP projects, by design, seek to support the goals, objectives, and performance targets in the Department of Transportation's (DOT) strategic plan and the FAA Flight Plan 2009–2013. Many FAA projects will contribute to more than one goal, objective, or performance target; however, the project linkages in the CIP (appendices A and B) connect each project to the single goal, objective, and performance target where that project's contribution is most significant. We list several projects under each performance measure for several reasons. Many projects are interdependent, and one project may not be successful in meeting a performance target without completion of other supporting projects. Also, in the complex system used for air traffic control, system improvements must address several different operating conditions to reach the overall performance target, and often it takes multiple projects to address each of the variables, which individually contribute to overall system inefficiencies. Only CIP projects with FY 2010–2014 funding are included in appendices A, B, and C.

The CIP connects projects to the six goal areas of the DOT Strategic Plan, which is broader than the FAA's Flight Plan that has four Strategic Goals. The Flight Plan incorporates Environmental Stewardship projects into the Increased Capacity goal and the Security, Preparedness and Response projects into the Organizational Excellence goal as shown below. This document aligns projects to all six DOT goals to show specifically which projects support DOT environmental and security goals.

The six DOT Strategic Goals are: **The four FAA Strategic Goals are:**

1. Safety…………………………………………………....Increased Safety
2. Reduce Congestion……………………………………..Greater Capacity
3. Global Connectivity…………………………………….International Leadership
4. Environmental Stewardship…………………………….(*Greater Capacity*)
5. Security, Preparedness and Response…………………..(*Organizational Excellence*)
6. Organizational Excellence………………………………Organizational Excellence

The detailed project information in appendix B provides more insight into the strategic purpose of projects by including a "Relationship of Program to FAA Strategic Goal, Objective, and

Performance Target" section that gives more specific information about how each project helps meet a Flight Plan goal.

1.3 Management Process for Selecting Modernization Projects

In addition to relating capital investment to agency strategic goals, FAA management must have a disciplined process for managing modernization. We have established a detailed process for evaluating, approving, and managing projects. When management considers a project for funding, it must have a business case that estimates both project cost and benefits. A Capital Investment Team composed of representatives of all the major lines of business reviews this business case as warranted. If the team believes the project has merit, it recommends that the Senior Vice-President – Finance approve it before presenting the project to the Executive Council (EC) and the Joint Resources Council (JRC), which consist of FAA's top executives. Once the JRC approves a project, a baseline cost estimate is established, and the FAA commits to fully fund that baseline, so projected benefits are not lost because the project cannot be implemented consistent with its planned schedule.

As requested by the Government Accountability Office, we have added Appendix D to this CIP to show a list of programs that have experienced baseline changes and the impact of those changes. There normally are two reasons for increases in a project's baseline. If annual funding is below the established baseline, the project schedule is extended, and that results in increased costs because the added years require inflation adjustments to labor rates, and the labor hours used exceed the baseline estimates. The other reason for baseline increases is that the project encounters unforeseen problems that require additional engineering design and production time sometimes accompanied by the need for more elaborate site preparation for system installation.

To manage projects to stay within the established baselines, project oversight must continue after initial approval. This includes regular program reviews of progress and assessment of the project's potential to deliver the planned benefits within the estimated cost envelope by the JRC. Projects that are over cost and/or behind schedule can be restructured or cancelled. To accommodate any necessary changes, the Capital Investment Plan financial baseline must be updated regularly and reflect these adjustments as we continue to seek the best solutions to expanding capacity and improving efficiency of air traffic services.

Appendices B and C detail the near-term capital investments, but we must also consider the longer term modernization needs. Section 3 shows the planning for operational improvements that are part of the NextGen system, and Section 4 contains the roadmaps that system engineers have developed that translate those improvements into hardware and software changes. These roadmaps help engineers look at the broader system engineering issues to ensure that efforts are integrated as several systems are enhanced simultaneously. They also identify the interactions among those systems to ensure that as modern systems replace the older systems, the air traffic control system will continue to function smoothly.

1.4 Important Factors Affecting Planning for the Future

1.4.1 Nature of Capital Investment

Capital investments normally require extensive planning and development. They often take several years to implement, and, after development, require extensive testing before any operational improvements or gains in efficiencies become effective. Thus, project managers must plan for the operating environment forecast for 4 to 5 years in the future rather than meeting only present needs. The FAA prepares a detailed forecast of future aviation activity every year to help project managers determine the future operating environment. The following section discusses some of the considerations that have led to our commitment to pursue NextGen solutions to provide the system of the future.

In addition to increasing aviation capacity by implementing NextGen, we must recognize the impact of our Nation's air transportation industry on economic growth. A recent study by the Air Traffic Organization (ATO) Performance Analysis and Strategy Service Unit, "The Economic Impact of Civil Aviation on the U.S. Economy," published in October 2008, estimates that aviation accounted for over $1.2 trillion in economic activity in 2006, which represents 5.6 percent of the total U.S. economic activity. It created an estimated 11 million aviation-related jobs and flew over 39 billion revenue ton-miles of air cargo. A reliable worldwide aviation network is essential for today's economy. Domestic and international commerce rely on the access and passenger and freight capacity it provides to cities around the world to sustain economic growth.

1.4.2 Air Travel Demand

The demand for air travel is closely related to changes in the economy. As Figure 1 shows, the growth in revenue passenger miles (RPM) over the last 30 years corresponds positively with the growth in inflation-adjusted GDP. Our inflation-adjusted (real) economic output has a long-term growth trend that supports the increases in the number of passengers and the miles traveled. There are some minor deviations in both the GDP and RPM growth line, which are caused by abnormal events, such as the terrorist attacks of September 11, 2001. It is our judgment, however, that the long-term economic growth trend is likely to continue upward after a period of adjustment because such factors as population growth, increases in productivity, and introduction of new technology will foster growth. It follows that increased demand for air travel will track that increased economic growth. Growth in air travel demand will lead to more aircraft operations, which translates into increased workload for the FAA. It also translates into more pressure on the 35 Operational Evolution Partnership (OEP) airports to handle additional operations. Significant increases in operations at these airports will increase delays, unless we implement the advanced NextGen capabilities to provide the improved services to handle this growth.

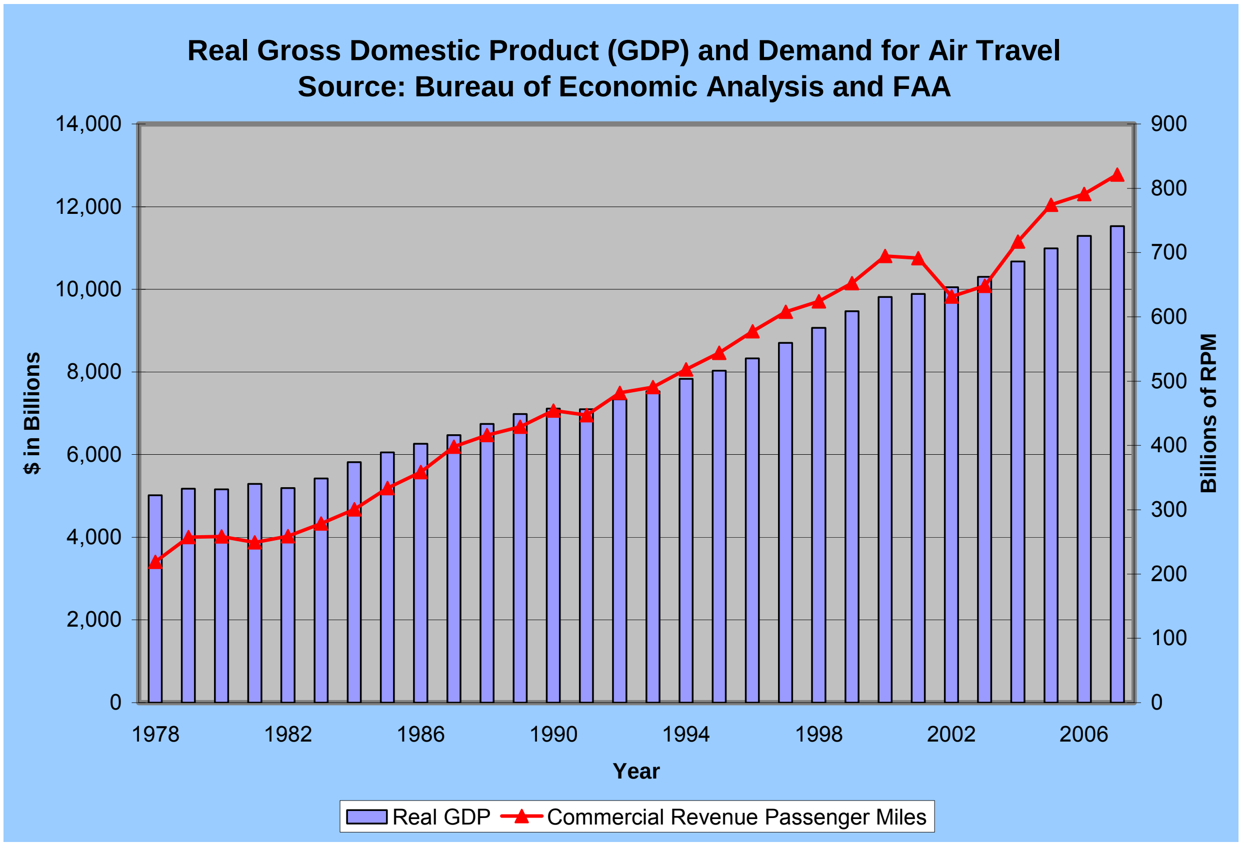


Figure 1 Air Travel Demand Growth Compared to Growth in GDP

1.4.3 Growth in En Route Operations

Figure 2 shows growth in the number of aircraft handled by en route centers and that this upward trend is consistent with the growth trend for RPM. The percentage of air traffic growth has been slower than the growth in RPM, but that may change in the future. In the past, airlines were able to meet a portion of the increased demand for air travel by buying larger aircraft with more seats and by increasing load factors. Operational considerations and costs will limit the amount of demand absorbed in that manner in the future as carriers try to match aircraft size more closely to market demand. A portion of increased future demand will be met with additional operations.

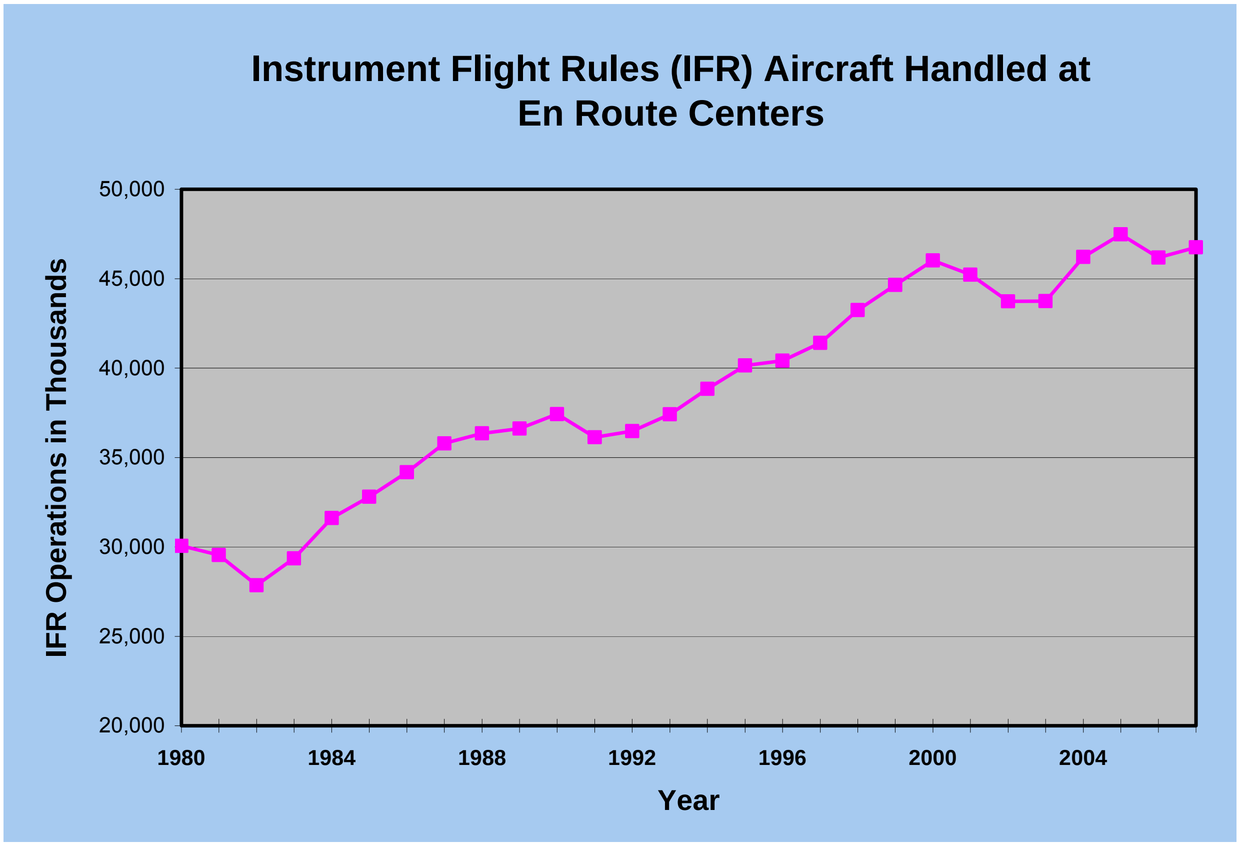


Figure 2 Historical Growth — Number of Aircraft Handled by En Route Centers

Since 2001, legacy air carriers have made adjustments to shift larger aircraft to long-haul routes and serve international markets that increase aircraft utilization and maximize their revenue yield. The smaller markets are either served by regional carriers under contract to the legacy carriers or abandoned altogether. When regional carriers serve these shorter routes, they fly smaller jets, which create more operations for the same number of passengers.

The FAA Aerospace Forecast Fiscal Years 2009-2025 states, "The latest set of economic forecasts from the Administration calls for the U.S. recession to end by the third quarter of FY 2009 followed by a relatively modest recovery over the next six quarters." Commercial aviation flights and travel demand are forecast to fall sharply in 2009, but growth is projected to return in 2010 with revenue passenger miles increasing 2.8 percent and the number of passengers increasing by 2.0 percent. The current forecast also assumes business use of general aviation aircraft will expand as growth in the economy returns. Reduction in the number of aircraft flown and in fuel prices will improve chances for commercial aviation to regain profitability and resume growth. As shown in Figure 2, past downturns in aircraft operations were usually short lived, and the recovery surpassed previous levels.

The nature of the current downturn suggests that recovery will be slower than it was in past downturns and the strength of the recovery more muted. However, as we pointed out in section 1.4.1, we must plan for the long-term when we are considering capital investments. Congestion and delays will increase if the FAA does not complete modernization in time to use airspace capacity more efficiently.

Another long-term factor that affects the need for capital investment is the continuing effort to increase airport capacity, especially at the larger airports. Some of these airports have been able to increase capacity by building new runways, and, as a result, 13 new runways have become operational since 2000. The NextGen Integration and Implementation Office has identified 12 more airfield projects that would be beneficial.

When local airport authorities build new runways or otherwise expand capacity, the FAA must add supporting equipment and develop procedures to make that capacity fully usable. When new runways are built, airspace around the airports is often reconfigured to accommodate new approach and departure patterns. This normally requires installing new navigational aids and precision landing systems to help pilots in the approach patterns for the runways. Before precision approach guidance systems become operational, the FAA must install approach lights, and position visibility sensors along the runway so that precision guidance can be used down to the lowest visibility approved for that system. Some airports need new surface surveillance systems to alert pilots to potential runway incursions and to help pilots negotiate complex airport taxiway and runway configurations. We also need capital investment to expand air traffic control facilities and add additional controller positions to handle the increased complexity of terminal airspace after a new runway is opened.

2 Key Considerations in Capital Planning

Capital planning requires careful balancing to satisfy competing needs over the next several years. We must ensure that the present system continues delivering highly reliable performance to support operations while we are preparing for the more capable system needed to sustain future growth. This requires allocating our expenditures between sustaining current operational facilities and equipment and investing in new technology and improved delivery of services.

2.1.1 Sustaining Current System Performance

The air traffic control system requires very high reliability and availability. Once an aircraft is airborne, the FAA must maintain constant contact with the aircraft and be able to provide separation service for the entire flight from takeoff to landing. Each system in the NAS has a high level of redundancy to support system reliability that will prevent service disruptions. The FAA must replace equipment on a scheduled basis to minimize failures and prevent deterioration in system performance.

There are nearly 60,000 NAS operational facilities that support Air Traffic Control (ATC) and over 500 large buildings that house major ATC functions. Upgrading and replacing facilities and equipment to sustain performance requires over $1.5 billion per year. Problems with buildings or the equipment they house can result in expensive disruptions in air traffic control.

2.1.2 Making Interim Upgrades to Existing Equipment

In addition to replacing critical facilities and equipment, the FAA must also regularly upgrade them. Since many systems now rely on commercial-off-the-shelf (COTS) hardware and software, we must continually keep pace with upgrades. Normally each upgrade depends on the previous release by the manufacturer, and skipping an upgrade is not an option.

Electronic components and computer systems become obsolete and sometimes must be replaced because manufacturers no longer produce repair parts. In other cases, replacing components in one set of equipment can require changes in connected equipment that sends information to or receives information from the obsolescent part being replaced. Examples of systems that the FAA is upgrading are the large displays that controllers use to maintain aircraft separation and the voice switches that allow controllers access to the many voice channels that they use to communicate with pilots and each other.

Many components of the air traffic control system exchange information with aircraft. As newer aircraft come into service and older aircraft have their avionics upgraded, the FAA will upgrade its equipment to take advantage of improvements in communication, navigation, and surveillance technology. These changes improve the accuracy of the information exchange, which improves FAA productivity.

An additional motivation for the FAA to replace equipment is the pressing need to reduce operating costs. The payback period for energy-saving devices can be as short as 1 or 2 years, so it is often economical for the FAA to replace equipment in the short term while designing and testing NextGen systems. There is also increasing pressure to lower emissions, which is tied to the accompanying goal of reducing energy consumption. Funding for these projects will continue until the savings no longer exceeds the cost.

The Next Generation Air Transportation System (NextGen) is the ultimate solution for fully modernizing air traffic control. The current system will not allow significant increases in capacity at busy airports. Growth in aviation will require new systems and procedures to accommodate the increased demand for capacity. We must also develop the skills to transition to NextGen, which will transform the existing system into one with advanced capabilities.

2.2 NextGen Investments

The fiscal year 2010 budget includes over $350 million to deploy foundational technologies and infrastructure, including Automatic Dependent Surveillance - Broadcast (ADS-B), Data Communications (DataComm), NextGen Network Enabled Weather (NNEW), NAS Voice Switch (NVS) and System Wide Information Management (SWIM). These are core technologies to introduce new capabilities promised for NextGen. They provide the communication, navigation, and surveillance technology supported by the more sophisticated information flows that will allow better use of airspace capacity.

The FAA will use additional NextGen funding to implement the NextGen solution sets (e.g., trajectory-based operations, high-density arrivals and departures, and five others). In some cases, these projects will develop and buy new equipment; in other cases, FAA will use the funds for demonstrations to prove that the new technology is accurate and reliable enough to use operationally. Future investments in improved communications, navigation, surveillance, and automation systems will implement the new technology, which will allow use of less separation between aircraft and result in capacity expansion.

This CIP shows that the transition to NextGen is well underway. We will be increasing spending over the next several years (see figure 3). We are carefully planning a responsible transformation of the existing air traffic control system to a newer system with far greater capabilities while maintaining the current system at peak operational performance. As we complete some of the existing CIP programs during this period, increased amounts of funding will be available for NextGen development and implementation.

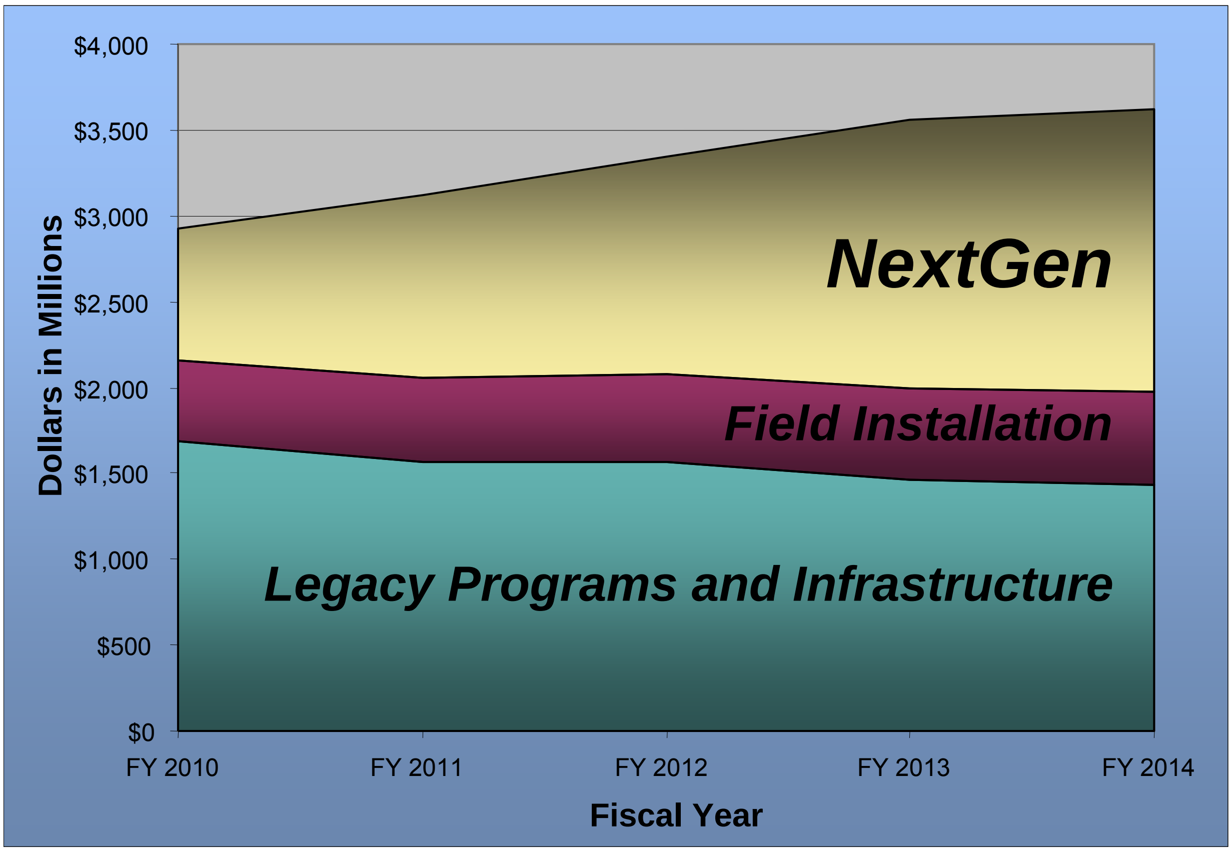


Figure 3 NextGen Portfolio Relative to the Total Capital Request

2.3 Major Initiatives in FY 2010 Budget

The areas and specific projects that we discuss below are the special initiatives funded in FY 2010 that address safety, capacity, and environmental issues. These are high-priority projects that address aviation challenges and reflect our best efforts to find solutions to them.

2.3.1 Safety

In FY 2010, the FAA is focusing on eliminating runway incursions by implementing Runway Status Lights and Airport Surface Detection Equipment – Model X (ASDE-X) while developing the Low Cost Ground Surveillance System (LCGS).

The Runway Status Light Program is requesting a large increase over FY 2009 requested funds ($27.0M to $117.3M) to implement these systems at an additional 20 airports. These systems of embedded lights in the taxiway and runway have been tested at two major airports and have been successful in warning pilots to not enter active runways when it would be unsafe to do so. To continue our success in reducing serious runway incursion incidents, we have decided to increase the number of airports that will benefit from these systems.

The ASDE-X program is well underway, and we have provided funding in FY 2010 to finish installing these airport surface detection systems. These systems provide airport operating area status to controllers and also transmit the information that operates the Runway Status Lights. ASDE-X displays in the airport tower show controllers the location of aircraft and ground vehicles near and on the taxiways and runways, so controllers can take swift action to prevent potential runway incursions.

The FAA is building prototypes of the LCGS system under the Runway Incursion Reduction Program in FY 2009 and will be testing them in FY 2010. If testing is successful, the LCGS could be used to reduce runway incursions at lower activity airports. The ASDE-X system, which is installed at larger airports, is not appropriate for these smaller airports, but the lower cost LCGS would provide equivalent protection against runway incursions.

2.3.2 Capacity

Airspace redesign has proven to be effective in enabling air traffic controllers to use airspace surrounding major airports more efficiently. Work is continuing on the New York/New Jersey airspace redesign, and when parties reach an agreement on implementing it, the estimated delay reduction is 20 percent. There is also airspace redesign for the Chicago area. The planned expansion and reconfiguration of the runways at Chicago's O'Hare Airport will generate significant benefits when additional arrival and departure routes are created to take advantage of the increased runway capacity.

We have substantially increased the investment for replacing and upgrading electrical power systems in the FY 2010 budget. These systems condition the power that runs the automation, communication, navigation, and surveillance systems used for air traffic control, and they can generate electricity when commercial power fails or accidents cut off power. Because air traffic control is so time critical, FAA facilities require exceptional reliability and stability, and power systems ensure that performance when commercial power sources fail. Preventing system outages avoids delaying or diverting aircraft, because outages normally result in significant decreases in capacity. We must also modernize and upgrade electrical power systems to protect against lightning strikes. Studies show that higher levels of spending are necessary to sustain the high performance of our electrical power systems.

2.3.3 Fuel Savings and Environment

One of the significant concerns about aviation growth is its impact on the environment. Past technological developments have led to reduced aircraft noise and emissions. However, we need continuing improvements to address and resolve aviation's environmental impacts — including noise, air quality, water quality, global climate effects, and related energy issues. Environmental and energy concerns, if not adequately managed, are likely to constrain aviation growth.

Airframe and engine manufactures are continuing their efforts to improve the fuel efficiency of aircraft. Improved fuel efficiency benefits the environment by reducing jet engine emissions because less fuel is consumed per flight, and it has the added benefit of reducing costs for airlines and other operators. In addition to manufacturers, commercial operators — for economic as well as environmental reasons—have a strong motivation to decrease fuel consumption and related emissions from aircraft. Testing is currently underway at Atlanta and Miami to determine how to implement Continuous Descent Approaches, which minimize fuel consumption as aircraft descend to land. Capabilities that we will develop under NextGen will play a significant role in reducing aircraft noise and emissions.

Manufacturers and users will implement the technological advances developed under the Continuous Low Energy, Emissions, and Noise (CLEEN) program for aircraft design and sustainable alternative fuels. We will invest in demonstrating integration of these capabilities and assessing system wide environmental benefits. New procedures supported by NextGen capabilities will decrease noise and emission impacts and increase air traffic control efficiency. By planning for and ensuring that aircraft fly shorter, more efficient routes, there is a double benefit: lower emissions and lower fuel consumption. Trajectory-Based Operations and High Density arrival and Departure initiatives will reduce distance traveled and decrease maneuvering in the terminal area to save both time and fuel. The FAA will also explore environmental control algorithms for ground, terminal area, and en route advanced operational procedures to reduce fuel burn, emissions, and noise.

3 Next Generation Air Transportation System

Over the last 20 years, the FAA has significantly modernized the existing air traffic control system. By both improving equipment and adding a robust strategic planning capability at the Air Traffic Control System Command Center, the agency has markedly improved its ability to handle the flow of air traffic. However, we anticipate reaching the limits of improving the current system in the near future. With more aviation growth on the horizon, the FAA must implement new ways of managing the predicted air traffic volume. The Next Generation Air Transportation System (NextGen) replaces and expands the current system's capabilities.

The NextGen effort to increase capacity began with operational specialists describing operational improvements that would improve the system's capability to handle more aircraft. These operational improvements are changes in air traffic control procedures that result from increasing the accuracy of navigation and surveillance systems or increasing the rate of information flows to the upgraded decision support tools within the ATC equipment. The increases in capacity occur because both the system capability upgrades and the fundamental changes in technology greatly enhance our ability to handle air traffic.

Once we identify the operational improvements, engineers must ascertain the equipment changes to implement them. The FAA has a detailed Enterprise Architecture, which shows the migration from the existing systems to the systems of the future. The architecture consists of several functional areas, including automation, communications, surveillance, navigation, and weather. These functions are supported by various types of computers, radios, broadcast stations, and sensors. By developing the architecture to show all the air traffic control systems and what functions they perform, engineers can determine the system upgrades and schedule for changes to implement new capabilities.

The Enterprise Architecture is partially portrayed on "roadmaps" that show the present and future configurations of air traffic control equipment. The roadmaps (discussed in section 4 below) show the planned evolution to the NextGen. They also show the planned schedule for either replacing or updating existing equipment. The architecture is the foundation for building a capital plan, and it allows work to be scheduled and coordinated so that everything is installed in the right place and at the right time when new capabilities are added.

Solution sets identify specific capabilities that will improve system capacity and efficiency. The sets are based on operational improvements that state how we will change our procedures to build system capacity through more efficient operations. Sections 3.1 through 3.7 describe the solution sets, including an initial assessment of the changes we will need to make in air traffic control systems as well as the associated investment required to implement those changes.

3.1 Initiate Trajectory Based Operations

Summary Description:

Trajectory-Based Operations (TBO) will improve efficiency of operations. Aircraft will be assigned to fly negotiated trajectories, which allows airspace to be used more efficiently because aircraft separation is preplanned and maintained as long as all aircraft stay within their planned trajectory and reach pre-assigned waypoints at the agreed time. Computer automation — ground and airborne — create these trajectories, and the trajectories are exchanged with aircraft by DataComm, a data link system that can automatically transmit data to and from FAA facilities. The aircraft position is reported by ADS-B, so the controller knows whether the aircraft has stayed within the trajectory and remains free of conflicts. Significantly more trajectories can be created then would be allowed by traditional route and altitude planning. Key elements in making TBO work is the rapid exchange of information that DataComm provides and FAA's ability to negotiate via DataComm with pilots on how to maneuver if they are outside their approved trajectory. This solution set focuses primarily on en route cruise operations, although all phases of flight will feel the effects of the TBO.

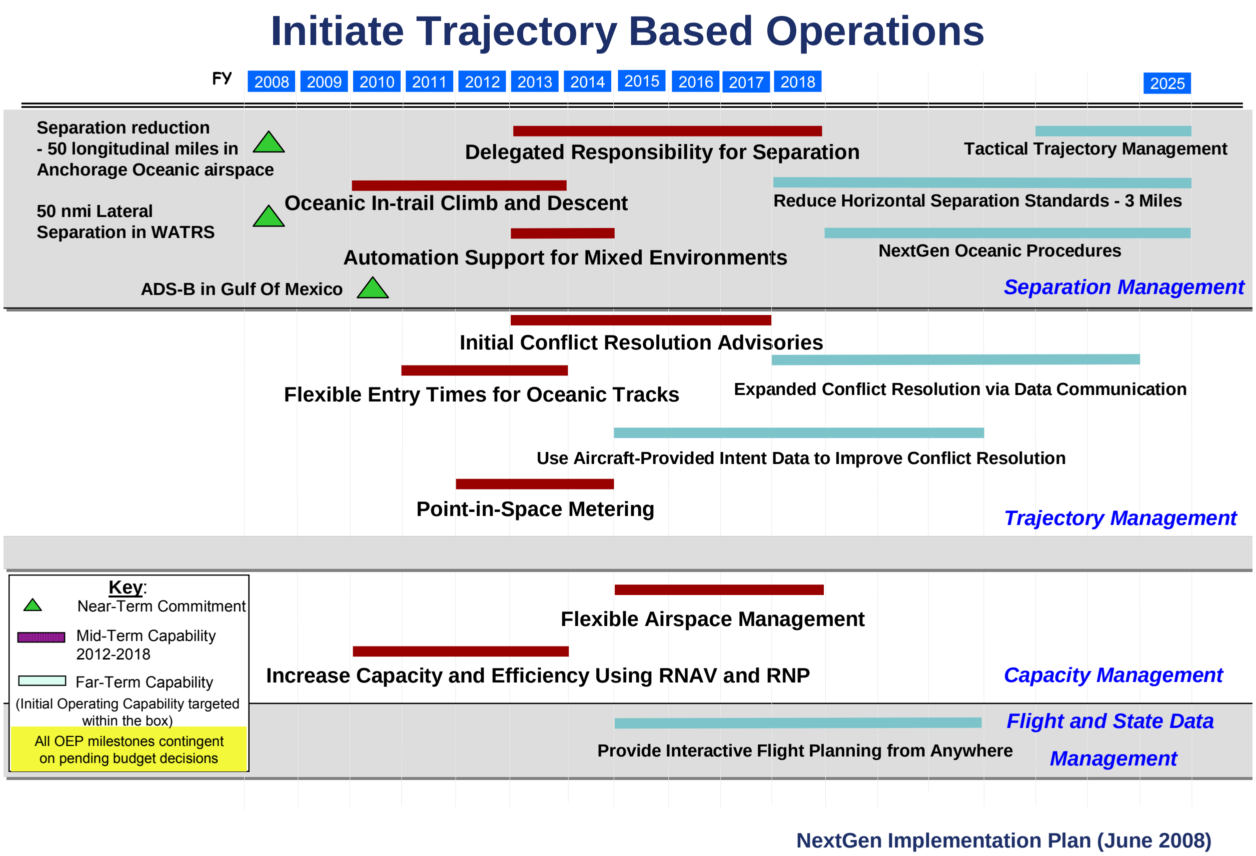
Background:

Voice communication is the primarily tool for managing flights in today's ATC system. Two-way radio is normally used to communicate clearances and changes in altitude and airspeed. Controllers separate aircraft by using radar screens to visualize future flight paths and identify potential conflicts with some automation decision support. With the diversity of aircraft operating characteristics and differing accuracy of their navigational systems, a single set of equipment-based separation procedures and standards is becoming increasingly inefficient and limits capacity.

Operational Capability Description:

Implementation of new TBO capabilities appears in the timeline below. The FAA will implement TBO in several phases. One initial focus will be in oceanic airspace. Due to limitations in surveillance and direct communication over the oceans, controllers use large separation standards to ensure safety. With improvements in aircraft position reports and more efficient communication channels, controllers can safely reduce aircraft separation for properly equipped aircraft. In addition, aircraft can fly more efficient flight profiles to enter oceanic airspace. The next step will be to introduce TBO into domestic airspace for those aircraft with the precision navigation capability and flight management systems that allow them to maintain an assigned trajectory.

Timeline:



Required Investment:

The near-term improvements in the *Separation Management* service on the diagram apply to domestic and oceanic flights. Due to previous equipment limitations, aircraft oceanic separation was maintained at 90–100 miles. With satellite communication links and Automatic Dependent Surveillance – Contract (ADS-C), it is possible to greatly decrease required separation and offer more efficient entry into oceanic airspace. The equipment required is Global Positioning System (GPS), ADS-C, satellite communication data link, and upgrades to the oceanic automation system called Advanced Technologies and Oceanic Procedures (ATOP). These technologies along with procedures and training will allow for aircraft-to-aircraft in-trail separation to be reduced to 50nm or less depending on the oceanic area and aircraft equipage. As the technology matures, it may be possible to allow aircraft to use Automatic Dependent Surveillance – Broadcast (ADS-B) and a cockpit display of traffic information (CDTI) to ensure that aircraft maintain separation while performing maneuvers with even lower separations. Domestically, separation management grows to support a variety of precision-navigation-based procedures and separations as well as the first aircraft-to-aircraft flight-deck-supported separation procedures.

The *Trajectory Management* service manages trajectories within flows to ensure that the objective of each flight is accommodated as much as possible while maintaining the overall capacity of flows across the en route airspace. This service requires the automated capability to initially create the trajectory and then track the aircraft flying the trajectory to verify that it reaches a designated point in space at the required time to stay within the boundaries of the trajectory. The En Route Automation Modernization (ERAM) program and extensions to Traffic Management Advisor (TMA) will provide the foundation for this capability. The starting point is the current TMA and implementation of Release 3 (R3) of the ERAM software. In 2011 (as the roadmaps show in section 4), work will begin on a post-ERAM R3 work package to further expand this capability to all airspace.

Capacity Management service involves providing the airspace structure and workforce to support flexible ATC services. Expansion of navigation support to allow full point-to-point operations using area navigation (RNAV) and increased precision in the navigational performance of the aircraft allows a more flexible structure of closely spaced air routes which can be developed to increase airspace capacity. The new modern voice switch and the enhanced flight data management of ERAM will also allow the airspace to be managed and assigned to controllers more flexibly, thus permitting controllers to more effectively guide aircraft around major storms. This ability to maintain greater levels of capacity in bad weather will reduce the need to restrict demand, as currently required in the Airspace Flow Program.

The final block on the TBO Capability diagram is *Flight and State Data Management*. Automation systems in different air traffic facilities share information continually as an aircraft flies across the country. We must update or replace existing systems to ensure information on all flights being followed is current and reflects changes in flight plans made before and during the flight.

3.2 Increase Arrivals and Departures at High Density Airports

Summary Description:

The solution set addresses improving use of available capacity at airports:

- With large numbers of operations;
- That have multiple runways with both airspace and taxiing interactions; and
- That are in close proximity to other airports that have the potential for airspace interference

Background:

For various reasons, it is difficult for an airport to achieve its maximum arrival or departure capacity. When the arrival stream contains small and large aircraft intermixed, larger separations are required. The cause can be differences in arrival speed or the effect wake turbulence from large aircraft can have on small aircraft following closely behind. Because of the effects of wake turbulence, controllers must increase separation between smaller aircraft which follow larger aircraft to 5 miles or more. Multiple runways can also complicate movement of aircraft on the ground and create restrictions on the number of takeoffs from available runways. In major metropolitan areas, multiple major hub airports must share airspace and capacity at these airports decreases when winds prevent use of runways with conflicting approach paths.

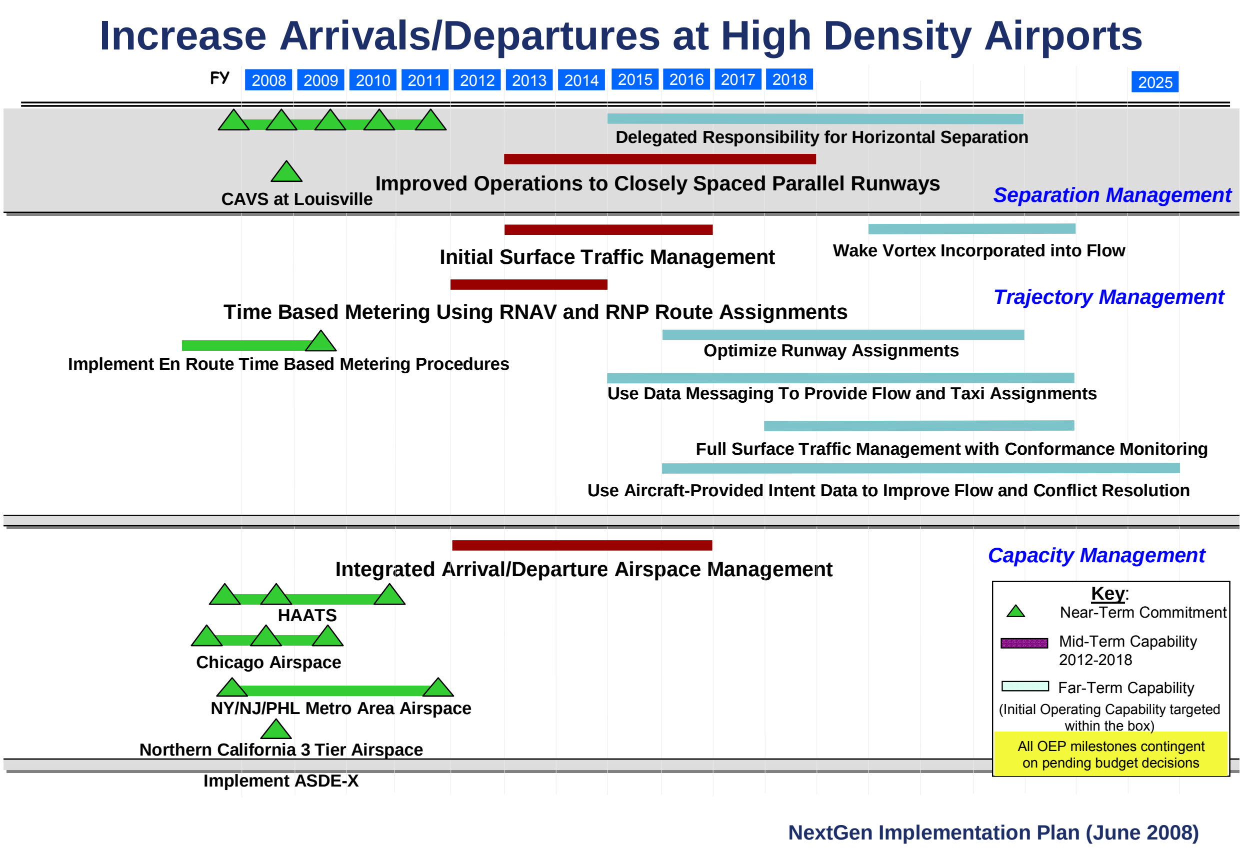
Operational Capability Description:

Better management of flows of aircraft landing at and departing from major airports will allow fuller use of runway capacity. Coordinating trajectory-based operations so that aircraft arrive in an optimal sequence will remove some of the existing inefficiencies in landing aircraft. Improved monitoring of aircraft, while taxiing, will decrease departure delays. Installing new technology will eliminate some current restrictions on approaching and departing aircraft.

Examples of solutions are:

- Using ground surveillance radars and surface management systems to help taxiing aircraft reach the runway sooner and in the right sequence to maximize the runway throughput;
- Allowing pilots to use a Cockpit Display of Traffic Information (CDTI) to maintain separation from other aircraft on final approach when arrival streams are relatively homogeneous;
- Using precision radar to allow simultaneous landings on closely spaced parallel runways; and
- Requiring pilots to arrive at a terminal fix at an assigned time so that the flow of aircraft can be arranged to minimize the greater separations needed between large and small aircraft.

Timeline:



Required Investment:
To support increases in arrival and departure rates at airports, we need more sophisticated automation, communication, and surveillance equipment. Terminal automation platform enhancements are necessary to support time-metered entry points for airport approaches. The DataComm system will allow rapid transfer of both data and air traffic control information to ensure that pilots follow the exact path planned and controllers maintain separation between arriving and departing aircraft. We will require the ADS-B system for rapid updates of aircraft position so that controllers are confident that aircraft are following their assigned path.

In the *Separation Management* area of the diagram above, Implementation of "Delegated Responsibility for Horizontal Separation" will require aircraft to equip with a CDTI and ADS-B technology. Any aircraft that maintains self-separation must have ADS-B (In) technology that allows that aircraft to receive information from other aircraft and ground stations giving the location of nearby aircraft. This information is then displayed on the receiving aircraft's CDTI, enabling its pilots to see the position of surrounding aircraft that are equipped with ADS-B (Out). ADS-B Out-equipped aircraft continuously broadcast their position obtained from onboard navigation equipment. The cockpit display in the receiving aircraft gives the precise distance to the aircraft being followed and also shows information on its speed and altitude. This display helps pilots maintain separation from a leading aircraft when controllers delegate responsibility for separation to them.

"Improved Operation to Closely Spaced Parallel Runways" is also possible for aircraft equipped with ADS-B and certified for Required Navigation Performance (RNP). The improved navigational performance and the potential use of ADS-B and CDTI, when required, give pilots sufficiently accurate information to maintain safe separation during simultaneous operations on these runways. These techniques will expand the throughput on existing and future parallel runways.

In the *Trajectory Management* area of the diagram, "Initial Surface Management and Time Based Metering" will depend on RNAV and RNP routes, the ASDE-X surveillance system, and terminal automation enhancements. The RNP and RNAV routes allow more efficient use of the airspace because aircraft have the equipment and crews have the training to maintain their intended route of flight within close tolerances. The aircraft and the aircrew are certified to be able to maintain the approach route with no more than a specified (for example 0.3 miles) deviation from that path. This reduces the potential for conflicts in approach paths for airports in close proximity. We need capital investment to create and test these RNAV routes, which are available to aircraft with the appropriate RNP rating. The rapid update radar will provide the controller frequent updates of an aircraft's position to ensure that it is following the assigned flight path. Time Base Metering, as mentioned, relies on Traffic Manager Advisor automation upgrades and helps manage the stream of arrival aircraft by assigning a specific time to reach the entry point to transition to terminal control.

The *Capacity Management* area depends on airspace redesign and terminal airspace consolidation to improve use of airspace surrounding an airport. Improvements in service stem from technology enhancements in surveillance that the ADS-B program provides. This system receives position information from aircraft and transmits it to control facilities. ADS-B is a key technology for two reasons. Distance from the ground station does not affect accuracy, and ADS-B updates position information more rapidly than conventional ground radars. Both capabilities support expanding use of terminal-area procedures that increases efficiency of arrivals and departures. Controllers will have timely and accurate information on whether aircraft are following their assigned trajectory in order to ensure that they are maintaining proper separation. At Chicago, New York, Houston, and other major airports, additional arrival and departure routes are being created, which will decrease airspace congestion and reduce the possibility of conflicts.

3.3 Increase Flexibility in the Terminal Environment

Summary Description:

This solution set concentrates on the improvements in the access, situational awareness, and separation services that all airports, from the largest to the smallest, may require. Unlike the high-density solution set that focuses on the increased traffic management to manage the high demand, this solution reflects the common needs that all airports have: precision landing, surface situational awareness, and improved management of flight data.

Background:

Flexible terminal operations serve a mix of Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) traffic, with aircraft types ranging from airline transport to low-end general aviation. Airports can be towered or non-towered, depending on traffic demand. In the future, some satellite airports will experience higher traffic demand due to migration of less sophisticated aircraft to these smaller airports to mitigate traffic congestion. These airports can accommodate the potential increase in use of personal aircraft for pleasure and business and emergence of on-demand air taxi services using very light jets (VLJs).

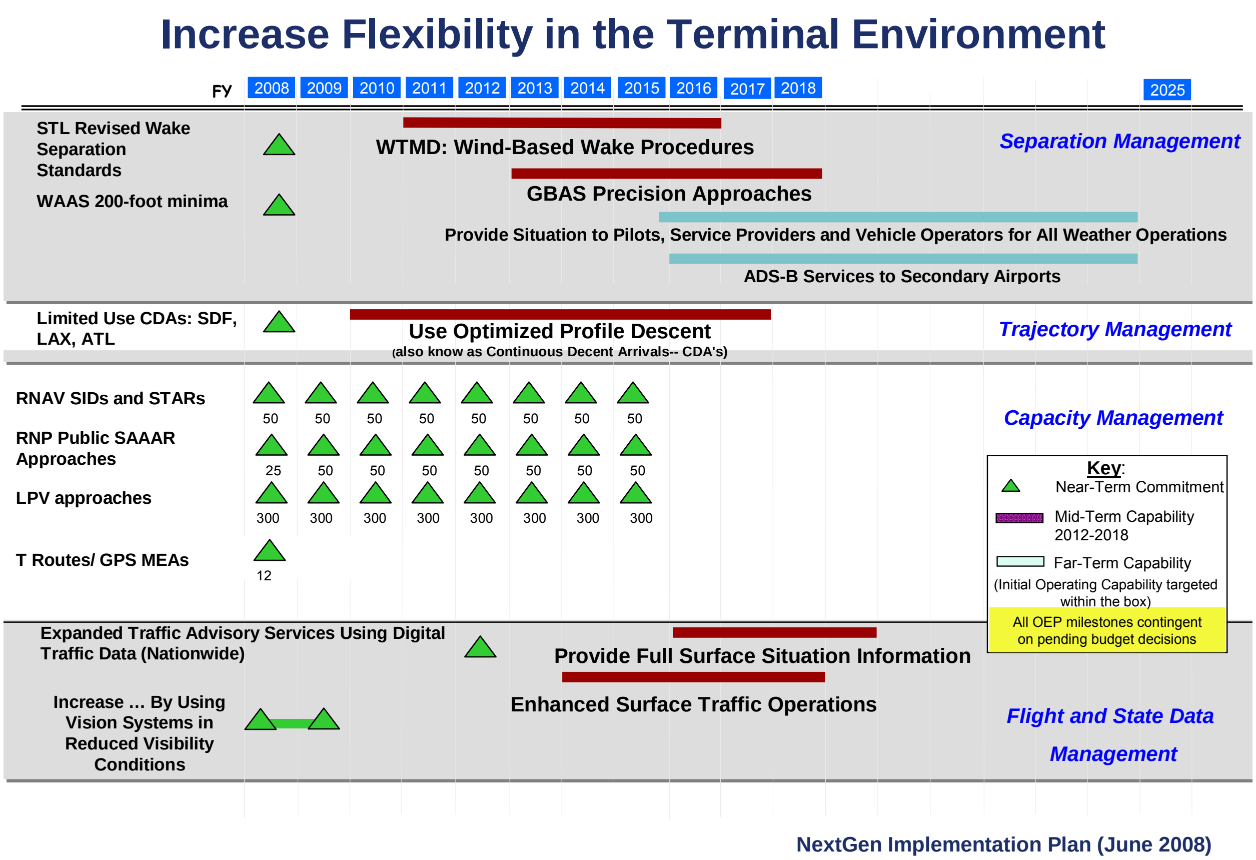
Operational Capability Description:

Operational Improvements focus on improving services at all airports in nearly all weather conditions without increasing staffing at those airports with staffed air traffic facilities. Planned elements include: developing “equivalent visual” approach procedures; providing support for low visibility taxi and departure operations; improving access to weather information; implementing improved wake vortex procedures; and developing procedures for the more efficient and environmentally sensitive optimal profile/continuous descent approaches. A major metric of this program will be increased capacity without a corresponding increase in human resources. Establishing a RNP-3D requirement and associated ground automation trajectory modeling will allow increased use of optimal profile descents without loss of capacity in higher traffic demand periods.

A Ground-Based Augmentation System (GBAS), also know as the Local Area Augmentation System (LAAS), will provide an optional lower cost alternative to the Instrument Landing System (ILS) for Category (CAT) II and CAT III-like approaches. The system could extend CAT II/III services to airports where a conventional ILS can not be installed due to siting constraints, assuming additional infrastructure (e.g., lighting) is economically justified. A ground-based augmentation system will also support a higher number of precision approaches at major airports by providing for precision missed approaches that avoid conflicts with other traffic near the airport. Finally, this system will enable offset landing thresholds for high-density airports, helping to implement wake-avoidance procedures on arrivals.

Cockpit displays of assigned taxi route, coupled with display of surface traffic and other hazards, enable aircraft to safely taxi at or near normal taxi speeds in low visibility and at night. Such improvements may virtually eliminate runway incursions and other taxi errors.

Timeline:



Required Investment:

The Wake Turbulence Mitigation for Departures (WTMD) system will mainly be installed at high-density airports with closely spaced parallel runways to eliminate the wake turbulence separation time presently used when a B757 or heavier aircraft is taking off on an adjacent runway. This separation time interval can be eliminated, if crosswinds are sufficient to keep the wake turbulence from the larger aircraft, out of the path of the aircraft on the parallel runway. Production of the WTMD system began in FY 2009, and funding is being requested for continued production and further testing.

For *Trajectory Management* and *Capacity Management*, Operations funding will generally cover development and testing of the following improvements, which will not require capital investment:

- Optimized Profile Descent (Continuous Descent Approach);
- Area Navigation (RNAV) Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs);
- Required Navigation Performance (RNP) Approaches;
- Lateral Precision with Vertical Guidance (LPV) Approaches; and
- T Routes (more efficient direct routes through terminal airspace).

Development of enhanced procedures and associated automation changes to implement these improvements will be a capital investment, with follow-on individual site adaptations funded in the Operations budget. The ability to use these new procedures will be supported by equipment in the aircraft and, for some procedures, the LAAS. When LAAS is tested and approved, it can provide new capabilities to smaller airports and possibly reduce the number of ILSs at high-density airports.

For *Flight and State Data Management*, several new capabilities are being planned to enhance surface traffic operations. This requires providing full surface situation information to pilots. Investments needed to support these capabilities are ADS-B, Airport Surface Detection Equipment (ASDE) Low Cost Ground Surveillance (LCGS), and appropriate displays and communication equipment. The Flight Information System can broadcast the location of other aircraft from ADS-B ground stations to properly equipped aircraft on the taxiways. DataComm can send other information, such as taxi routes to the pilot.

3.4 Improve Collaborative Air Traffic Management (CATM)

Summary Description:

This solution set covers strategic and tactical flow management, including interactions with operators to guide choices when FAA cannot accommodate the desired route of flight. Collaborative Air Traffic Management (CATM) includes flow programs and collaboration on procedures that will shift demand to alternate routings, altitudes, or times when there is severe weather affecting operators' planned routes, or demand for certain routes exceeds capacity. CATM also includes development of systems to distribute and manage aeronautical information, manage airspace reservations, and manage flight information from preflight to post analysis.

Background:

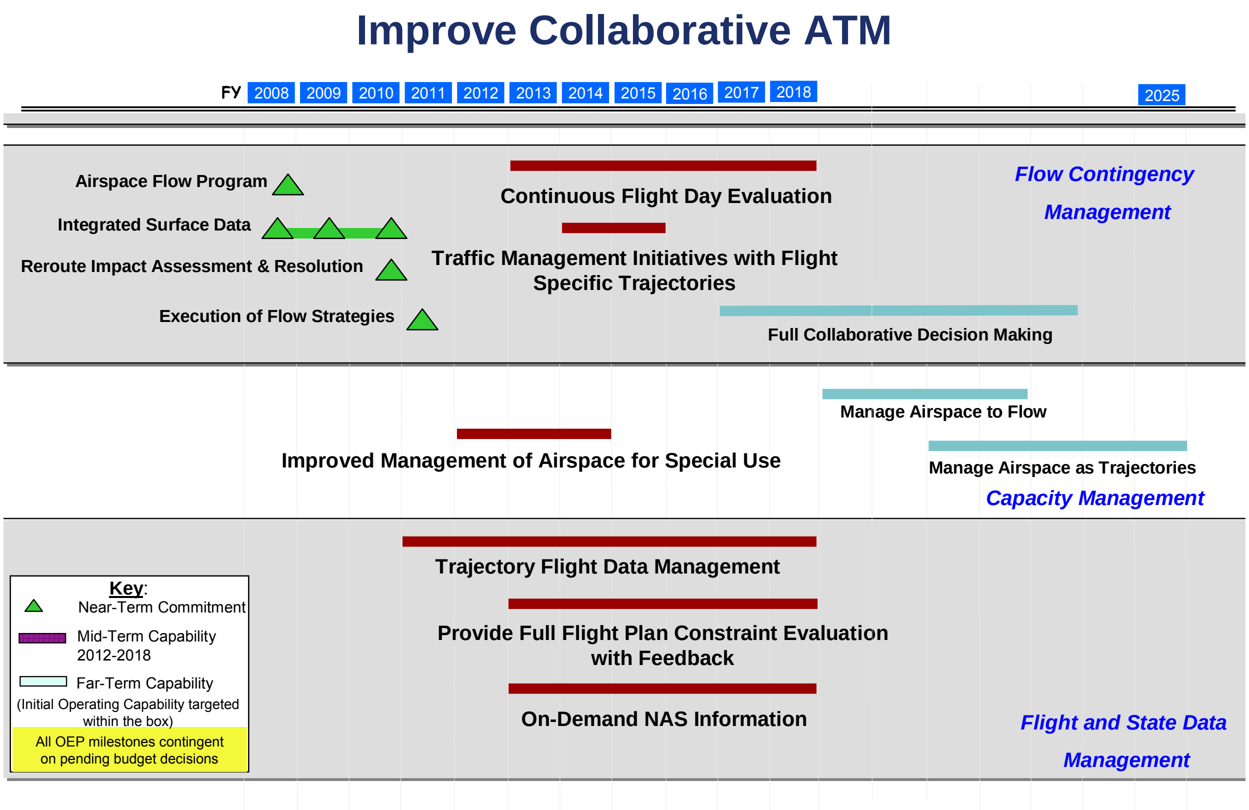
Current tools for managing Air Traffic Management (ATM) system demand and capacity imbalances are relatively coarse. Optimal solutions would minimize the extent to which flights are either over-constrained or under-constrained. Flight restrictions can unnecessarily interfere with optimizing operator efficiency and increase the cost of travel. Restrictions also inhibit operators from specifying a preferred alternative and constrain their involvement in resolving imbalance issues. The overall philosophy driving delivery of CATM services in the NextGen is to accommodate flight operator preferences to the maximum extent possible. Restrictions should be imposed only when a real operational need exists. If restrictions are required, the goal is to maximize opportunity for airspace operators to resolve them, based on their operational priorities.

Operational Capability Description:

The NextGen goal is for all airspace operators to be able to collaborate on ATM decisions. This information exchange will range from current large-scale flight operations centers with complete CATM automation tools to individual pilots with handheld personal computers. Individual pilots (personal users) will have appropriately scaled CATM collaboration access. To the extent possible, the affected air traffic control facility will make decisions fully aware of system wide NextGen implications. This will also include, to a greater extent than ever before, an increased level of decision-making by the flight crew and/or flight operations centers.

CATM will balance operator objectives and constraints with overall NAS performance objectives. To ensure that locally developed solutions do not conflict with overall goals or other implemented strategies, decision-makers will look to NAS-wide objectives and test solutions to identify interference and conflicts with other initiatives.

Timeline:



NextGen Implementation Plan (June 2008)

Required Investments:

"Continuous Flight Day Evaluation" will improve air traffic management by incorporating real-time information on operational constraints so that both FAA and users will be able to assess and readjust flight plans to take advantage of the most favorable routings. Current systems are incapable of rapidly updating information on constraints that affect the route of travel. Investments that support this capability include ERAM Release 3, Aeronautical Information Modernization (AIM) Segment 1, Collaborative Air Traffic Management Technologies (CATMT) Work Package 2, and the System Wide Information Management (SWIM) Segment 2.

The current automation systems do not support flight-specific assignment of trajectories for traffic flow purposes. The "Traffic Management Initiatives with Flight Specific Trajectories" will be capable of preparing these types of trajectories so that Command Center or center Traffic Management Units can offer the best routings to individual flights based on up-to-date information on the status of the NAS. This capability will depend on implementation of ERAM releases 2 and 3 and CATMT Work Package 2.

“Improved Management of Special Use Airspace” will upgrade the flow of information on the status of this airspace so that users have current data on when civilian flights can use this airspace. Large blocks of airspace are reserved for military operations and other special uses. When portions of this airspace are not in active use and proper coordination is completed, civil aircraft may have access to this airspace. Opportunities to use this airspace are currently inhibited by limitations on sharing this information. This improvement will depend on implementing Aeronautical Information Management (AIM) Modernization Segment 1.

“Trajectory Flight Data Management” will provide current flight data, including aircraft location information that all air traffic facilities and authorized users can access. Current systems cannot provide the flexibility for every facility to alter a trajectory when circumstances change and a rerouting is required. This system will allow continuous monitoring of air traffic and allow more rapid and efficient rescheduling of trajectory-cleared routes as needed. In addition to ERAM, AIM, and CATMT improvements, this capability requires developing requirements for Flight Object data systems.

“Full Flight Plan Constraint Evaluation” will inform pilots of any expected limitations on their planned route of flight as they file their flight plans. This information will be up to date so that pilots will not have to plan for a less-than-optimal route to accommodate constraints that are no longer in effect. Current systems use planning data instead of actual data, and upgrading to dynamic data collection will improve efficiency of flight and adjustment of workforce. This capability will require AIM, CATMT Work Package 2, and the ERAM mid-term work package.

“On-Demand NAS Information” will be available to all users who are equipped to receive it and who request it. This will assist pilots in flight planning and allow them to monitor weather and traffic conditions when they are airborne. This will allow for more efficient planning and accelerate the process for changing routes when unpredicted weather requires a diversion. This capability requires ERAM Release 3, SWIM, and AIM.

3.5 Reduce Weather Impact:

Summary Description:

Reduce Weather Impact (RWI) is a planning and development portfolio to ensure NextGen operational systems take advantage of a broad range of weather detection and forecast improvements and technologies to mitigate the effects of weather in future NAS operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. These elements combined will provide improved, consistent weather information that can be integrated into air traffic decision support tools that will enable more effective and timely decision making by both Air Navigation Service Providers (ANSP) and users. These improvements will support meeting future capacity, efficiency and safety objectives. They enable FAA and users to share a common understanding of the forecast of future atmospheric conditions, and they support traffic flow management for trajectory based operations and provide for improved weather avoidance.

Weather plays a significant role in all NAS operations. RWI is one of several complementary and interrelated weather investments that will build integrated capabilities for the future. RWI will address improvements in weather observation quality and facilitate integrating weather forecasts into user decision support tools. Advanced weather forecast research is conducted under the Aviation Weather Research Program (AWRP), and RWI will transition these AWRP efforts into operational use. The NextGen Network-Enabled Weather (NNEW) transformational program will provide universal common access to weather information through the 4D Weather Data Cube. Weather Technology in the Cockpit (WTIC) research program will develop weather improvements suitable for in-flight operational decision making. Collectively the projects in the NextGen portfolio will result in weather information being integrated with, and supporting NextGen decision-oriented automation capabilities and human decision-making processes, rather than just being displayed, which requires cognitive interpretation and impact assessment, which limits the ability to significantly impact delays.

Background:

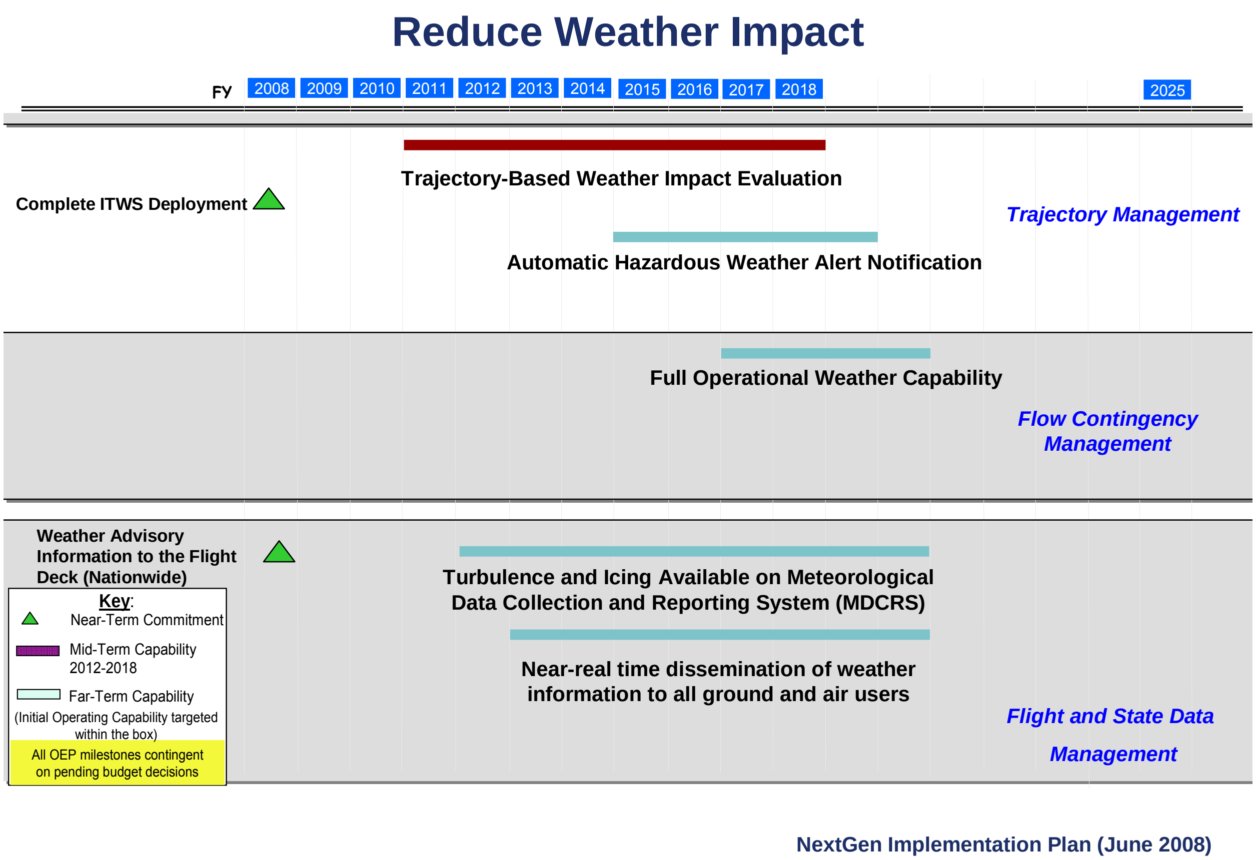
In today's NAS, weather is responsible for 70% of delays over 15 minutes and contributes to 24% of accidents and 34% of fatalities. Estimates have been made that up to two-thirds of weather delays are avoidable. Despite a continuous flow of improvements aimed at providing better weather information, the significant impact of weather on aviation remains. Weather is the most significant factor causing delays and impacts safety of NAS operations. Impacts on aviation operations will increase as air traffic levels grow in the NextGen era.

Weather information is needed for aviation decisions, which range from planning individual flights to the management of airspace at individual terminals and management of overall NAS capacity. Collaboration among the ANSP and users is required to mitigate the constraints resulting from adverse weather. Today, Air Traffic Management (ATM) units, airline Flight Operations Centers (FOC) and flight deck operational decision makers' collaboration on weather is somewhat ineffective because weather information today doesn't meet users' needs for every strategic and tactical decision. The current procedures for making these decisions are labor intensive, and rely on multiple weather inputs to obtain the required decision. The system is not optimized to support decision makers and it has gaps in both weather observation and dissemination of current weather conditions and forecasts, as well as deficiencies in those forecasts regarding their accuracy and consistency with other forecasts.

Operational Capability Description:

Advances in weather information content and dissemination will provide users and/or their automated decision support systems with the ability to better predict specific weather impacts for individual airframes on planned operations (e.g., trajectory based operations and arrival/departure planning). Users will have access to weather information that helps them assess when re-planning or re-routing actions are needed. This customized weather information will be integrated into tactical and strategic decision support tools developed under the TBO, CATM, Flexible Terminal, and High Density Terminal solution sets. These tools will assess the risk for weather impacts on flights/trajectories, and provide candidate actions to the ANSP that mitigate impacts on safety and traffic flow.

Timeline:



Required Investment:

Most improvements to reduce weather impact are mid and long term. The capabilities on the chart above build the weather infrastructure needed for improvements such as trajectory-based operations. As the NAS shifts towards management by trajectories, there will be a high reliance on weather data to improve path and time predictions in the determination of an actual trajectory agreement that accounts for traffic congestion and weather. In addition, operators and the air traffic controllers will need accurate predictions of the impact of weather on the currently planned trajectories to negotiate reroutes if adverse weather conditions arise after the flight is launched. To support trajectory-based operations, we will need to implement NextGen Network Enabled Weather (NNEW), the Next Generation Weather Processor, System-Wide Information Management (SWIM), and ERAM Release 3.

"Reduce Weather Impact" specific investments will assess the shortcomings of existing weather sensors, develop better sensors, and expand the sources of weather data. There will also be significant investments in new forecast algorithms to predict turbulence and icing conditions more precisely. Implementing trajectory-based operations will require more specific weather forecasts in real time. Investments in the NextGen Network Enabled Weather (NNEW) and the

NextGen Weather Processor will result in better sharing of weather information and more accurate, timely and tailored forecasts.

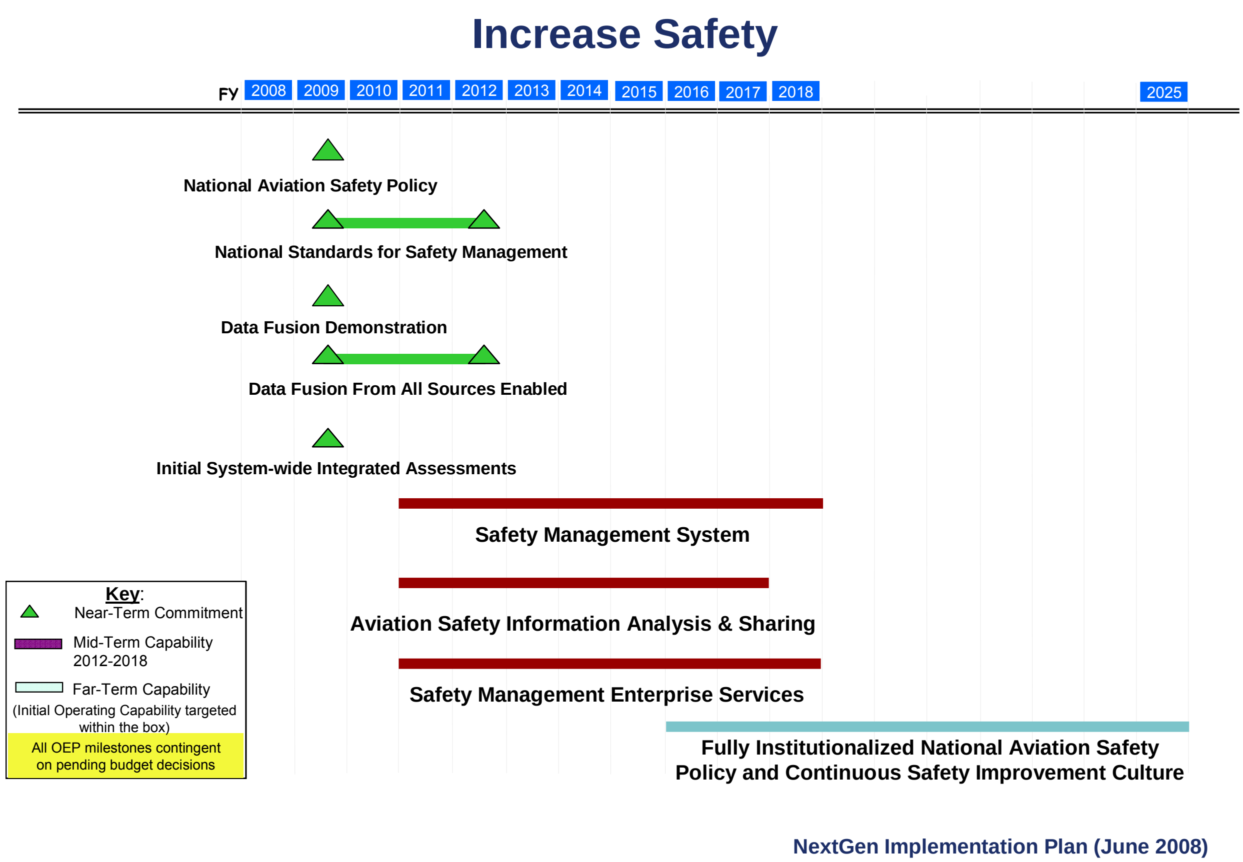
3.6 Increase Safety, Security, and Environmental Performance

Safety:

Summary Description:

Safety is FAA's highest priority. NextGen will emphasize integrating safety into the design and development phases. There are many operational programs in the FAA that address improving current safety performance. Since NextGen will be implementing new systems, the FAA has the opportunity to identify risks before installing them. This is consistent with the philosophy of the Safety Management System, which is used to carefully review both new equipment and the procedures to ensure that we have identified the safety risks and taken steps to eliminate them. We will interweave safety analysis with every initiative that is part of the NextGen effort.

Safety Timeline:



Required Investment:

To successfully implement the NextGen improvements, we must use a consistent and proactive safety management approach that incorporates advanced prognostic methods to forecast safety risk potential and encourages information sharing without fear of retribution. The *Safety Management System* creates a disciplined approach to understanding risk and developing systems that minimize that risk. We will analyze risk and design all the new systems to eliminate identified safety problems.

The *Aviation Safety and Information Analysis and Sharing* (ASIAS) system will integrate and share high-quality, relevant, and timely aviation safety information that is critical to the operational success of the Safety Management System. We are demonstrating data fusion from other safety databases in 2009 to support ASIAS, which should be fully operational in 2012. Implementing ASIAS will improve our ability to identify future safety risk, conduct a causal analysis of those risks, and recommend solutions for the commercial aviation sector. By developing new analytical techniques and leveraging state-of-the-art information technology, the FAA and its industry partners will be able to monitor effectiveness of safety enhancements by establishing baselines and examining trends for safety metrics to identify emerging risks.

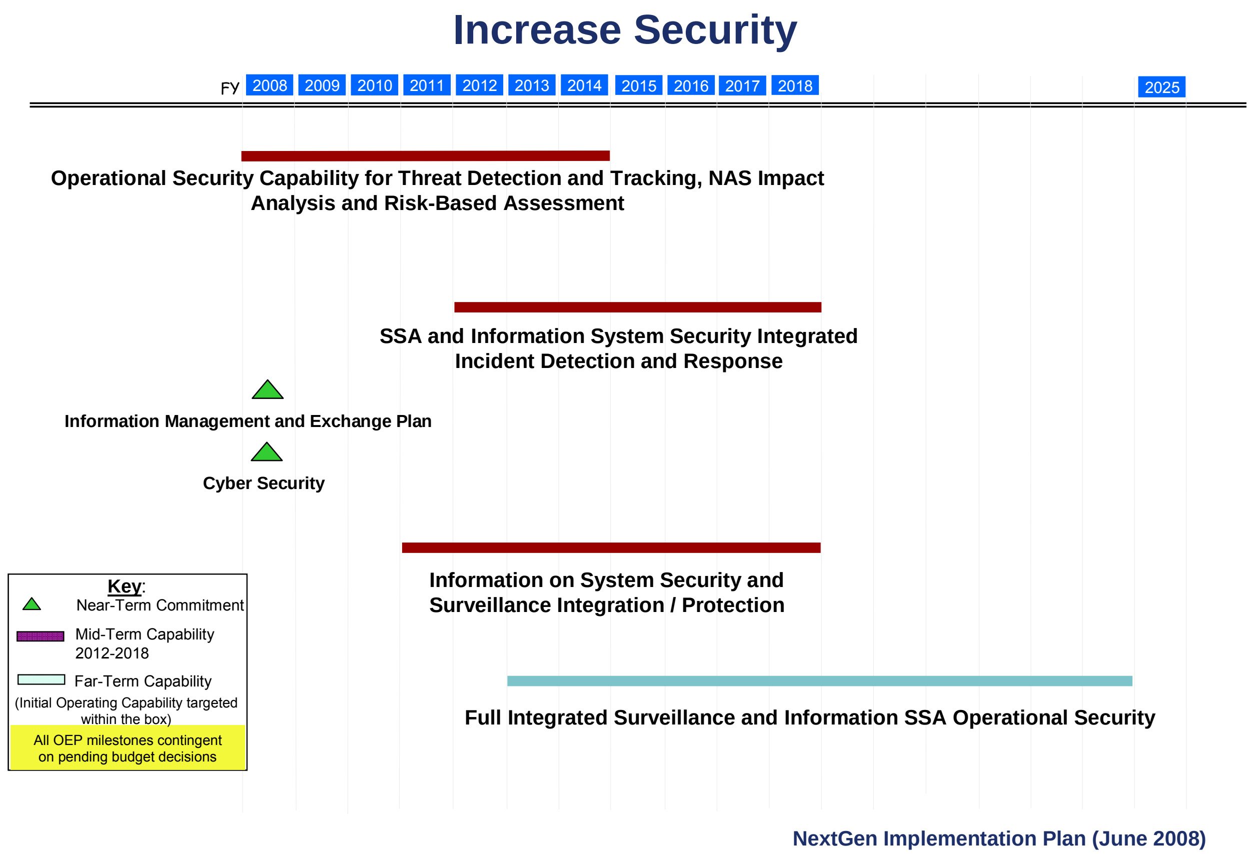
Safety Management Enterprise Services will provide the ability to evaluate the performance of individual systems and their impact on overall system risk. The combination of individual assessments and integrated analysis will support the goals of the Safety Management System.

Security:

Summary Description:

Security is necessary for all aspects of NAS operations. The FAA has planned investments in both airspace and information security. Airspace security deals with protecting air traffic control, communication, and navigation facilities. Information security is already integral to the baseline of each NAS program, and we have designed information security processes and protocols into new equipment to protect FAA systems. The FAA will provide continuous upgrades as information security technology and best practices improve. The agency also must be part of the national response and recovery for events, such as natural disasters (e.g., hurricanes) and preparation for biological events (e.g., pandemic influenza).

Security Timeline:



Required Investment:

The *Operational Security Capability for Threat Detection and Tracking, NAS Impact Analysis and Risk-Based Assessment* initiative integrates information on flight-specific risk levels provided by the Department of Homeland Security and trajectory-based assessment algorithms in FAA equipment. Monitoring flights and identifying security concerns early are essential for success in preventing terrorist actions.

The Security Integrated Tool Set (SITS) shown in the roadmap in the section 4.1 will enable the System Operations Security organization to perform data correlation, NAS impact analysis of security and/or emergency actions, as well as trend analysis. SITS will also support restricted airspace development and methods for sharing that airspace when it is not in use. We will seamlessly integrate these capabilities with Air Traffic Management systems and support defense, homeland security/disaster recovery, and law enforcement operations.

The *Shared Situational Awareness (SSA) and Information Security Integrated Incident Detection and Response* initiative is a cooperative effort among the FAA and other agencies to detect and correlate attempted information system intrusions so that the agencies can take actions to prevent them. We and other agencies have intrusion detection systems and Cyber Security Response

Centers that rely on timely reporting and cooperative efforts to identify and defeat attempted intrusions.

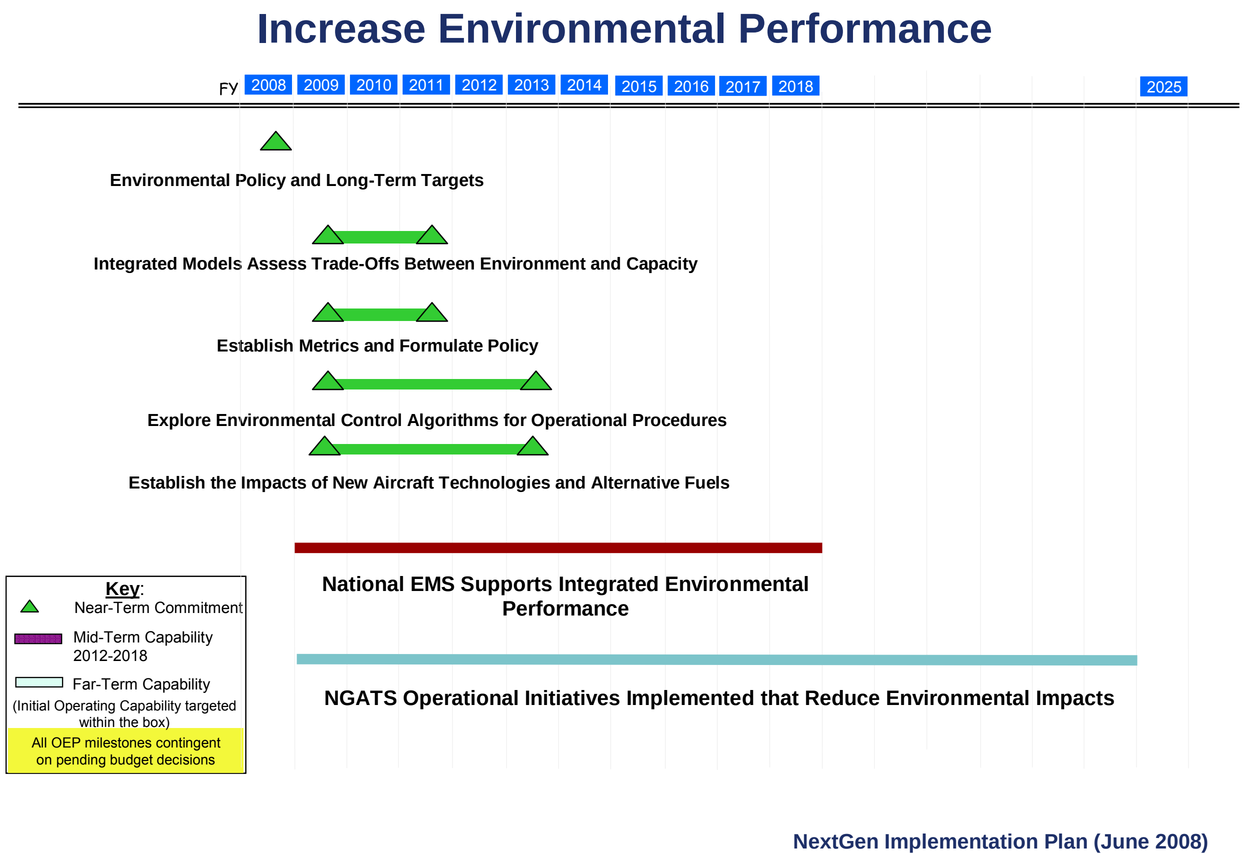
The *Information on Systems Security and Surveillance Integration/Protection* program processes and integrates surveillance information, which enables us to construct effective defenses to prevent disruptions of agency information systems.

Environment:

Summary Description:

Increased attention is being directed at aviation's impact on the environment — not only regarding longstanding noise and air quality impacts, but also in the important new areas of global climate change and energy consumption. Although aviation has been a relatively small source of emissions and has made significant strides in lessening its environmental "footprint," the anticipated growth in air transportation demand will increase pressure on aviation to reduce emissions and fuel consumption. NextGen investment planning must factor in changes in fuel use, emissions, and noise caused by operational improvements — both positive and negative. Fuel consumption is also a concern because of the long-term outlook for fuel prices. The FAA must carefully examine the environmental consequences of its actions and strive for improvements.

Environmental Timeline:



Required Investment:

Several efforts are already underway, as the first five lines on the chart above show. Although operating funds support many of these efforts, we will require continued capital investment to develop environmental policy, build models, establish metrics, and construct algorithms to determine the impacts of new aircraft technologies, aviation alternative fuels, and air traffic control procedures.

To achieve NextGen, we must proactively address environmental and energy impacts of the solution sets by integrating environmental protection objectives and requirements into core and business and operational strategies. A comprehensive Environmental Management System framework will provide the foundation and facilitate identifying environmental aspects and impacts of new operational procedures and help formulate and implement targets and plans to achieve environmental improvements.

3.7 Transform Facilities

Summary Description:

NextGen redesigns air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. Infrastructure, automation, equipage, procedures, and regulations will be designed to support this seamless operational concept and must evolve from a geographical focus to a broader air traffic management concept. This includes facilities and the personnel who staff them.

To address this, the Facilities component of NextGen focuses on optimization of air navigation service provider (ANSP) resources. This includes the establishment and decommissioning of facilities, changes to the numbers and sizes of control facilities, and thinning/eliminating other facilities such as navigational aids. It also includes the allocation of staffing and facilities to provide expanded services; service continuity; best deployment, management, and training of the workforce; and the use of more cost-effective and flexible systems for information sharing and back-up.

Because of the net-centric capabilities and the geo-independence that NextGen provides, facilities do not require proximity to the air traffic being managed. Facilities will be sited and occupied to provide for air traffic management facility optimization. This includes combining facilities (e.g., air route traffic control centers (ARTCCs), terminal radar approach control (TRACONs), and air traffic control towers (ATCTs) towers when appropriate.

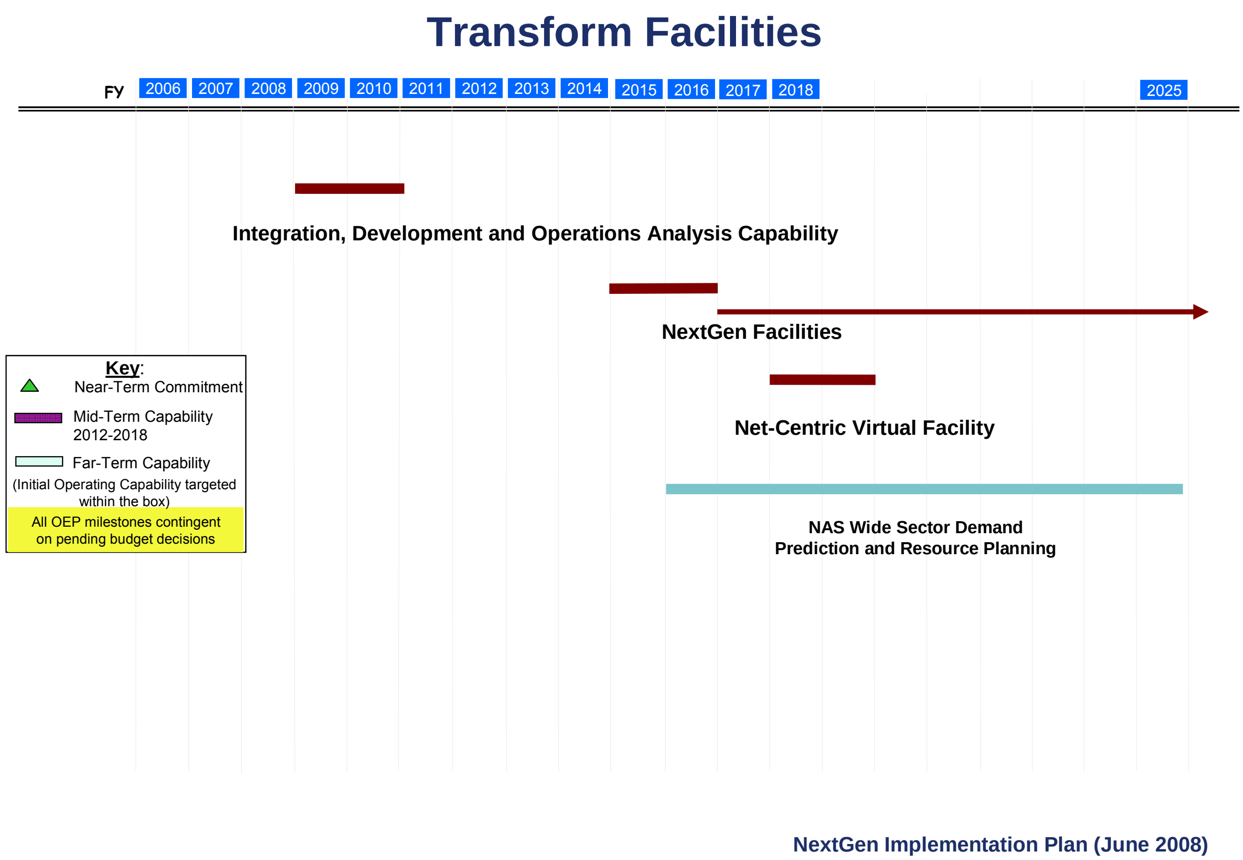
Background:

Today's air traffic system was built around 1960's radar technology and is constrained by its limitations. This geo-dependent model (communication constraints, hardware/software limitations, and available data distribution capabilities) dictated how many facilities were needed and their location. As a result of these limitations, the number of terminal and en route air traffic control facilities has grown to over 500. Security concerns, including location-based risks, distributed infrastructure constrained by legacy architecture, and disparate automation platforms, further challenge the air traffic control infrastructure. This results in operational inefficiencies, including capacity limitations and less than optimal business continuity planning (BCP) strategies. In addition, many of these facilities have aged to the point where repair and remediation is not cost effective.

To facilitate NextGen, handling increased traffic in the future while managing costs, improving and expanding services, and transforming FAA en route and terminal facilities to facilitate NextGen operational improvements is necessary. The current system has built-in limitations in flexibility, cost of service delivery, and continuity of operations. Some smaller airports have limited service due to its cost; creating a need to determine how to provide service in these locations, while reducing costs. Air traffic management facility optimization is needed to fully realize NextGen benefits.

Flexible infrastructure service delivery is needed to meet changing user needs and cost-effectively scale services up and down as needs change. This will ensure that the service providers and the information (e.g., flight data, surveillance, weather) are readily available when and where needed.

Timeline:



Required Investment:

Investment analysis regarding facility infrastructure will help frame the decisions concerning how to transform facility infrastructure to best accommodate NextGen capabilities. After the analysis is complete, funds will be requested to transform aging facilities into NextGen Facilities. Initial plans show a segmented implementation of NextGen Facilities and whether sets of facilities will be renovated, rebuilt or reconfigured.

Additionally, FAA plans to research and develop a Net-Centric Virtual Facility and convert some towers to this type of operation. A Net-Centric Virtual facility will depend on sensors at the airport to provide controllers at remote locations sufficient information to control traffic.

4 Enterprise Architecture Roadmaps

The detailed roadmaps appearing in the following sections are an integral part of the NAS Enterprise Architecture. The roadmaps show progression from the present system to NextGen. The roadmaps extend planning beyond the 5-year financial horizon covered in the CIP, and the transition to NextGen will be an incremental process over several years. Transforming the NAS to NextGen will require detailed engineering design to support new capabilities, and integration of operational changes that we must demonstrate and test. Some NextGen improvements will not receive funding until after the 5-year timeframe of the CIP, but projects that are foundational technologies for NextGen will have substantial funding during the next 5 years.

We update the roadmaps frequently to reflect the results of studies, demonstration projects, and economic analysis related to projects. Because of that, we do not attempt to explain all roadmap details. The purpose of including the roadmaps in the CIP is to show the full scope of long-term planning for system modernization. The funding tables at the end of each roadmap section contain both projects that are shown in the roadmap and those projects that are included in an overall FAA Enterprise Architecture which includes some projects that are not directly related to air traffic control. All projects with estimated funding over the next five years except very small and labor related projects are described in Appendix B. For more detailed information on the roadmaps, view the Enterprise Architecture and Roadmaps at: http://www.nas-architecture.faa.gov.

Figure 4 defines the roadmap symbols. The dashed lines indicate that a system may be eliminated after economic and operational analysis is complete. The solid lines indicate either the continued operation of an existing system or the progression from a current system to a more capable or modernized system. The boxes with names identify systems, which are either described in the text or are the acronym is spelled out in appendix E with the systems' full name.

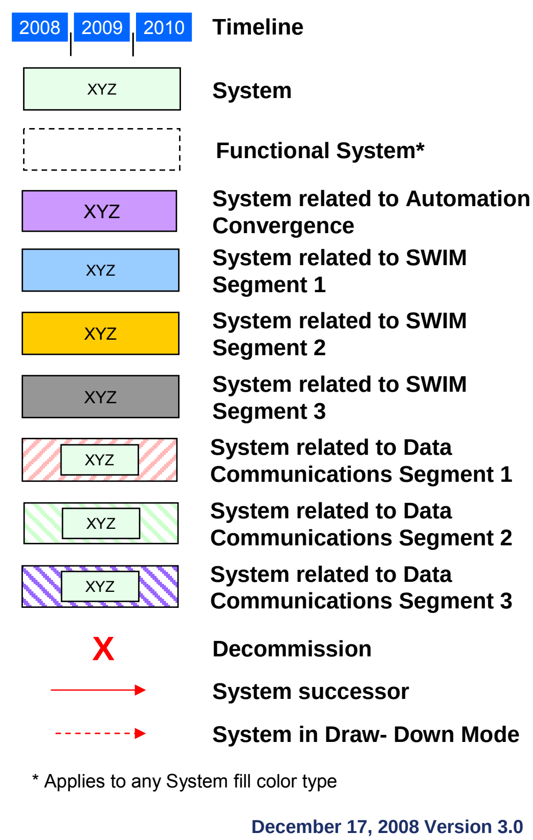


Figure 4 Roadmap Legend

4.1 Automation Roadmap

Automation is a core element of the air traffic control system. Controllers require a real-time display of aircraft location as well as information about the operating characteristics of aircraft they are tracking — such as speed and altitude — to keep the approximately 50,000 flights safely separated every day. Automation gives controllers continuously updated displays of aircraft position, identification, speed, and altitude as well as whether the aircraft is level, climbing, or descending. Automation systems can also continue to show an aircraft's track when there is a temporary loss of surveillance information. It does this by calculating an aircraft's ground speed and then uses the ground speed to project its future position.

Other important features of automation include the following:

- It maintains flight information and controller-in-charge data from pre-flight to post-flight analysis, which supports coordination between air traffic controllers as they hand off responsibility of the flight from tower to terminal to en route sector.
- It generates symbols displaying information on routes, restricted areas, and several other fixed features of the controller's sector.
- It uses software that further enhances safety by providing automated alerts to controllers regarding potential aircraft conflicts and warnings that an aircraft may be approaching a terrain hazard.

- It supports many functions that are essential to controlling air traffic, such as showing the data from weather sensors, giving the status of runway lights and navigational aids, and providing flight plan information on monitored aircraft.

The automation roadmaps in figures 5 and 6 depict the planned architecture from 2008 to 2025. The FAA will upgrade and ultimately replace current systems with more capable systems that can manage the levels of air traffic we predict for the future. These newer systems and the enhanced software will allow controllers to use airspace more efficiently and offer more sophisticated services, such as early approval of direct routes. They will also allow better allocation of workload among facilities.

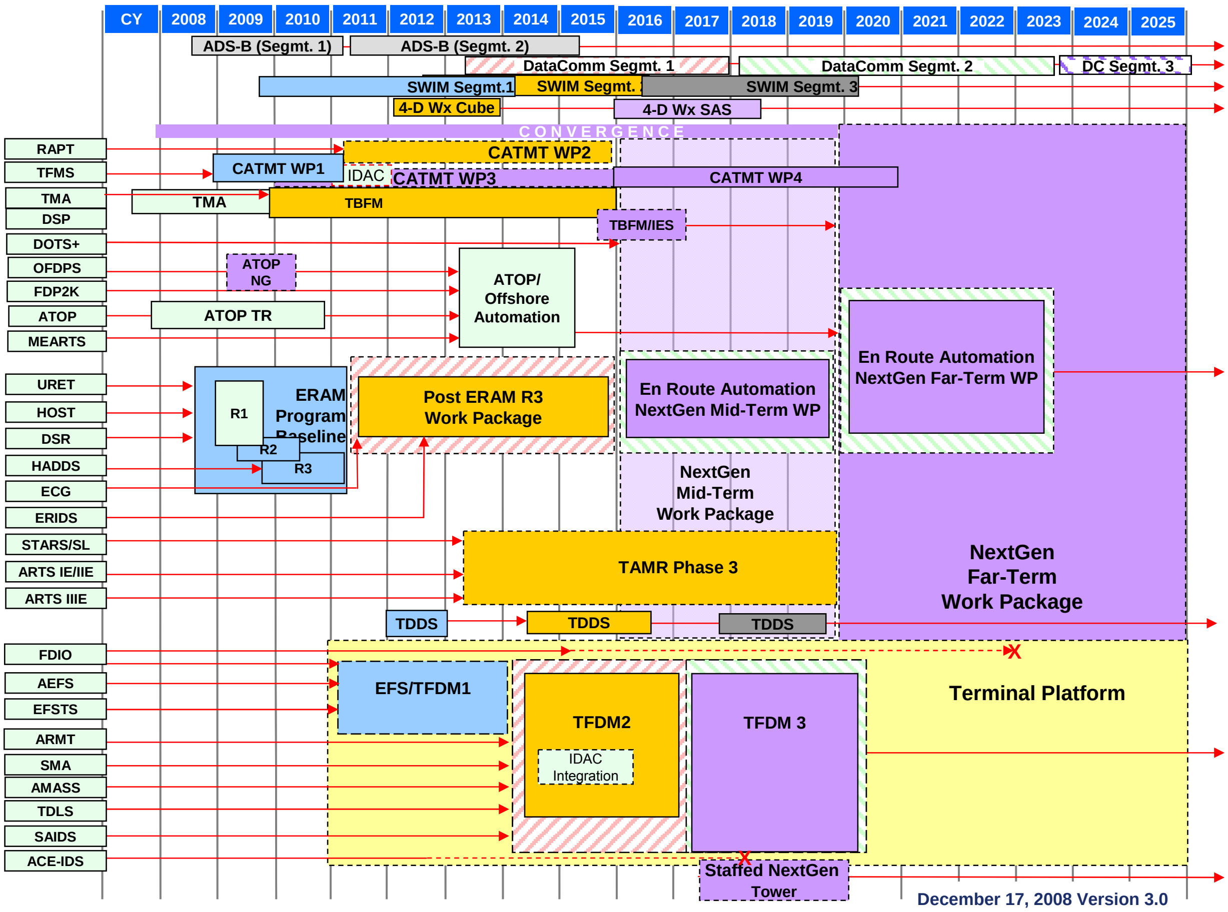


Figure 5 Automation Roadmap (1 of 2)

Enabling technologies for NextGen appear at the top of the automation roadmaps: System-Wide Information Management (SWIM), Data Communications (DataComm), Automatic Dependent Surveillance-Broadcast (ADS-B), and 4D Weather (Wx) Cube systems are central to collecting and sharing information used throughout the NAS. They transmit and receive critical information to support air traffic control in both the en route and terminal environments. When the 4D Weather Cube is fully developed it will be the Single Authoritative Source (SAS) for weather data, so the same data is available to both FAA and users to assist in making decisions. Collecting and sharing data is essential to improving NAS efficiency because it provides common ground for all parties participating in making the decision.

The first grouping on the left side of the roadmap contains the systems used for traffic management, such as Traffic Flow Management System (TFMS) and Traffic Management Advisor (TMA). The systems are installed at the Air Traffic Control System Command Center (ATCSCC), en route centers, and busy terminal control facilities. They are used to analyze future demand for en route and terminal services and strategically plan for how to best accommodate that demand. They use real-time displays of aircraft in flight and weather affecting aviation to assess which routes are best and to prevent severe congestion at airports. These functions will continue and be improved as described in the Collaborative Air Traffic Management (CATM) NextGen solution set, with expansion of collaboration to individual pilots and improvements in the information exchanged between the FAA and airline dispatch offices.

The next grouping on the left side is the oceanic control projects. They are the automation systems (OFDPS, MEARTS, FDP2K, and ATOP) that process data regarding the position of oceanic flights to aid controllers in separating flights that the FAA controls in the oceanic areas. The DOTS+ system uses weather information to determine the most fuel-efficient routes based on wind velocity and direction. The FAA will consolidate all of these systems into the Advanced Technology Oceanic Procedures (ATOP) system when ATOP receives a technology refresh; and the FAA plans to decide in 2015 whether to continue ATOP after that time or fold its functionality into the NextGen Mid-Term Work Package.

The next six blocks on the left side are components of the en route control system, which the FAA is replacing with the En Route Automation Modernization (ERAM) program. ERAM replaces hardware and rewrites the ATC software used at en route centers. ERAM is being tested at the first operational site, and it is scheduled to be operational at all en route control centers by 2011. Its initial purpose is to modernize ATC automation systems and expand capacity. After that has been done, the later releases of the ERAM software are necessary to initiate Trajectory Based Operations. As the roadmap shows, the FAA will transform ERAM over time into a NextGen Automation System that will address both en route and terminal automation requirements.

The next three systems (STARS/S L, ARTS 1E/IIE, and ARTS IIIE) are different terminal automation models that the FAA will sustain as separate systems, and the Terminal Automation Modernization and Replacement Phase 3 (TAMR P3) program will replace and modernize STARS and/or ARTS systems until the agency eventually consolidates them as part of the NextGen Work Package.

Tower Flight Data Manager (TFDM) will be a phased implementation of a new Terminal local area network (LAN)-based infrastructure targeting reduction of redundancies, integration of flight data functions, and providing System Wide Information Management (SWIM) enabled flight data exchanges with other National Airspace System (NAS) subsystems. TFDM Phase 1 is the initial capability that will integrate Flight Data Input/Output (FDIO), Advanced Electronic Flight Strip (AEFS) and Electronic Flight Strip Transfer System (EFSTS), while TFDM phase 2 will integrate the Airport Resource Management Tool (ARMT) and the Tower Data Link Services (TDLS) function. Trade studies will identify if additional elements will be integrated, such as Departure Spacing Processor/Departure Flow Management (DSP/DFM), Automated

Surface Observing System (ASOS) Controller Equipment-Information Display System (ACE-IDS), and System Atlanta Information Display System (SAIDS).

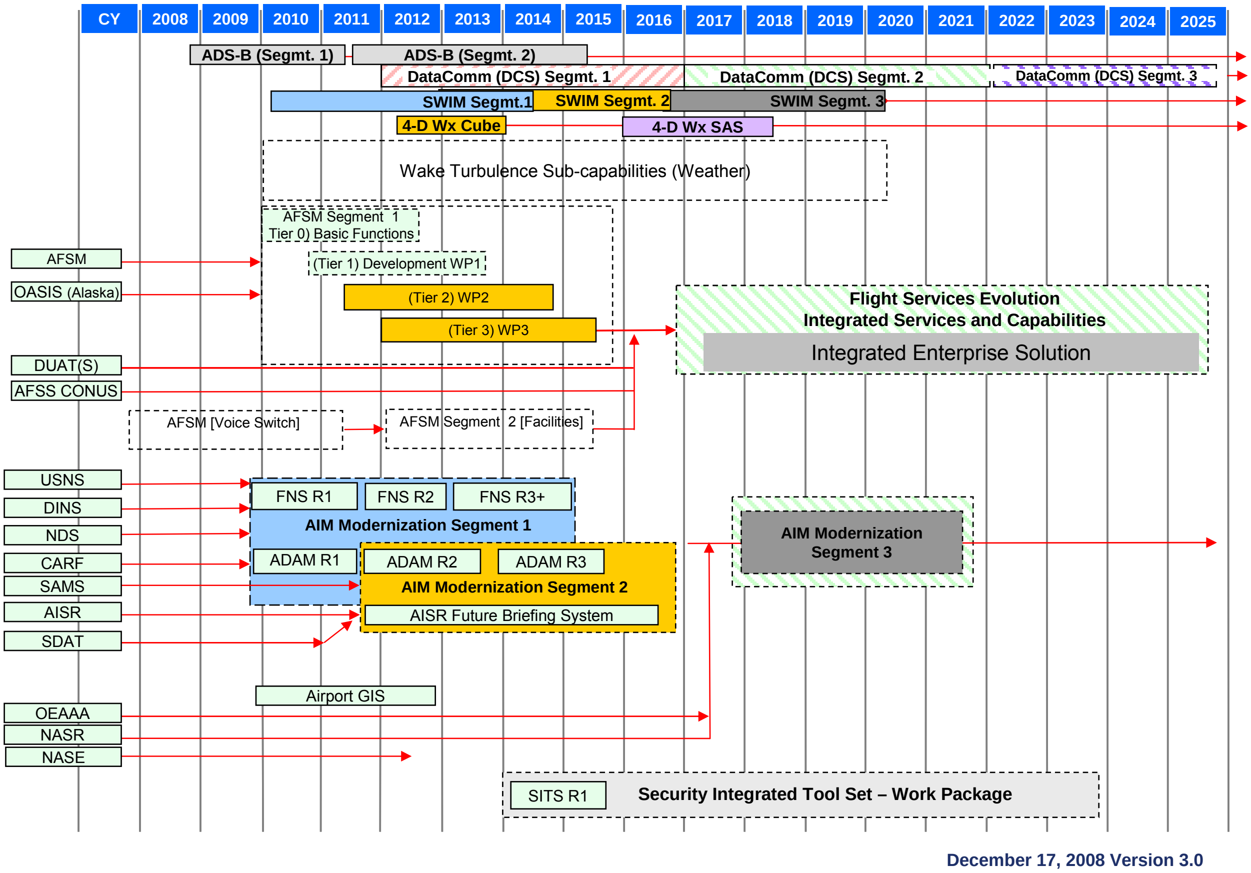


Figure 6 Automation Roadmap (2 of 2)

AFSM, OASIS (Alaska), DUATS, and AFSS CONUS on the top left side of Figure 6 support flight services. Flight services are generally used by individual pilots and include weather briefings and filing of flight plans. The FAA has contracted for flight services in the lower 48 states, and the contractor is responsible for upgrading equipment, such as flight service specialist workstations. The Direct User Access Terminals (DUATS) currently allow pilots to file flight plans and obtain weather information for their planned routes from flight service station automation systems. Flight service specialists use Flight Service Automation Systems (AFSS CONUS and OASIS (Operational and Supportability Implementation System) to record flight plans and provide weather briefings to pilots. The Alaska Flight Service Modernization (AFSM) project will replace the existing automation systems used in FAA-operated flight service stations. We will also request funding to upgrade the buildings and supporting equipment for Alaska's flight service stations.

The next 10 systems (USNS, DINS, NDS, CARF, SAMS, AISR, SDAT, OEAAA, NASR, and NASE) mainly provide status information on airports, airspace, and navigation facilities, but the

FAA uses some of them to evaluate airspace. A modernized and consolidated Aeronautical Information Management (AIM) system will replace these individual systems.

- USNS — United States NOTAM (Notice to Airmen) System,
- DINS — Defense Internet NOTAM Service,
- NDS — NOTAM Distribution System,
- CARF — Central Altitude Reservation Function,
- SAMS — Special Airspace Management System,
- AISR — Aeronautical Information System Replacement,
- SDAT — Sector Design and Analysis Tool,
- OEAAA — Obstruction Evaluation/Airport Airspace Analysis,
- NASR — National Airspace System Resources,
- NASE — NAS Adaptation Services Environment.

NOTAMs are notices of temporary changes, such as temporary flight restrictions and runway closures for construction. SAMS and CARF inform controllers when airspace ordinarily reserved for military use is available for civilian use. The other systems contain more detailed information about FAA air traffic control equipment or less frequently changed information such as charts and airspace regulations. The AIM program will establish a standard format and a user-friendly interface for finding the information related to a specific route of flight.

The Security Integrated Tool Set (SITS) is a security system that validates the identity and legitimacy of aircraft within or entering the NAS; it will be incorporated into the NAS in 2014.

Figure 7 shows projected CIP expenditures on automation roadmap projects.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Automation Functional Area	**$715.4**	**$741.8**	**$764.9**	**$715.0**	**$678.3**
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$33.8	$30.0	$30.0	$30.0	$30.0
1A08	Next Generation Air Transportation System (NextGen) - System Development	$66.1	$70.8	$100.2	$101.0	$119.1
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations	$63.5	$43.0	$32.0	$31.0	$28.0
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$51.8	$38.0	$33.0	$35.0	$35.0
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$44.6	$57.0	$53.0	$51.0	$44.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$64.3	$64.1	$45.2	$36.9	$18.0
2A01	En Route Automation Modernization (ERAM)	$171.8	$131.5	$130.0	$125.0	$129.0
2A02	En Route Communications Gateway (ECG)	$3.6	$16.3	$19.8	$18.5	$9.9
2A06	Air Traffic Management (ATM)	$31.4	$15.2	$8.5	$13.4	$8.1
2A11	Oceanic Automation System	$7.7	$9.8	$14.9	$12.1	$6.0
2A14	System-Wide Information Management (SWIM)	$54.6	$76.0	$22.5	$6.3	$3.9
2A18	Collaborative Air Traffic Management Technologies (CATMT)	$18.1	$49.5	$57.9	$66.8	$60.7
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$28.0	$32.0	$41.8	$42.0	$39.5
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$3.0	$20.0	$65.0	$75.0	$86.7
2B05	Terminal Automation Program	$9.6	$6.0	$2.5	$2.5	$2.6
2B15	Integrated Display System (IDS)	$7.0	$8.7	$8.8	$8.2	$8.2
2B18X	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)*	$0.0	$2.8	$2.4	$3.0	$3.0
2D08	Instrument Flight Procedures Automation (IFPA)	$7.9	$0.5	$2.2	$1.8	$2.0
3A02	Aviation Safety Analysis System (ASAS) - Regulation & Certification for Infrastructure System Safety (RCISS)	$10.5	$14.6	$22.5	$8.9	$11.5
3A07	System Approach for Safety Oversight (SASO)	$20.0	$23.4	$37.1	$31.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$8.1	$14.8	$17.2	$6.9	$16.0
4A10	Aeronautical Information Management (AIM)	$10.0	$17.8	$18.3	$8.3	$7.6

Figure 7 Expenditures in the Automation Functional Area[1]

Figure 7 shows funding for systems that are shown in the roadmaps as well as the following systems that are part of the overall FAA Enterprise Architecture and support the safety functions of FAA:

- Instrument Flight Procedures Automation (IFPA)
- Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS-RCISS)
- System Approach for Safety Oversight (SASO)
- Aviation Safety Knowledge Management Environment (ASKME)

The IFPA program automates the development of terminal approach and departure procedures. The other three systems support databases of safety information to assist safety inspectors in reviewing the performance of flight crews and companies that provide aviation services. All are ongoing efforts to increase the efficiency and effectiveness of Industry safety practices

4.2 Communications Roadmaps

Communication between pilots and controllers is an essential element of air traffic control. Pilots and controllers normally use radios for communication, but because control sectors cover areas that extend beyond direct radio range, they need supplemental links. Remotely located

[1] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

radio sites allow controller-pilot voice communications beyond normal radio range by transmitting messages received at a remote site to air traffic control facilities through ground telecommunication lines. If no ground links are available, satellite links can be used to connect pilots with controllers. To minimize the impact of losing a primary communication link, backup systems are necessary to provide continued ability to communicate when the primary systems fail.

In addition to communicating with pilots, controllers must communicate with controllers within their own facility and controllers in adjacent facilities. Voice switches in air traffic facilities allow controllers to select among the different channels they need to communicate with one another and with pilots. Figure 8 is the roadmap for modernizing these systems and the other system on the roadmap that transfer data to FAA facilities.

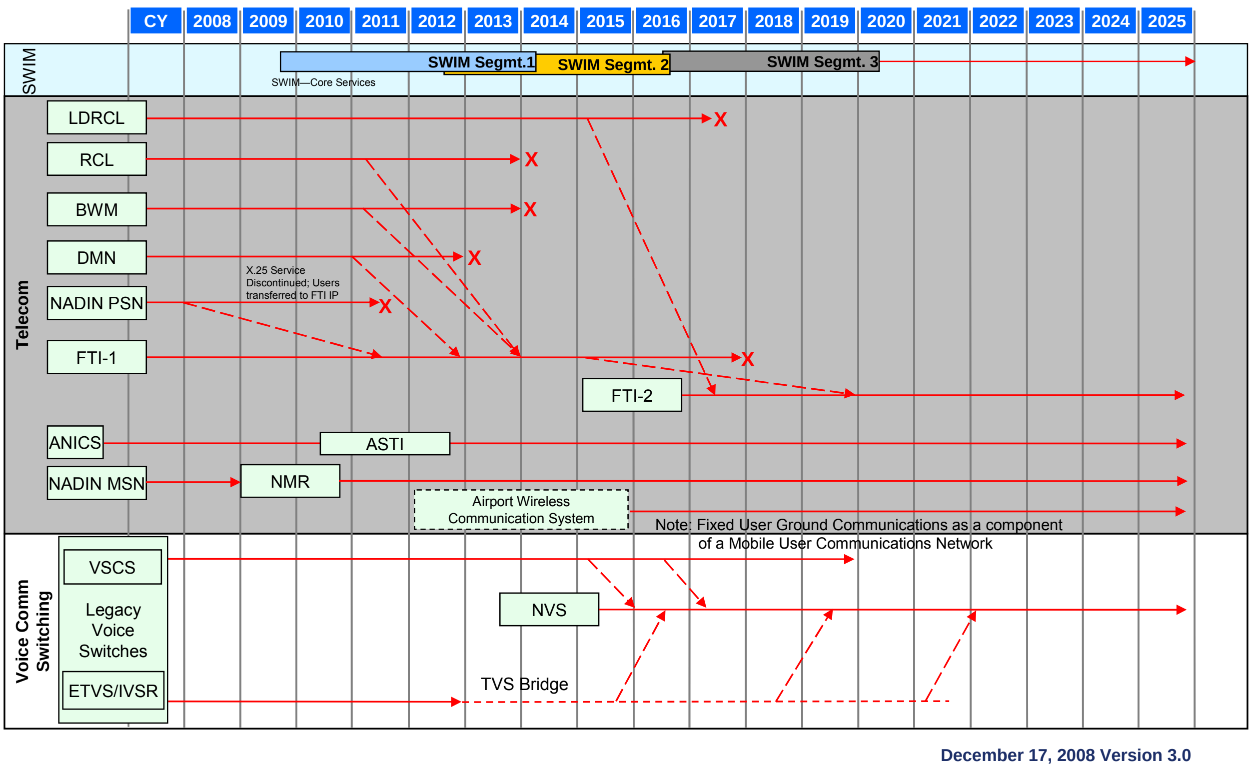


Figure 8 Communications Roadmap (1 of 2)

At the top of Figure 8 are the System-Wide Information Management (SWIM) program segments, which will establish information management and data-sharing capabilities to support NextGen. SWIM will develop policies and standards to support data management, along with the core services to enter data into NAS systems, retrieve it, secure its integrity, and control its access and use. The FAA is developing SWIM incrementally. Segment 1, the initial phase of SWIM, includes capabilities that were selected based upon the needs of various users (both government and private sector), maturity of design standards for concepts of use, and the ability of existing programs to integrate these SWIM capabilities into their program plans. Future segments will build on the initial steps to support the data sharing that NextGen programs require.

SWIM will reduce the number and types of interfaces between NAS systems, reduce unnecessary redundancy of information systems, improve predictability and operational decision-making, and reduce cost of service. The improved coordination that SWIM will provide will enable the FAA to transition from tactical conflict management of air traffic to strategic trajectory-based operations.

Below SWIM is a list of several FAA communication systems used mainly for transmitting data. The LDRCL (Low Density Radio Communication Link) and the RCL (Radio Communication Link) are microwave systems that transmit radar data from remote radar sites to FAA air traffic control facilities; they can also transmit operational and administrative information to and from air traffic control facilities. Current plans are to eliminate these systems by 2014 and use the FAA Telecommunications Infrastructure (FTI) to carry this data. The Band Width Manager (BWM) improves efficiency of information flow on the microwave network. It will not be needed when the FAA shuts down RCL and LDRCL. The NADIN PSN (National Airspace Data Interchange Network – Package Switching Network) and DMN (Data Multiplexing Network) transmit flight plans and other important aeronautical information to air traffic facilities. The DMN is a system that improves efficiency of message transmission by dividing messages into packages and sending packages from multiple messages at the same time to make fuller use of communication links. The packages are coded, and each message is reassembled at the receiving end. The FAA will replace NADIN PSN with NADIN MSN (Message Switching Network) to comply with international standards for transmitting flight plans. Some functions of NADIN PSN and DMN will be absorbed into the FAA Telecommunications Infrastructure and its follow on contract.

The Alaska National Airspace System Interfacility Communications System (ANICS) consists of ground stations that send and receive data from communications satellites to connect the operational facilities in Alaska. The ASTI (Alaska Satellite Telecommunications Infrastructure) program is a follow-on to ANICS, and it provides the same services while modernizing the infrastructure. Because there are far fewer ground telecommunications connections in Alaska, we use a satellite system to ensure that important air traffic information is reliably transmitted between smaller and larger facilities. Previous commercial satellite service did not meet FAA standards for reliability and availability.

The Voice Comm Switching block in Figure 8 shows the voice switching systems that FAA facilities use. En route centers use the Voice Switching and Control System (VSCS) to connect controllers with the appropriate telecommunications line to speak to pilots, controllers in other facilities, and controllers within their own facility. The Enhanced Terminal Voice Switch (ETVS) and the Interim Voice Switch Replacement (IVSR) contracts fulfill the same function in airport towers and Terminal Radar Approach Control (TRACON) facilities. The FAA is upgrading the VSCS with a technical refresh to replace components that have a high failure rate. The ETVS and IVSR programs are replacing terminal voice switches at the rate of about 10 per year, as well as installing new voice switches when new airport traffic control towers are built.

The FAA has begun developing requirements for the NAS Voice Switch (NVS), a single scalable design that would replace both center and terminal voice switches and equip NextGen facilities. It would have a modular configuration so that it could be sized for the facility in which it was installed. The value of using a single type of voice switch is that it reduces the number of training courses for maintenance technicians and the inventory of spare parts to maintain it. NVS also enables operation of planned NextGen facilities. The FAA plans to begin installing the system in 2013, and, by 2023, all the voice switches will be NVS.

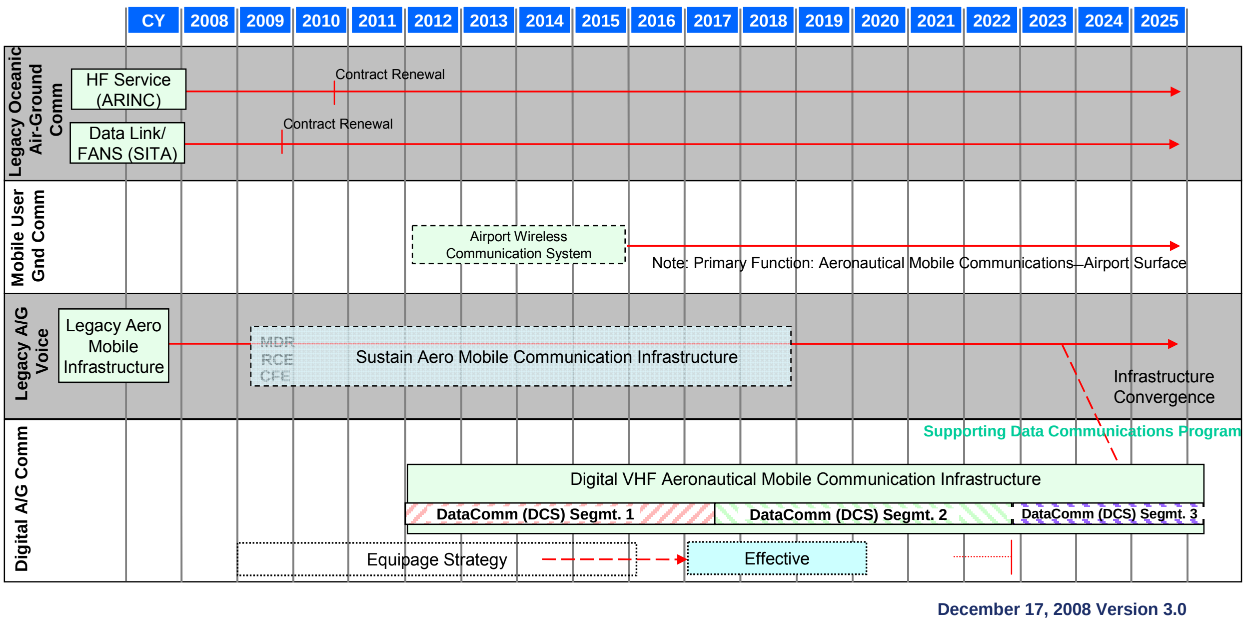


Figure 9   Communications Roadmap (2 of 2)

The second roadmap (Figure 9) shows the communications systems used both on the ground and in the aircraft for air traffic control. In the oceanic control area, the universal system is HF (high frequency) radio. Operated by a company named ARINC, HF allows the FAA to stay in touch with aircraft that are several thousand miles from shore. HF is supplemented by Data Link (FANS) Future Air Navigation System, which relies on communications satellites to transfer messages over long distances. The Legacy A/G (air/ground) Voice box indicates that FAA will continue to sustain the very high frequency/ultra high frequency (VHF/UHF) radios used for controller-pilot communications. The MDR (multimode digital radio) is replacing existing VHF/UHF equipment with modern systems capable of operating in either analog or digital modes. The RCE (Radio Control Equipment) program replaces the control system that allows controllers to activate and use radios at remote locations. The Communications Facilities Expansion (CFE) program funds establishment or relocation of remote communications sites when necessary to serve new or relocated air routes.

An Airport Wireless Communications System based on existing IEEE 802.16e standards is being considered to provide communications for both fixed and mobile units on the airport surface. This technology could be a low cost alternative for supporting existing and future applications associated with ASDE-X, ADS-B and SWIM in the airport environment.

Starting in 2009, the FAA will be developing digital communications with data link capability (DataComm) for pilot-controller communications. Initially, DataComm will be used for routine messages such as air traffic clearances, advisories, flight crew requests, and reports. As the technology matures, the FAA may be able to issue an entire route of flight directly to an aircraft's flight management system.

Figure 10 shows the projected CIP spending for replacing communications systems and improving and modernizing communications channels.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Communication Functional Area	**$215.4**	**$295.4**	**$354.8**	**$505.5**	**$823.7**
1A06	Data Communication in support of Next Generation Air Transportation System	$51.7	$132.8	$214.6	$389.5	$714.7
2A07	Air/Ground Communications Infrastructure	$8.6	$2.5	$2.8	$2.0	$2.0
2A10	Voice Switching Control System (VSCS)	$16.7	$15.9	$0.0	$0.0	$0.0
2A13	Next Generation VHF Air/Ground Communications System (NEXCOM)	$70.2	$60.5	$64.7	$52.0	$45.0
2B08	Terminal Voice Switch Replacement (TVSR)	$10.5	$0.0	$0.0	$0.0	$0.0
2B13	National Airspace System Voice Switch (NVS)	$26.6	$50.0	$50.0	$50.0	$50.0
2B14	Voice Recorder Replacement Program (VRRP)	$11.9	$9.6	$0.0	$0.0	$0.0
2E05	Alaskan NAS Interfacility Communications System (ANICS)	$9.0	$12.1	$10.7	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$10.2	$12.0	$12.0	$12.0	$12.0

Figure 10 Expenditures in the Communications Functional Area[2]

4.3 Surveillance

To provide separation services to aircraft, air traffic controllers must have an accurate display of all aircraft under their control. Controller displays use a variety of inputs, including radar and transponder information to show the location of aircraft. Automation systems process radar data and other inputs and send it to the displays. En route facilities use the Air Route Surveillance Radar (ARSR), and terminal facilities use several models of the Airport Surveillance Radar (ASR) as primary radars. The ARSR and ASR radars are primary because they do not require a cooperative transmission from an aircraft to detect and track its location. En route and terminal facilities normally use secondary radars called the Air Traffic Control Beacon Interrogators (ATCBI) and Mode Select (Mode S) for traffic separation. Secondary radar sends a signal to aircraft equipped with a transponder. The transponder sends a reply, which can be processed to determine the aircraft call sign, altitude, speed, and its position. Using ATCBI or Mode S enhances the controller's ability to separate traffic because flight and altitude information can supplement the position display for each aircraft.

We use two systems for tracking aircraft on or near the airport surface. The ASDE-3 is a primary radar system that provides a display of aircraft and ground vehicles in the airport operating areas (runways and taxiways). This helps controllers manage aircraft on the ground and warn them of potential runway incursions. The ASDE-X uses several technologies to improve detection of aircraft and provide a clear display of the positions of aircraft and vehicles on or near taxiways and runways.

[2] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

Figure 11 is the roadmap for surveillance systems.

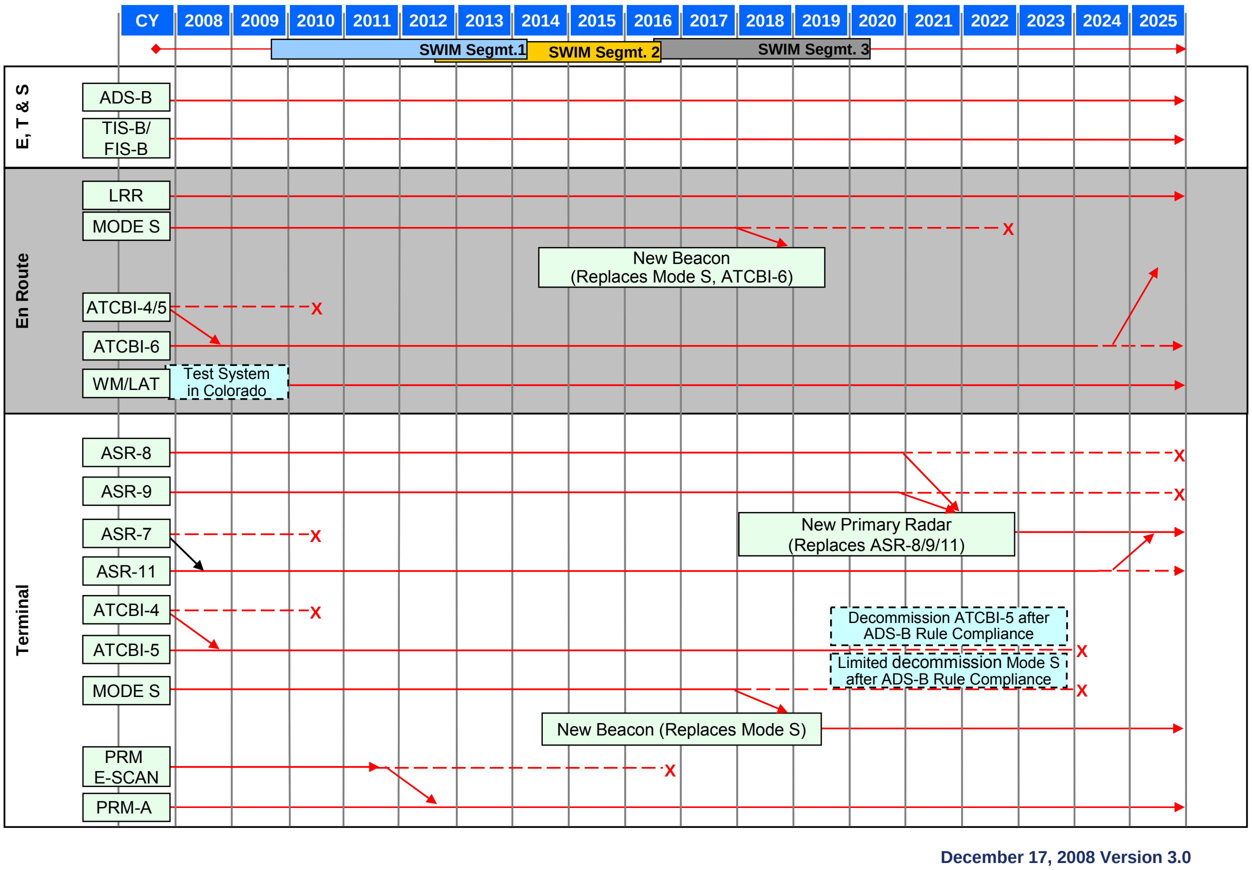


Figure 11 Surveillance Roadmap (1 of 2)

The Automatic Dependent Surveillance-Broadcast (ADS-B) line at the top of the roadmap indicates a planned shift toward a different technology for providing surveillance data to controllers. Nationwide implementation of ADS-B will enable a once-per-second transmission of location and other flight information from the aircraft to air traffic control facilities. It may replace or supplement the data from a transponder response or passive reflected energy from radars. The advantage of ADS-B is that it has a faster update rate (1 second versus 5 seconds for a radar), and the accuracy remains constant regardless of the distance from the aircraft to the receiving site, unlike radar technology where accuracy changes with distance from the radar.

The major systems shown in the block for en route are the Long Range Radar (LRR — a generic term for the various ARSR models); the Air Traffic Control Beacon Interrogator (ATCBI); and the Mode S. The LRR has a range exceeding 200 miles, and it provides aircraft location information to the en route centers. It is a "skin-paint" radar that sends out electrical pulses and determines aircraft location by combining information on the direction the antenna is pointing and the time it takes the reflected energy to return to the radar antenna. The ATCBI or Mode S transmits an electronic signal to aircraft, which triggers a transponder. The ATCBI triggers all transponders within its beam, while the Mode S is able to address each aircraft within its beam separately.

Due to national and homeland security concerns, we will maintain the LRR throughout the roadmap timeframe. The FAA and the Department of Defense will jointly fund the maintenance required to keep the existing systems operational. We are replacing the ATCBI 4/5 with the ATCBI-6 and plan to decommission the 4s and 5s in 2010. We may start phasing out the Mode S in 2017 and decide in 2011 whether we need a New Beacon system to support NextGen.

The Wide Area Multilateration (WM/LAT) system is experimental, and is being tested in Colorado. The system uses triangulation, based on ADS-B technology, to determine the location of an aircraft that cannot be detected by radar. In mountainous terrain, the line-of-sight transmission from radar can be blocked by an intervening mountain between the radar and the aircraft; the WM/LAT system overcomes this problem. It is being locally financed and may be implemented in other mountain regions if it proves to be successful.

There are four models of terminal radars currently in use. The Airport Surveillance Radar Model 11 (ASR-11) is the newest, and it is replacing some of the older radars that were not replaced by the ASR-9 program. As shown in the roadmap, the FAA will replace all the existing ASR-7s by 2010. The ASR-8 and the ASR-9 will have Service Life Extension Programs (SLEP) to update and modernize their components, and the FAA will decide in 2014 whether to continue to update these systems or to design a replacement. Current planning calls for keeping terminal skin-paint radars operational to address safety and weather requirements.

The Precision Runway Monitor (PRM) is installed at six airports, and it can be used to allow simultaneous approaches to closely spaced parallel runways. It is a rapid-update radar that provides the precision that controllers need to ensure two aircraft approaching runways side by side maintain safe clearance between them. The electronic scan (E-SCAN) version achieves the rapid update by moving the beam electronically rather than relying on a turning antenna. The FAA will decide in 2010 whether to continue using a scanning beam or to rely on multilateration similar to the ASDE-X.

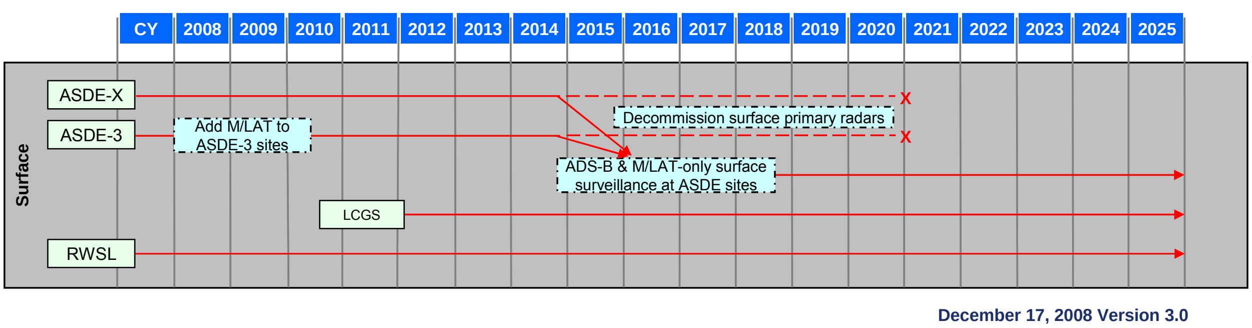


Figure 12 Surveillance Roadmap (2 of 2)

Controllers use two systems to maintain aircraft separation on the airport surface. Some airports have ASDE-3, which uses radar and a display in the tower to depict the location of aircraft on or approaching the taxiways and runways. These displays help controllers determine aircraft location when weather or darkness makes it difficult to see the airport surface. The ASDE-X uses several technologies to perform the same function. We plan to upgrade 21 of the existing ASDE-3 radars with multilateration technology to enhance their effectiveness, and ASDE-X will replace 4 existing ASDE-3 radars. We are accelerating installations of ASDE-X so that by 2010 we will have installed all of these systems, and the final system will become operational in 2011.

The surface surveillance section of the roadmap shows that the FAA is developing a new system, the Low Cost Ground Surveillance (LCGS) system, for possible deployment in 2011. After testing competing designs for the LCGS, we will decide during 2010 which of the technologies has the best performance and whether to deploy the technology as a production system. LCGS would be used at small to medium-sized airports, and it would cost less than the ASDE-X or ASDE-3 with multilateration. Deploying LCGS would increase the number of airports that use sophisticated detection systems to show the location of aircraft and other vehicles near the runways and taxiways on tower displays, which would enhance our efforts to reduce runway incursions.

A third system that warns pilots about potential runway incursions is the Runway Status Lights (RWSL). These systems use lights embedded in the runway to inform a pilot when it is unsafe to cross a runway; and they are turned off when it is safe to proceed. We have tested these lights at Dallas/Fort Worth International Airport. The FAA has requested funding in FY 2010 to significantly increase the number of airports where we will install these systems as part of our goal to reduce runway incursions.

Figure 13 shows the CIP costs associated with upgrading the surveillance units.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Surveillance Functional Area	**$362.1**	**$270.6**	**$305.4**	**$291.0**	**$275.1**
2A08	ATC Beacon Interrogator (ATCBI) - Replacement	$4.7	$0.0	$0.0	$0.0	$0.0
2A09	Air Traffic Control En Route Radar Facilities Improvements	$5.3	$5.6	$5.8	$5.9	$0.9
2A15	Automatic Dependant Surveillance-Broadcast (ADS-B) NAS-Wide	$201.4	$175.2	$284.2	$270.7	$256.9
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$17.3	$0.0	$2.2	$10.0	$11.1
2B10	Airport Surveillance Radar (ASR-9)	$3.5	$0.0	$0.0	$0.0	$0.0
2B11	Terminal Digital Radar (ASR-11)	$12.6	$4.1	$3.4	$4.4	$4.4
2B12	Runway Status Lights (RWSL)	$117.3	$85.7	$9.8	$0.0	$1.8

Figure 13 Expenditures in the Surveillance Functional Area[3]

4.4 Navigation Roadmaps

There are two major types of navigational aids: those used for en route navigation and those used for precision approach and landing guidance. The en route aids have traditionally been radio transmitters that provide pilots with direction and distance from their location. The ground-based system commonly used for en route navigation is the Very High Frequency Omnidirectional Range with Distance Measuring Equipment (VOR and DME). There are over

[3] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

1,000 VORs spread across the United States. These navigational aids allow pilots to determine an accurate position and also help define the airways, which are routes based on the straight lines from VOR to VOR. Airways can simplify route planning and reduce the length of the clearances to fly from departure to destination, and they have the added value of providing predictability for air traffic controllers who often must project an aircraft's future position to avoid conflicts. Pilots use VOR/DME to follow their planned routes accurately under all visibility conditions.

As we implement NextGen and more aircraft equip, the Global Positioning System (GPS) satellite navigation system, will be more widely used for en route navigation. Using GPS will support more direct routing because pilots will have be able to program and fly routes defined by geographic coordinates rather than flying from VOR to VOR. GPS in the aircraft will also be used to report an aircraft's position when we implement ADS-B.

Precision landing guidance systems and the associated equipment supporting low visibility operations, provide radio signals and approach lights that pilots use to land safely in limited visibility. There are two precision landing aids. Instrument Landing Systems (ILS) guide pilots to runway ends using a radio beam to define the approach glideslope, which pilots can follow using cockpit instrumentation. There are more than 1,200 ILSs installed in the United States. They are essential to airlines for maintaining schedule reliability during poor weather. Augmented GPS satellite signals also provide precision landing guidance. There are two augmentation systems that will be used for this purpose. The Satellite Based Augmentation System (SBAS) is the FAA's Wide Area Augmentation System (WAAS) that uses 38 ground monitors to calculate corrections to the GPS signals and broadcast those corrections from telecommunications satellites so that properly equipped aircraft can use the information to fly a precision approach to a runway in low visibility conditions. There are currently more than 1,300 WAAS precision approach procedures that are referred to as Localizer Performance with Vertical Guidance (LPV) which use GPS augmented by WAAS for both horizontal and vertical guidance. The Ground Based Augmentation System (GBAS) is the FAA's Local Area Augmentation System (LAAS), which is located on an airport's surface and calculates corrections that are used to provide precision approach services to all runways at an airport in weather conditions approaching zero visibility.

Figures 14 and 15 show the roadmaps for navigation aids.

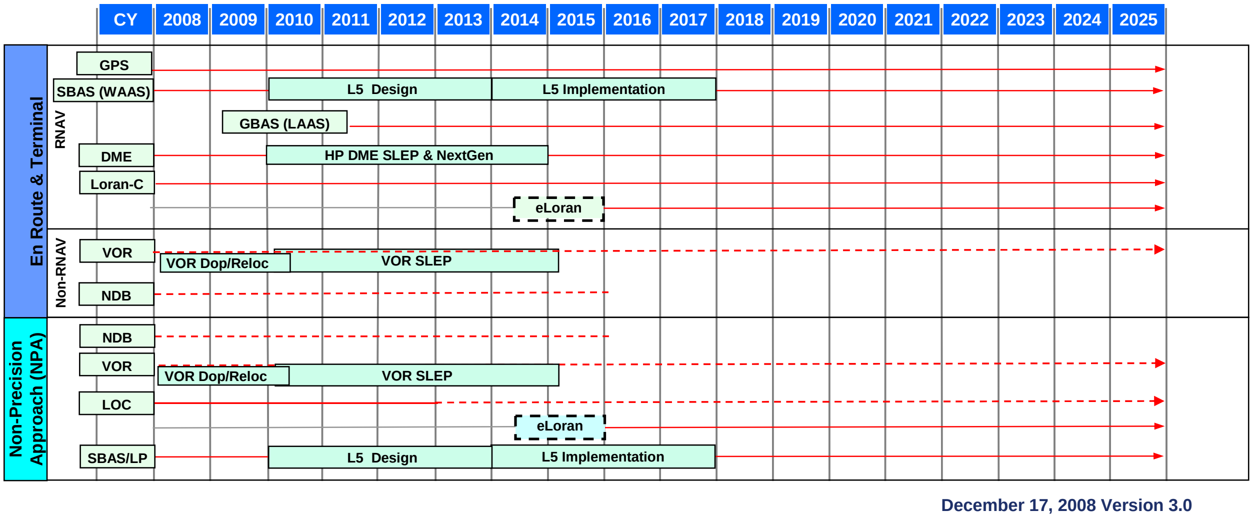


Figure 14 Navigation Roadmap (1 of 2)

The en route and terminal domains have traditionally relied on the system of VORs to define airways within the NAS. The FAA decided in 2007 to reduce the number of VORs between now and 2025 as part of the transition to satellite-based navigation. The FAA will decide in 2015 whether to continue operating VORs as a backup for GPS or remove all the VORs by 2025. If we retain VORs, they will need a service life extension program (SLEP).

We will keep Distance Measuring Equipment (DME) in service to support Area Navigation/Required Navigation Performance/ (RNAV/RNP) for en route and terminal navigation services. We will install additional DME in both terminal and en route airspace to support the capability of NextGen to handle increased demand for services.

The FAA is phasing out and plans to decommission Non-Directional Beacons (NDB) by 2015. NDBs provide only limited directional information.

The Department of Defense operates GPS. There are typically 24 to 30 active satellites in orbit, and a navigation receiver can determine an aircraft's position by interpreting the data transmitted by all the satellites in view. Two GPS upgrades are expected in future years. The next generation of satellites, Block IIF, will have a second frequency (L5) for civilian safety-of-life use. An aircraft receiver that receives both the existing L1 signal and the new L5 signal can calculate corrections to account for atmospheric distortion. The GPS III family of satellites will be upgraded with an additional civil signal (L1C) and increased transmitting power.

The WAAS (Wide Area Augmentation System) improves the precision of GPS by providing corrections and satellite reliability information to aeronautical GPS receivers. The receivers use WAAS corrections to calculate a precise geographic position. That precision will be further improved with introduction of the L5 signal. By comparing the information received on the two separate signals, receivers will be able to correct for ionospheric disturbances caused by solar weather events, which will significantly improve availability of LPV approaches.

GPS III civil-unique requirements development will be another enhancement to the GPS constellation, and civilian agencies will fund it. This program will develop GPS signal monitors to determine whether the civilian frequencies being added to GPS satellites are within required tolerance.

Non-precision approaches provide guidance to pilots preparing to land on a runway when there is limited visibility, but only provide lateral, not vertical guidance. These approaches do not allow descent to the same minimum altitudes possible with a precision approach. VORs support many of the non-precision approaches, and GPS and WAAS also support non-precision approach services. If the FAA decides to decommission VORs, GPS and WAAS will become the primary means for providing this service. The FAA has more than 4,000 GPS-WAAS non-precision approach procedures in place.

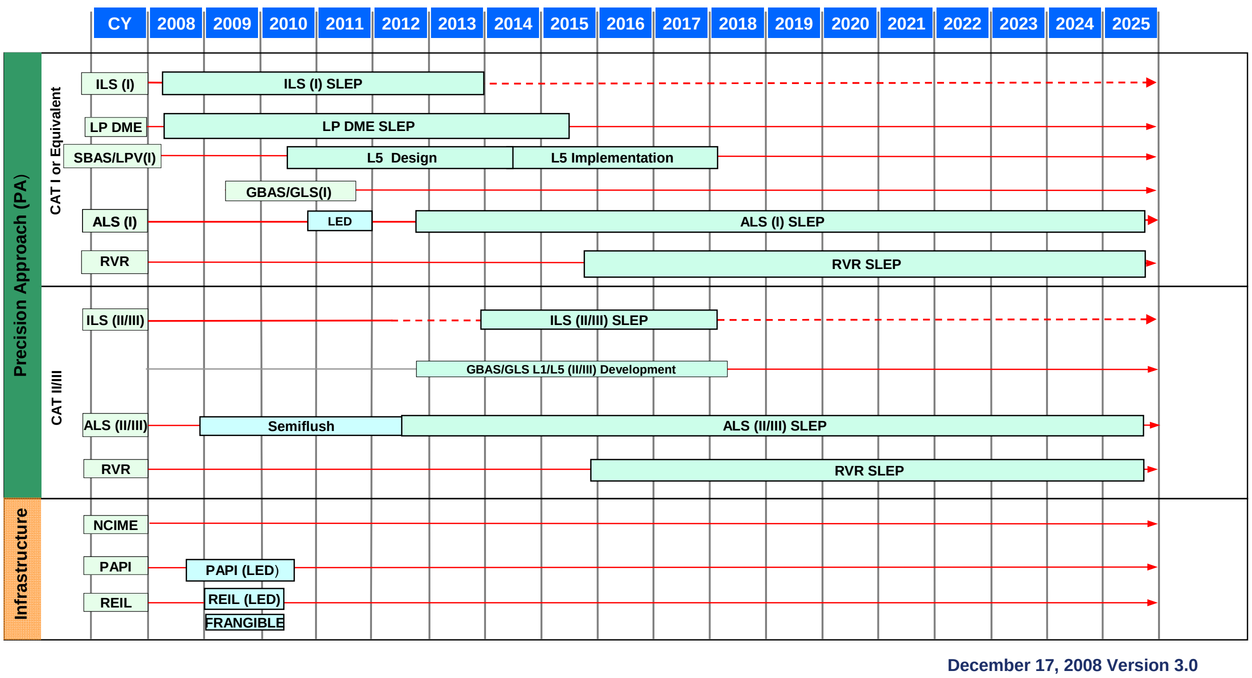


Figure 15 Navigation Roadmap (2 of 2)

There are three categories of precision approach. Category I is the most common. The Category I approach guides the pilot to the runway end, but it requires that the pilot be able to see the runway when the aircraft is no less than 200 feet above the field elevation, and the horizontal visibility is a half mile or more. The Category II and III approaches have lower minimums (i.e., less vertical and horizontal visibility is required). Currently only the ILS is accurate enough for these categories of precision approach, because Category II and III ILS have the redundancy and reliability that reduce the risk of errors when descending to lower minimums. Alternatives for precision approach guidance are the WAAS/LPV (Localizer Performance with Vertical Guidance) and LAAS. When these alternatives become operational, many ILSs can be decommissioned, but a number will remain in service to provide a backup capability at the OEP airports and other airports as required.

In the precision approach section and in the infrastructure section, there are references to an Airport Lighting System (ALS), Runway End Identification Lights (REIL), and Precision Approach Path Indicator (PAPI). These systems help the pilot to visually align with the runway for both precision and non-precision approaches. The FAA is testing the use of light emitting diodes (LED) to replace the incandescent lamps currently in use in these systems to reduce both maintenance and operating costs. The Runway Visual Range (RVR) sensors, which determine the horizontal visibility along the runway will continue operating throughout the roadmap timeframe. The FAA is considering the Navaid Control and Interlock and Monitoring Equipment (NCIME) system for upgrading the control of navigational aids surrounding an airport.

Figure 16 shows the future capital investments for navigation systems included in the CIP.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Navigation Functional Area	**$187.8**	**$146.1**	**$141.9**	**$139.8**	**$132.4**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment	$5.0	$5.0	$5.0	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$8.6	$7.8	$5.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$97.4	$101.1	$100.5	$100.3	$107.9
2D04	Runway Visual Range (RVR)	$5.0	$5.0	$5.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$8.7	$5.0	$5.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$6.0	$6.0	$5.0	$5.0	$0.0
2D07	Visual Navaids - Establish/Expand	$3.7	$3.2	$3.4	$5.0	$0.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$6.0	$6.0	$6.0	$8.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$7.0	$7.0	$5.0	$5.0
2D11	GPS Civil Requirements	$43.4	$0.0	$0.0	$0.0	$0.0

Figure 16 Expenditures in the Navigation Functional Area[4]

4.5 Weather Systems

Timely and accurate weather observations and forecasts are essential to aviation safety and making the best use of aviation capacity. Pilots need to know whether winds aloft will make their actual speed more or less than the airspeed shown on their instruments and if there will be obstructions to visibility that restrict landings at their destination airport. They also need to check on whether the runway is wet or dry and how that will affect their braking action. Traffic flow managers and pilots must use weather observations and forecasts to determine when they need to plan alternative routes to avoid severe weather. Thunderstorms with hail and heavy rain, turbulence, and icing must be avoided because they can damage aircraft and potentially injure passengers. The FAA has the leading role in collecting and distributing aviation weather data. The agency distributes current weather hazard information from its own systems and uses computer models that develop forecasts based on data available from the National Weather Service for use by air traffic control facilities, pilots, airline operations centers, and other aviation-related facilities.

Two categories of weather systems that the FAA uses are weather sensors and weather processing/dissemination/display systems. Weather sensors include weather radars and surface observation systems that measure atmospheric parameters, such as surface temperature,

[4] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

prevailing wind speed and direction, relative humidity, and bases and tops of clouds. Weather sensors provide real-time information to air traffic facilities and to centralized weather forecasting models that other agencies use. Weather processing/dissemination/ display systems organize and process the sensor's observed data. Data from multiple sensors feed forecast models, which can be disseminated and integrated in national and local processing and display systems to interpret broad weather trends affecting aviation operations. This information can then be sent to air traffic controllers and pilots. Figure 17 shows the current and planned status of weather sensors.

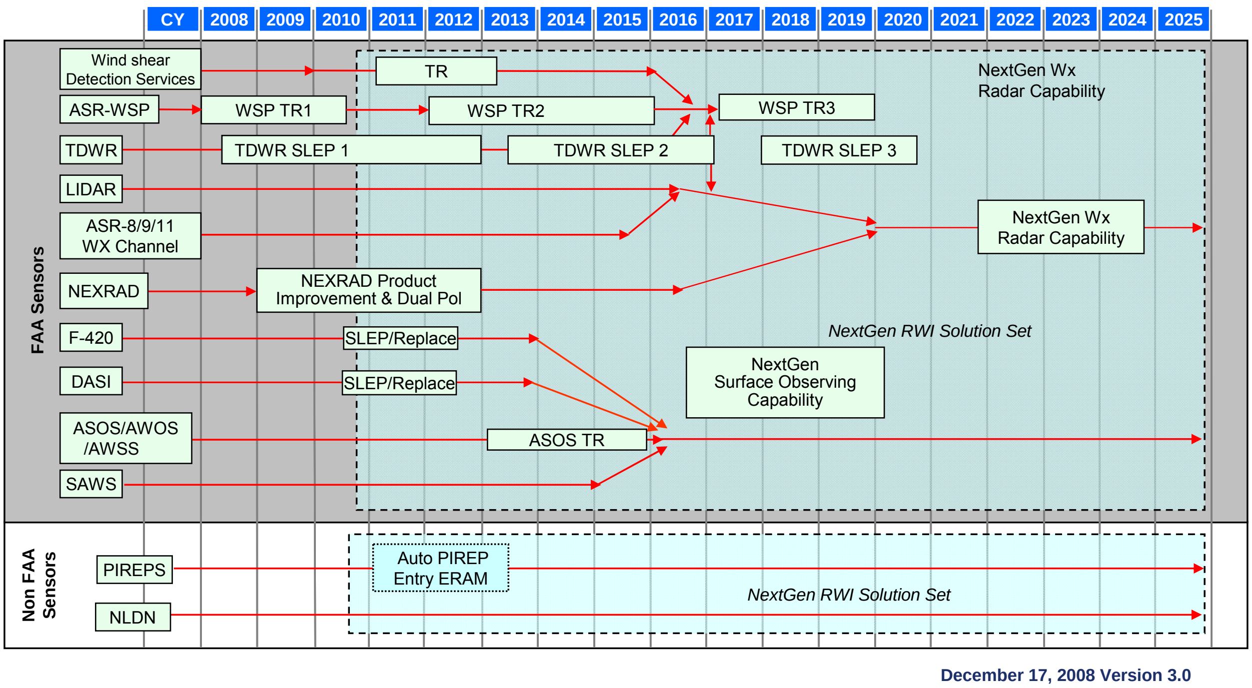


Figure 17 Weather Sensor Roadmap

The FAA sensors shown at the top of the roadmap include the Wind Shear Detection Services; the Airport Surveillance Radar – Weather System Processor (ASR-WSP); and the Terminal Doppler Weather Radar (TDWR). They all detect wind conditions near the surface of the airport to warn pilots of gust fronts and wind shear. The Light Detection and Ranging (LIDAR) system detects dry microbursts and gust fronts that TDWR may not detect. LIDAR is being evaluated at Las Vegas McCarran International Airport (LAS). It is one of four major airports located in dry high plains or an intermountain environment, where wind shear is not always accompanied by sufficient precipitation for the TDWR to detect it with 90 percent reliability. The evaluation of LIDAR will determine whether it is an acceptable alternative for other wind shear detection systems.

The ASR-9/11 Weather Channel and the Next Generation Weather Radar (NEXRAD) detect precipitation, wind, and thunderstorms that affect aircraft in flight. The F-420 and the Digital Altimeter Setting Indicator (DASI) are located in FAA facilities and display the current wind and barometric pressure for controllers. The Automated Weather Observing Systems

(AWOS/ASOS/SAWS) measure weather parameters on the surface to report conditions to air traffic facilities and pilots and also assist in weather forecasting.

Of the ground-based wind shear sensors, the most sophisticated is the TDWR. There are 46 operational TDWR sites located on or near the largest airports with the most risk of wind shear. Using Doppler technology, the radars can detect the rapid changes in wind speed and direction that indicate wind shear hazards for an aircraft approaching or departing a runway. Airports with significant wind shear risk that have a lower volume of air traffic are served by a lower cost alternative, the Airport Surveillance Radar-Weather System Processor (ASR-WSP). ASR-WSP uses two dimensional search radar signals to approximate the output of the TDWR.

To supplement these radar systems, Wind Shear Detection Services (WSDS), formerly known as LLWAS, consists of wind sensors located at 6 to 10 points around the runways to measure surface wind direction and velocity. The wind sensors and the associated computer systems determine whether wind shear and microburst events are occurring in the approach/departure corridors but do not detect them in other locations near the airport as a radar would. WSDS serve airports that do not have a TDWR or WSP as well as locations where they supplement the radars with point-specific wind measurements to verify the presence and location of wind shears. The WSDS program will collect data from each of the wind shear sensors to determine on a site-by-site basis what level of wind shear service should continue under NextGen. This data will also be used to decide in the 2018 timeframe whether to replace all current wind shear sensors with a NextGen weather radar system.

Replacing the ASR-8/9 weather channel will be necessary only if the ASR-8/9 do not remain in operation. The FAA plans to decide by 2018 whether to incorporate these functions into a combined NextGen weather radar replacement. The currently operating Next Generation Weather Radar (NEXRAD) was developed under a joint Department of Commerce National Weather Service, Department of Defense, and FAA program. These systems are Doppler weather radars that detect and produce over 100 different long-range and high-altitude weather observations, including areas of precipitation, winds, thunderstorms, turbulence, and icing. The NEXRAD radars are essential for forecasting future weather. In the short term, we are funding upgrades such as Dual Polarization (Dual Pol) and software improvements. Working with our partner agencies, we will also decide by 2018 whether to incorporate long-range NEXRAD functions that may be supplemented with intermediate range gap-filler functions into the combined NextGen weather and surveillance radar system.

The Automated Surface Observing Systems (ASOS) and other variants — such as the Automated Weather Observing System (AWOS); the Automated Weather Sensor Systems (AWSS); and the Stand Alone Weather Sensing (SAWS) system — have up to 14 sensors that measure surface weather data, including temperature, barometric pressure, humidity, type and amount of precipitation, and cloud bases and amount of sky cover. These systems feed data directly to air traffic control facilities and support automated broadcast of weather information to pilots. They also provide regular updates for the forecast models that predict future weather problems. The Digital Altimeter Setting Indicator (DASI) and the F-420 wind sensors, used by ATC towers, may require updating. We plan to work with our partner agencies and decide how their functions are incorporated into the NextGen Surface Observing Capability.

Pilot reports (PIREPS) of weather conditions can be transmitted by voice or automated systems to FAA facilities. We are studying whether these reports can be transmitted directly to air traffic automation systems in the future. The National Lightning Detection Network (NLDN) reports on the location of lightning strikes. The existing system or a modernized system will continue operating through 2025.

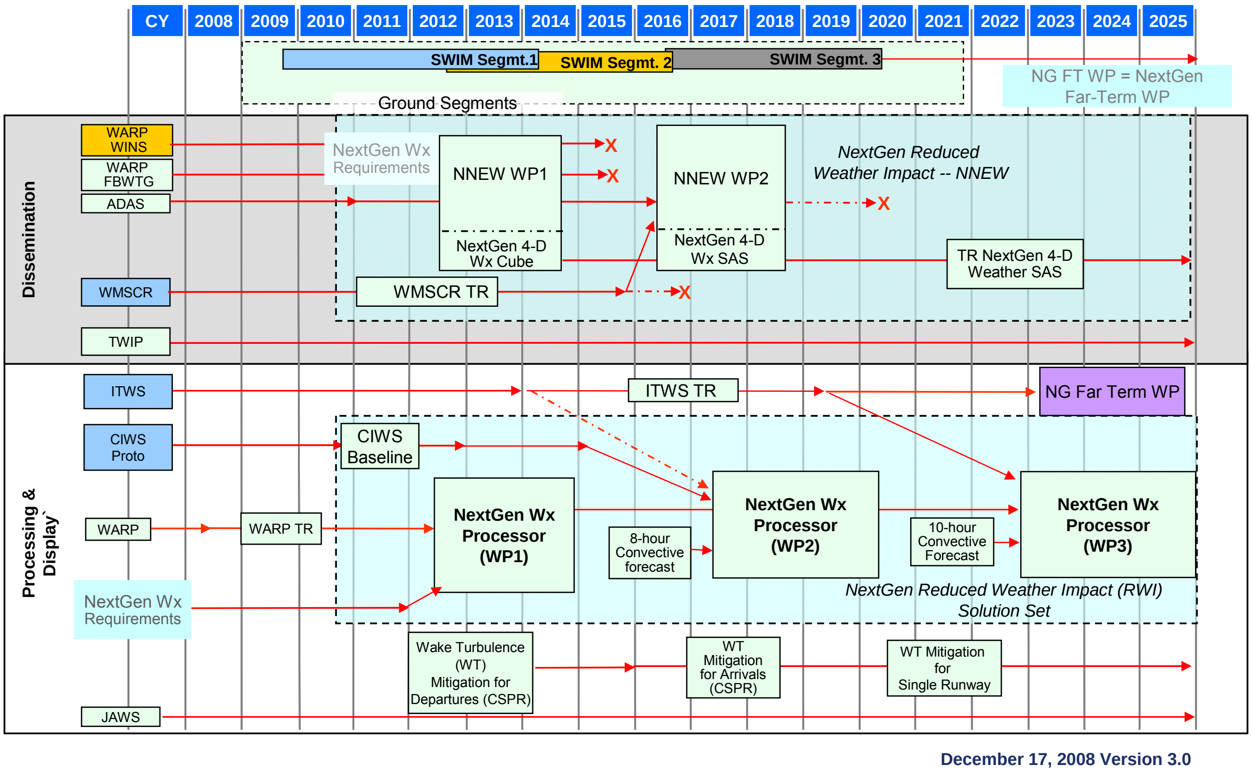


Figure 18 Weather Dissemination, Processing, and Display Roadmap

NextGen requires efficient consolidation of large volumes of weather observations and derived forecasts by processing, display, and dissemination systems that capture and process weather data and then integrate the resulting more sophisticated outputs into the decision software for advanced automation capabilities. NextGen Work Package 2 (WP 2) will enhance the display of weather information by using new algorithms to portray icing conditions, turbulence, and other hazards to aviation. Further upgrades of weather-predicting algorithms will be added by WP 3 such as wind shear/microburst and wake vortex detection and prediction.

The Weather and Radar Processor Weather Information Network Server (WARP WINS) stores data from multiple NEXRAD radars for use by en route control facilities. SWIM may distribute this data as a NextGen capability in the future. WARP compiles information for interpretation by the Center Weather Service Unit forecasting stations. WARP also feeds data to controllers' displays. The Automated Weather Observation Data Acquisition System (ADAS) is a radio link that transmits AWOS/ASOS/SAWS data to air traffic facilities. The FAA-operated Weather Message Switching Center Replacement (WMSCR) is a network with distribution nodes in Salt Lake City and Atlanta that collects and distributes nationwide weather information. The

Terminal Weather Information for Pilots (TWIP) system transfers TDWR weather information to FAA facilities and the airline's communication provider for uplink to pilots for use in analyzing terminal weather conditions. Current planning is that collection and storage of weather information will be a function of the SWIM network as part of Segment 3; however, the TWIP may continue as a NAS system. The FAA will decide during 2015 whether to integrate TWIP into the SWIM Air Segment.

The Integrated Terminal Weather System (ITWS) consolidates weather information from automated sensors and surrounding radars to provide real-time weather information for terminal control facilities. The system also projects movement of severe weather systems up to 20 minutes into the future. Tower and Terminal Radar Approach Control (TRACON) controllers use the information to make more precise estimates of when runways should be closed and subsequently reopened. They also use the information to plan for a switch in terminal arrival patterns to avoid excessive maneuvering to accommodate a runway change as aircraft approach an airport. The ITWS has been installed at 22 airports, and it is being deployed to 11 additional sites. ITWS will receive technical refresh in the near term, and the ITWS weather inputs and processing power will become part of the NextGen Automation Platform by 2023.

The Corridor Integrated Weather System (CIWS) gathers weather information occurring along the busiest air traffic corridors to help controllers select the most efficient routes when they must divert traffic to avoid severe weather conditions. The CIWS prototype tested a predictive capability that would refine the decisions on when normal (direct) routes will be available. This system will become part of the NextGen Weather Processor and support the Traffic Flow Management automation software.

The NextGen Weather Processor will incorporate the functionality of the existing Weather and Radar Processing (WARP) system. Work Package 2 (WP 2) will enhance the display of weather information by using new algorithms to portray icing conditions, turbulence, and other hazards. The ITWS functions will be incorporated as part of WP 3. Further upgrades of weather-predicting algorithms will also be added in WP 3 to include Wind Shear/Microburst and Wake Vortex Detection and prediction advisories.

The NextGen 4D Weather Cube is a distributed "virtual" database that will receive weather data directly from sensors and other sources, and, either automatically or by request, send data to FAA facilities so that observations and forecasts can be more widely and consistently distributed to a broad set of users via network enabled operations. The 4D Weather Cube will be part of the NextGen Networked Enabled Weather program and supports the Reduce Weather Impact solution set. The 4D Weather Cube will host the Single Authoritative Source (SAS), which ensures that the most accurate and consistent data will be distributed to users to ensure that decisions are based on correct and coherent weather information. Decision support tools will use this weather information to help users understand weather constraints and reduce risk for aviation operations.

The Juneau Airport Weather System (JAWS) is unique to the Alaska region. It provides wind hazard information from mountain peak wind sensors located around Juneau to the Flight

Service Station and Alaska Airlines to improve the safety of operations arriving and departing the airport.

Figure 19 shows the planned expenditures included in the CIP for weather sensors and weather dissemination and processing systems.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Weather Functional Area	**$104.5**	**$149.4**	**$145.7**	**$156.9**	**$120.7**
1A05	NextGen Network Enabled Weather (NNEW)	$20.0	$43.0	$56.4	$36.6	$33.8
1A10	Next Generation Air Transportation System (NextGen)-Reduce Weather Impact	$35.6	$64.3	$66.7	$109.8	$77.0
2A03	Next Generation Weather Radar (NEXRAD)	$6.9	$6.7	$2.8	$3.3	$1.2
2A12	Corridor Integrated Weather System (CIWS)	$2.3	$5.5	$3.0	$0.0	$0.0
2A16	Windshear Detection Service	$1.0	$0.0	$0.0	$0.0	$0.0
2A17	Weather and Radar Processor (WARP)	$17.6	$6.7	$1.8	$0.7	$0.7
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$9.9	$8.6	$7.7	$2.1	$0.5
2B16	Integrated Terminal Weather Systems (ITWS)	$1.9	$4.7	$0.0	$0.0	$1.3
2C01	Automated Surface Observing System (ASOS)	$5.5	$6.7	$2.5	$0.0	$0.0
2C03	Weather Camera Program	$3.8	$3.2	$4.8	$4.4	$6.2

Figure 19 Expenditures in the Weather Functional Area[5]

4.6 Facilities

The Air Traffic Organization maintains and operates thousands of staffed and unstaffed operational facilities that we must regularly upgrade and modernize. The largest facilities are the 21 en route centers, which house hundreds of employees and equipment to control aircraft flying in the en route airspace. The other operational facilities with significant staffing are the more than 500 towers and 167 TRACON facilities that control traffic departing and arriving at airports.

There are also more than 16,000 unstaffed facilities—many in very remote locations—supporting communications, navigation, and surveillance equipment and weather sensors. Much of this equipment is housed in shelters and buildings that have exceeded their service lives and need renovation. Many have deteriorating steel towers and foundations. Some newer unstaffed buildings and structures frequently need renovation because they are in remote and/or hostile locations near the ocean or on mountaintops. Replacing roofing, power, heating/cooling, and structural and security components of these structures is essential to successful operation of the NAS.

The William J. Hughes Technical Center (WJHTC) in Atlantic City, NJ, and the Mike Monroney Aeronautical Center (MMAC) and FAA Depot in Oklahoma City, OK, have many buildings. Each year, these complexes receive funds to both sustain and replace infrastructure and to improve and modernize buildings to support training, logistics, research, and management functions. The MMAC operates under a lease from the Oklahoma City Trust, and funds are requested to pay the annual lease costs. The MMAC also receives infrastructure funding for building renovation and updated infrastructure. The WJHTC supports research programs and testing of new equipment that will be installed in the NAS. The FAA has requested funding for 2010 and beyond to upgrade buildings and infrastructure such as roads. In addition, funding is

[5] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

provided to reconfigure the research laboratories to accommodate acceptance testing for new equipment and to test modifications to existing equipment.

There are two budget line items for tower and TRACON investments, which have significant funding. The first is the Terminal Air Traffic Control Facilities – Replace program, which includes funding for both airport traffic control towers (ATCT) and TRACON facilities. This line item funds both replacement of existing towers and TRACONs and construction of towers for new airports. In most years, there are between 10 and 20 projects to replace towers that are too small to handle the traffic growth that has occurred since they were built or have inadequate sight lines due to construction of new runways or new hangers. The second line item is the Terminal Air Traffic Control Facilities – Modernize program which replaces specific exterior or interior components of existing towers, such as elevators; heating ventilation and cooling equipment; roofs; or other infrastructure that the FAA must upgrade to keep towers functioning.

The FAA invests about $50 million a year to upgrade and improve Air Route Traffic Control Center (ARTCC) facilities. Projects include expanding the size of the facility, replacing heating and cooling systems, and upgrading electrical power distribution systems.

Over the next 2 years, the FAA will evaluate the design and configuration of future NextGen facilities to ensure that these facilities will support the planned NextGen improvements in service and the potential changes in airspace controlled by these facilities. It is important that these new facilities are sized correctly so the full benefits of the NextGen Architecture can be realized. The potential benefits include accommodating NextGen capabilities such as Integrated Arrival and Departure Services, High Altitude Generic En Route Services, Flexible Airspace Management, Staffed NextGen Towers and integrated business continuity services. If the studies show that benefits will exceed costs, the FAA may begin transforming facilities starting in 2014.

Figure 20 shows the planned expenditures for facilities projects that contribute to modernizing the air traffic control system.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Facilities Functional Area	**$542.5**	**$697.9**	**$794.4**	**$905.2**	**$738.9**
1A03	William J. Hughes Technical Center Facilities	$12.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$5.5	$5.6	$5.7	$5.9	$6.0
1A15	Next Generation Air Transportation System (NextGen) - Networked Facilities	$24.0	$160.4	$213.4	$337.8	$166.9
2A04	Air Traffic Control System Command Center (ATCSCC) Relocation	$10.3	$2.1	$2.1	$0.0	$0.0
2A05	ARTCC Building Improvements/Plant Improvements	$51.3	$57.0	$62.0	$62.4	$62.4
2B06	Terminal Air Traffic Control Facilities - Replace	$176.0	$145.0	$160.0	$165.0	$170.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$38.9	$48.0	$53.3	$52.7	$52.7
2C02	Flight Service Station (FSS) Modernization	$20.1	$22.3	$16.5	$8.5	$2.5
2E01	Fuel Storage Tank Replacement and Monitoring	$6.2	$6.3	$6.4	$6.6	$6.7
2E02	Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)	$18.2	$15.0	$15.7	$16.3	$16.5
2E04	Airport Cable Loop Systems - Sustained Support	$6.0	$5.0	$5.0	$5.0	$5.0
2E06	Facilities Decommissioning	$5.0	$5.0	$5.0	$5.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$101.0	$147.5	$160.0	$165.0	$170.0
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A05	Facility Security Risk Management	$18.0	$20.0	$30.0	$15.0	$19.4
3B01	Aeronautical Center Infrastructure Modernization	$13.8	$10.1	$10.3	$10.5	$10.8
4A04	Mike Monroney Aeronautical Center Leases	$16.2	$16.6	$17.0	$17.5	$17.9

Figure 20 Expenditures in the Facilities Functional Area[6]

4.7 Support Contracts and Automated Management Tools and Processes

The FAA has several support contracts and automated management tools that help our employees plan and manage modernization of existing systems; develop detailed transition plans to install new equipment; and oversee installing that equipment. The System Engineering and Technical Assistance contract and the Center for Advanced Aviation System Development contract help us plan overall modernization and simulate the impact of implementing new concepts and new equipment on our ability to manage air traffic. The Technical Support Services program provides field engineers who oversee site preparation and installation of new equipment in addition to supporting environmental projects to remove asbestos, improve fire life safety, and abate environmental pollution. These engineers and technicians help the FAA keep installation and other NAS projects on schedule, including projects with equipment deliveries and those associated with relocation and/or removal of equipment. The National Implementation Support Contract helps plan our transition to new equipment. Since air traffic control functions must continue while we install new equipment, we must prepare detailed plans before we begin installation to minimize any disruption.

Another category of support contracts covers leasing, modifying, or modernizing buildings to house engineering and training. The FAA also leases or purchases computer automation to support these engineering functions. Examples include improving the System Support Lab and licensing fees for software used for the WJHTC. In addition, there are support contracts to provide spectrum engineering to allocate radio frequencies for new installations and to prevent outside interference with existing frequencies.

[6] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

BLI Number	Program Name	FY 2010 Budget	FY 2011	FY 2012	FY 2013	FY 2014
	Mission Support Functional Area	**$327.5**	**$322.6**	**$323.8**	**$314.3**	**$304.9**
1A01	Advanced Technology Development and Prototyping (ATDP)	$41.8	$37.5	$33.9	$30.4	$28.1
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A14	Next Generation Air Transportation System (NextGen) - Safety, Security, and Environment	$8.2	$8.0	$10.0	$10.0	$8.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$26.0
2B18	Remote Maintenance Monitoring	$1.0	$0.0	$0.0	$0.0	$0.0
2E03	Aircraft Related Equipment Program	$10.0	$9.0	$13.0	$9.0	$9.0
2E09	Aircraft Fleet Modernization	$6.0	$0.0	$9.0	$0.0	$0.0
2E09X	Independent Operational Test/Evaluation - Outyear request	$0.0	$5.0	$5.2	$5.3	$5.5
3A03	Logistics Support Systems and Facilities (LSSF)	$9.3	$11.5	$0.8	$0.0	$0.0
3A06	Information Security	$12.3	$12.0	$12.0	$12.0	$12.0
3A09X	Logical Access Control	$0.0	$10.2	$9.0	$10.0	$0.0
3B02	Distance Learning	$1.5	$1.0	$1.0	$1.0	$1.0
3B03	National Airspace System (NAS) Training - Simulator	$6.7	$0.0	$0.0	$0.0	$0.0
4A01	System Engineering and Development Support	$31.7	$32.3	$32.9	$33.5	$34.1
4A02	Program Support Leases	$37.5	$38.6	$39.7	$40.9	$42.1
4A03	Logistics Support Services (LSS)	$11.0	$8.5	$8.5	$8.5	$8.5
4A05	Transition Engineering Support	$15.0	$15.0	$15.0	$15.0	$15.0
4A06	Frequency and Spectrum Engineering	$3.6	$2.0	$0.0	$0.0	$0.0
4A07	Technical Support Services (TSS)	$22.0	$22.0	$22.0	$25.0	$30.0
4A08	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$4.0	$0.0
4A09	Center for Advanced Aviation System Development (CAASD)	$79.0	$79.0	$80.8	$82.7	$84.6

Figure 21 Expenditures in the Mission Support Functional Area[7]

Figure 21 shows planned expenditures for specific mission support projects that will help us modernize the air traffic control system.

[7] Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal.

5 Conclusion

Predicting the exact changes in air traffic workload over the next few years is quite challenging because there are significant recent downward trends in many economic measures, and the uncertainty about the direction these measures are heading makes forecasting the future more uncertain. FAA workload is closely correlated with Gross Domestic Product, and determining the full implications of these trends on aviation activity will depend on the economy becoming more stable. There are some positive economic factors such as the reduction in fuel prices that partially offset the negative changes, but the majority of economic indicators are affecting air travel negatively. To adjust to current conditions airlines have reduced operations, and the sale of business jets appears to be declining. These changes have led to a temporary decrease in FAA workload at centers and towers; but, if the recent prediction of the beginning signs of recovery is accurate, growth will resume in the near future.

This near-term downturn in workload suggests that we could defer system modernization, but there are several reasons why that assumption is invalid. Operational improvements from capital investment often lag the appropriation of that funding by several years, because the complex equipment necessary to support improvements takes time to develop, build, install, test and finally use. Investment must anticipate future growth, because it cannot produce immediate results to respond to growth that has already materialized. Since flight delays in early 2008 were the worst in 8 years, the need for additional capacity will be evident shortly after growth resumes. If we do not schedule investment now, we will not be ready for recovery. In addition, the computer systems and other technology that we use for air traffic control have an estimated life of 10 to 20 years. For even some of the newer equipment, we will have to replace several system components in the latter part of the next decade. Without funding in these early years, we will not have contracts in place to provide the new equipment when it is needed. We also are committed to modernizing the existing air traffic control system rather than just replacing components. We need the Next Generation Air Transportation System (NextGen) to expand capacity to meet the needs of the future.

NextGen is not a copy of the current air traffic control system: it embodies a whole new concept for handling air traffic. It will allow individual flight paths to be assigned and controllers will seldom have to intervene when aircraft fly their assigned trajectory and hit the assigned waypoints at the assigned times. Real-time information on weather and traffic conditions will be available to all users, and we will solve conflicts collaboratively. We need NextGen for this to happen, and we need to start building it now.

6 Appendices

The CIP contains four appendices.

Appendix A

- Lists FAA strategic goals, objectives, and performance targets.
- Associates CIP projects with strategic objectives and performance targets.

Appendix B

- Provides CIP project descriptions and the relationship of projects to strategic goals.
- Provides the Strategic Management Plan (SMP) pathway and objective supported by projects.
- Lists FY 2010–2014 — performance output goals.
- Shows system implementation schedules.

Appendix C

- Provides estimated expenditures from FY 2010 through FY 2014 by Budget Line Item (BLI).

Appendix D

- Response to GAO Report 08-42 - Identifies programs with baseline changes and explains the causes of those changes.

Appendix E

- Defines acronyms and abbreviations.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix A

Fiscal Years 2010 – 2014

APPENDIX A

GOAL MATRIX

The Capital Investment Plan (CIP) projects have been aligned to the goals, objectives, and performance targets in the Department of Transportation's (DOT) strategic plan and Federal Aviation Administration (FAA) Flight Plan 2009-2013. Many FAA projects will contribute to more than one goal, objective, or performance target; however the project linkages in the CIP (Appendix A and B) are aligned to a single goal, objective, and performance target where a project's contribution is most significant. Only CIP projects with Fiscal Year (FY) 2010-2014 funding are included in Appendix A, B, and C.

The CIP goals are formatted to follow the six goal areas of the DOT Strategic Plan. The FAA's Flight Plan has four Strategic Goals and they are aligned with the matching DOT Goal as follows.

Six DOT Strategic Goals are:	**Four FAA Strategic Goals are:**
1) Safety………………………………………………………………..…	Increased Safety
2) Reduced Congestion……………………………………………..…	Greater Capacity
3) Global Connectivity…………………………………………..…..…	International Leadership
4) Environmental Stewardship……………………………….….…	*(Increased Capacity)*
5) Security, Preparedness and Response…………………….……...	*(Organizational Excellence)*
6) Organizational Excellence…………………………………………….	Organizational Excellence

To show alignment with all of the DOT goals the CIP aligns projects to the Goal 4) Environmental Stewardship and Goal 5) Security, Preparedness and Response Strategic Goals. FAA's Organizational Excellence Goal is numbered 6 to match the DOT plan.

A 3-digit code is used in the CIP and the terms/definitions provided in the DOT or FAA Strategic Plans are shown in this Appendix. The first digit is the goal, the second digit is the objective, and the third digit is the performance target. In the case when projects are aligned with the DOT Goal the second digit is the DOT Strategy for that goal.

Projects are shown under their respective performance target or strategy and each has the following information, Budget Line Item (BLI), CIP number, and CIP Program/ Project Name. BLI numbers with an X (i.e., 1A09X) are used to designate programs/projects that are not in the FY 2010 President's Budget. These Programs/projects are new starts or future programs not currently in the President's budget and will report future year planned activities based on projected funding.

For clarification, the following definitions generally describe the elements of the FAA Flight Plan 2009-2013 and can be used to relate the objectives and performance targets to the CIP projects.

STRATEGIC GOAL

A general statement of the broad agency purpose in carrying out its mission, such as: "To achieve the lowest possible accident rate and constantly improve safety."

OBJECTIVE

A statement of a specific emphasis area that will contribute to the overall goal, such as: "Reduce commercial air carrier fatalities."

PERFORMANCE TARGET

A quantifiable measure of the improvement in a goal area that sets a target for specific improvements in outcomes that affect FAA customers, such as: "Cut the rate of fatalities per 100 million persons on board in half by FY 2025".

Table of Contents

1. STRATEGIC GOAL: INCREASED SAFETY

FAA Strategic Goal: To achieve the lowest possible accident rate and constantly improve safety.

- **FAA Objective 1:** Reduce commercial air carrier fatalities.
  - **FAA Performance Target 1:** Cut the rate of fatalities per 100 million persons on board in half by 2025.

FY 2010 BLI	CIP #	CIP Name
1A01J	A28.01-01	Traffic Alert & Collision Avoidance System (TCAS)
1A01L	A08.04-01	Aeronautical Information Process Improvement
1A08F	G7M.02-01	NextGen – System Dev – Systems Safety Mgmt Transformation
2A16	W05.03-01	Wind Shear Detection Devices
2B02	W03.03-01	Terminal Doppler Weather Radar – Service Life Extension Program (SLEP)
2D05	N04.03-00	Visual Navaids – ALSIP Continuation
2D07	N04.01-00	Visual Navaids – Visual Navaids for New Qualifiers
2E03A	M12.00-00	Aircraft Related Equipment Program
2E03B	M12.01-01	Aircraft Related Equipment Program – Boeing Simulator Replacement
2E03X	M12.01-03	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technical Refresh
2E08	M11.02-00	Flight Standards Inspector Aircraft Replacement – Phase 1
2E08X	M11.02-01	Flight Standards Inspector Aircraft Replacement – Phase 2
3A02	A17.01-01	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 1
3A02X	A17.01-02	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 2
3A07	A25.02-01	System Approach for Safety Oversight (SASO) – Phase 2A
3A07X	A25.02-02	System Approach for Safety Oversight (SASO) – Phase 2B
3A08	A26.01-00	Aviation Safety Knowledge Management Environment (ASKME)
3A08X	A26.01-01	Aviation Safety Knowledge Management Environment (ASKME) – Phase 2
4A10	A08.03-02	Aeronautical Information Management (AIM) Modernization – Segment 1a
4A10X	A08.03-03	Aeronautical Information Management (AIM) Modernization – Segment 1b

- **FAA Objective 2:** Reduce general aviation fatalities.
  - **FAA Performance Target 1:** Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018).

FY 2010 BLI	CIP #	CIP Name
2D03A	N12.01-00	Wide Area Augmentation System (WAAS) – LPV Segment
2D03B	N12.01-06	Wide Area Augmentation System (WAAS) – Survey and Procedures

– **FAA Performance Target 2:** By the end of FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from the 2000-2002 average of 130 accidents per year to no more than 99 accidents per year. This measure will be converted from a number to a rate at the beginning of FY 2010.

FY 2010 BLI	CIP #	CIP Name
1A01H	W10.01-00	Juneau Airport Wind System (JAWS), Alaska Weather Research
2C02	F05.04-01	Alaska Flight Services Modernization
2C03	M08.31-01	Weather Camera Program – Segment 1
2C03X	M08.31-02	Weather Camera Program – Future segments
2E05	C17.02-01	Alaskan NAS Interfacility Communications System (ANICS) Satellite Network – ANICS Modernization – Alaskan Satellite Telecommunication Infrastructure (ASTI)

- **FAA Objective 3:** Reduce the risk of runway incursions.

– **FAA Performance Target 1:** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.45 per million operations, and maintain or improve through FY 2013.

FY 2010 BLI	CIP #	CIP Name
1A01A	S09.02-00	Runway Incursion Reduction Program (RIRP) – ATDP
1A01K	S12.01-01	Low Cost Ground Surveillance
2B01	S09.01-00	Airport Surface Detection Equipment – Model X (ASDE-X)
2B01X	S09.01-01	ASDE-X –Tech Refresh & Disposition
2B12	S11.01-02	Runway Status Lights (RWSL) – Segment 1
2B12X	S11.01-03	Runway Status Lights (RWSL) – Segment 2

– **FAA Performance Target 2:** By the end of FY 2013, reduce total runway incursions by 10 percent from the FY 2008 baseline.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Objective 4:** Ensure the safety of commercial space launches.

– **FAA Performance Target 1:** No fatalities, serious injuries, or significant property damage to the uninvolved public during licensed or permitted space launch and reentry activities.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Objective 5:** Enhance the safety of FAA's air traffic systems.
  - **FAA Performance Target 1:** Limit Category A and B (most serious) operational errors to a rate of no more than 1.95 per million activities by FY 2013.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Objective 6:** Implement a Safety Management System (SMS) for the FAA.
  - **FAA Performance Target 1:** In FY 2010, implement (SMS) in the Air Traffic Organization, Office of Aviation Safety, and Office of Airports. In FY 2012, implement SMS policy in all appropriate FAA organizations.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

2. STRATEGIC GOAL: GREATER CAPACITY

FAA Strategic Goal: Work with local governments and airspace users to provide increased capacity in the United States airspace system that reduces congestion and meets projected demand in an environmentally sound manner.

- **FAA Objective 1:** Increase capacity to meet projected demand and reduce congestion.
  - **FAA Performance Target 1:** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

FY 2010 BLI	CIP #	CIP Name
1A01B	M08.28-00	System Capacity, Planning, and Improvements – ATDP
1A01C	M08.29-00	Operations Concept Validation and Infrastructure Evolution – ATDP
1A01D	M08.27-01	NAS Wide Weather Requirements & Strategic Planning
1A01E	M08.28-04	Airspace Management Program (AMP) – ATDP
1A01I	M08.36-01	Wake Turbulence Research
1A05	G4W.01-01	NextGen – NextGen Network Enabled Weather (NNEW)
1A06	G1C.01-01	NextGen – Data Communications – Segment 1a
1A06X	G1C.01-02	NextGen – Data Communications – Segment 1b
1A06X	G1C.01-03	NextGen – Data Communications – Segment 2
1A07	G8M.01-01	NextGen – Demonstrations and Infrastructure Development
1A08A	G1M.02-01	NextGen – System Dev – ATC/Tech Ops Human Factors
1A08B	G1M.02-02	NextGen – System Dev – New ATM Requirements
1A08C	G1M.02-03	NextGen – System Dev – Ops Concept Validation Modeling
1A08E	G6M.02-02	NextGen – System Dev – Wake Turbulence Re-Categorization
1A09A	G1A.01-01	NextGen – TBO – Separation Mgmt – Modern Procedures
1A09B	G1A.01-02	NextGen – TBO – Separation Mgmt – High Altitude
1A09C	G1A.02-01	NextGen – TBO – Trajectory Mgmt – En Route
1A09D	G1A.02-02	NextGen – TBO – Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt
1A09E	G1A.02-03	NextGen – TBO – Trajectory Mgmt – Conflict Advisories
1A09F	G1N.01-01	NextGen – TBO – Capacity Mgmt – NextGen DME
1A10A	G4W.02-01	NextGen – RWI – Weather Observation Improvements
1A10B	G4W.03-01	NextGen – RWI – Weather Forecast Improvements
1A11A	G2A.01-01	NextGen – HD – Trajectory Mgmt – Surface Tactical Flow
1A11B	G2A.01-02	NextGen – HD – Trajectory Mgmt – Surface Conformance Monitor
1A11C	G2A.01-03	NextGen – HD – Trajectory Mgmt – Arrival Tactical Flow
1A11D	G2M.02-01	NextGen – HD – Capacity Mgmt – Integration Arrival & Departure Operations
1A12A	G5A.01-01	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Integration
1A12B	G5A.01-02	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Enhancement
1A12C	G5A.02-01	NextGen – CATM – Flight & State Data Mgmt – Common Status & Structure Data

FY 2010 BLI	CIP #	CIP Name
1A12D	G5A.02-02	NextGen – CATM – Flight & State Data Mgmt – Advanced Methods
1A12E	G5A.02-03	NextGen – CATM – Flight & State Data Mgmt – Flight Object
1A12F	G5A.04-01	NextGen – CATM – Capacity Management – Dynamic Airspace
1A13A	G6A.01-01	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD)
1A13B	G6A.02-01	NextGen – FLEX – Surface/Tower/Terminal Systems Engineering
1A13C	G6N.01-01	NextGen – FLEX – Separation Mgmt – Approaches (GBAS)
1A13D	G6N.01-02	NextGen – FLEX – Separation Mgmt – Closely Spaced Parallel Rwy Ops
1A13E	G6N.01-03	NextGen – FLEX – Separation Mgmt – Approaches, NextGen Nav Init
1A13G	G6N.02-01	NextGen – FLEX – Trajectory Mgmt – Arrivals
1A13H	G6N.03-01	NextGen – FLEX – Flight & State Data Mgmt – Avionics
1A15A	G3F.01-01	NextGen – Networked Facilities – Future Facilities Investment Planning
1A15B	G3M.02-01	NextGen – Networked Facilities – Integration, Development, & Operations Analysis Capability
2A01	A01.10-01	En Route Automation Modernization (ERAM)
2A01X	A01.10-03	En Route Automation Modernization (ERAM) – Technical Refresh
2A12	W07.02-00	Corridor Integrated Weather System (CIWS)
2B05B	A32.01-01	Electronic Flight Strip System
2B05C	A33.01-01	Terminal Flight Data Management System
2B16	W07.01-00	ITWS – Development/ Procurement/ Pre-Planned Product Improvement (P3I)
2D02	N03.01-00	Instrument Landing Systems (ILS)
2D06	N09.00-00	Sustain Distance Measuring Equipment (DME)
2D11	N12.03-01	GPS Civil Requirements

– **FAA Performance Target 2:** Achieve an average daily airport capacity for the 7 Metro areas of 39,484 arrivals and departures per day by FY 2009 and maintain through FY 2013.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

– **FAA Performance Target 3:** Commission nine new runway/taxiway projects, increasing the annual service volume of the 35 OEP airports by at least 1 percent annually, measured as a five-year moving average, through FY 2013.

FY 2010 BLI	CIP #	CIP Name
1A01F	M46.01-01	Strategy and Evaluation – ATDP

– **FAA Performance Target 4:** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

FY 2010 BLI	CIP #	CIP Name
2A02	A01.12-02	En Route Communication Gateway – Technology Refresh
2A03	W02.02-01	NEXRAD – Legacy, Icing & Hail Algorithms
2A03X	W02.02-02	NEXRAD – Technical Refresh
2A05	F06.01-00	ARTCC Plant Modernization/Expansion – ARTCC Modernization
2A07	C04.01-01	Radio Control Equipment (RCE) – Sustainment
2A07	C06.01-00	Communications Facilities Enhancement – Expansion
2A08	S02.03-00	ATC Beacon Interrogator (ATCBI) Replacement
2A09	S04.02-03	LRR Improvements – Infrastructure Upgrades/Sustain
2A10	C01.02-03	Voice Switching and Control System (VSCS) – Tech Refresh – Phase 2
2A13A	C21.01-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 1a
2A13A	C21.02-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 2
2A13B	C06.04-00	Communications Facilities Enhancement – UHF Replacement
2A17	W04.03-01	Weather and Radar Processor (WARP) Sustain
2B03	A04.01-02	Standard Terminal Automation Replacement System – Terminal Enhancements (TAMR Phase 1)
2B03	A04.01-01	Standard Terminal Automation Replacement System – Technical Refresh (TAMR Phase 1)
2B04	A04.07-01	Terminal Automation Modernization – Replacement (TAMR) – Phase 3
2B05A	A01.11-01	Flight Data Input/Output (FDIO) Replacement
2B06	F01.02-00	ATCT/TRACON Replacement
2B07	F01.01-00	ATCT/TRACON Modernization
2B08	C05.02-00	Voice Switches – Terminal Voice Switch Replacement (TVSR) II
2B10	S03.01-05	ASR-9 / Mode S SLEP, Phase 1B – Transmitter Modification
2B10	S03.01-06	ASR-9 / Mode S SLEP, Phase 2
2B11A	S03.02-01	ASR-11 – ASR-7/ASR-8 Replacement, DOD Takeover, New Establishments
2B11B	S03.02-04 S03.02-05	ASR-11 – Tech Refresh – Segment 1 and Segment 2
2B13	G3C.01-01	Networked Facilities – NAS Voice Switch
2B14	C23.01-00	Voice Recorder Replacement Program – Next Generation Recorders (VRRP)
2B15	A03.05-01	Integrated Display System (IDS) – Technical Refresh and Sustainment
2B17	M07.04-01	Remote Maintenance and Monitoring System (RMMS) – Tech Refresh
2B18X	A04.05-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 2 Tech Refresh
2C01	W01.02-02	Automated Surface Weather Observation Network (ASWON) – ASOS – Pre-Planned Product Improvements (P3I)
2D01	N06.00-00	Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC)

FY 2010 BLI	CIP #	CIP Name
2D04	N08.02-00	Runway Visual Range (RVR) – Replacement/Establishment
2D09	N04.04-00	Navaids – Sustain, Replace, Relocate
2E02	F12.00-00	FAA Buildings & Equipment Sustain Support – Unstaffed Infrastructure Sustainment
2E04	F10.00-00	Airport Cable Loop Systems – Sustained Support
2E07	F11.01-01	Power Systems Sustained Support
4A06	M43.01-00	NAS Interference Detection, Locating and Mitigation (NAS IDLM)

- **FAA Objective 2:** Increase reliability and on-time performance of scheduled carriers.
  - **FAA Performance Target 1:** Achieve a NAS on-time arrival rate of 88.00 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

FY 2010 BLI	CIP #	CIP Name
2A06	A05.01-06	TFM Infrastructure – Infrastructure Modernization
2A06	A05.01-10	Collaborative Air Traffic Management Technologies (CATMT) –Work Package 1
2A06	A05.05-01	Route Availability Planning Tool (RAPT)
2A11	A10.03-00	Advanced Technologies and Oceanic Procedures (ATOP)
2A15	G2S.01-01	Automatic Dependent Surveillance – Broadcast (ADS-B) – National Implementation – Segment 1 and 2
2A18	G5A.05-01	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2
2A18X	G5A05-02	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3
2A18X	G5A05-03	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4
2D10	N04.02-00	Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI)
4A09	M03.02-00	CIP Systems Engineering & Technical Assistance – MITRE

- **FAA Objective 3:** Address environmental issues associated with capacity enhancements.
  - **FAA Performance Target 1:** Reduce the number of people exposed to significant noise by 4 percent per year through FY 2013, as measured by a three-year moving average, from the three-year average for calendar years 2000-2002

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

  - **FAA Performance Target 2:** Improve aviation fuel efficiency by another 1 percent over the FY 2008 level (for a total of 7 percent) through FY 2009, and 1 percent each subsequent year through FY 20132 to 11 percent, as measured by a three-year moving average of the fuel burned per revenue mile flown, from the three-year average for calendar years 2000-2002

FY 2010 BLI	CIP #	CIP Name
1A08D	G6M.02-01	NextGen – Systems Dev – Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction
1A08G	G7M.02-02	NextGen – Systems Dev – Operational Assessments

3. STRATEGIC GOAL: INTERNATIONAL LEADERSHIP

FAA Strategic Goal: Increase the safety and capacity of the global civil aerospace system in an environmentally sound manner.

- **FAA Objective 1:** Promote improved safety and regulatory oversight in cooperation with bilateral, regional, and multilateral aviation partners.
  - **FAA Performance Target 1:** Work with the Chinese aviation authorities and industry to adopt 27 proven Commercial Aviation Safety Team (CAST) safety enhancements by FY 2011. This supports China's efforts to reduce commercial fatal accidents to a rate of 0.030 fatal accidents per 100,000 departures by FY 2012.
  - **FAA Performance Target 2:** By 2013, arrange commitments for external funding for at least 35 aviation development projects (7 per year).
  - **FAA Performance Target 3:** By 2013 work with at least 18 countries or regional organizations to develop aviation leaders to strengthen the global aviation infrastructure.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support these Targets

- **FAA Objective 2:** Promote seamless operations around the globe in cooperation with bilateral, regional, and multilateral aviation partners.
  - **FAA Performance Target 1:** By FY 2013, expand the use of NextGen performance-based systems to five priority countries.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

4. STRATEGIC GOAL: ENVIRONMENTAL STEWARDSHIP

DOT Outcome: Reduction in pollution and other adverse effects from transportation and transportation facilities.

- **DOT Strategy 1:** Adopt transportation policies and promote technologies that reduce or eliminate environmental degradation.

FY 2010 BLI	CIP #	CIP Name
2E01	F13.01-00	Fuel Storage Tanks
3A01	F13.02-00	Environmental Cleanup / HAZMAT

5. STRATEGIC GOAL: SECURITY, PREPAREDNESS AND RESPONSE

DOT Outcome 1: Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector.

- **DOT Strategy:** Continued to enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters.

FY 2010 BLI	CIP #	CIP Name
3A04	C18.00-00	Command & Control Communications (C3)
3A05	F24.00-00	Facility Security Risk Management (FSRM)
3A06	M31.00-00	NAS Information Security – Information Systems Security
3A09X	M31.02-01	Logical Access & Authorization Control Svc (LAACS)

6. STRATEGIC GOAL: ORGANIZATIONAL EXCELLENCE

FAA Strategic Goal: Ensure the success of the FAA's mission through stronger leadership, a better trained and safer workforce, enhanced cost-control measures, and improved decision-making based on reliable data.

- **FAA Objective 1:** Implement human resource management practices to attract and retain a highly skilled, diverse workforce and provide employees a safe, positive work environment.

  – **FAA Performance Target 1:** By FY 2010, 80 percent of FAA external hires will be filled within OPM's 45-day standard for government-wide hiring.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support these Targets

  – **FAA Performance Target 2:** Reduce the total workplace injury and illness case rate to no more than 2.44 per 100 employees by the end of FY 2011, and maintain through FY 2013.

FY 2010 BLI	CIP #	CIP Name
2B09	F13.03-00	NAS Facilities OSHA & Environmental and Occupational Safety and Health Compliance and Fire/Life Safety for Airport Traffic Control Towers

  – **FAA Performance Target 3:** Reduce grievance processing time by 30 percent (to an average of 102 days) by FY 2010 over the FY 2006 baseline of 146 days, and maintain the reduction through FY 2013.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

– **FAA Performance Target 4:** Maintain the air traffic controller workforce at, or up to 2 percent above, the projected annual totals in the Air Traffic Controller Workforce plan.

FY 2010 BLI	CIP #	CIP Name
3B03	M20.01-02	NAS Training Simulation – Tower Cab
3B03	M20.01-03	Tower Cab Simulator – Segment 2

– **FAA Performance Target 5:** Maintain the aviation safety workforce within 1 percent of the projected annual totals in the Aviation Safety Workforce plans.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Objective 2:** Make the organization more effective with stronger leadership, a results-oriented, high-performance workforce and a culture of accountability.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Objective

- **FAA Objective 3:** Improve financial management while delivering quality customer service.

– **FAA Performance Target 1:** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:

10-15 percent savings for strategic sourcing for selected products and services;

By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;

Annual reduction of $15 million in Information Technology operating costs; and

By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

FY 2010 BLI	CIP #	CIP Name
1A02/1A03	F14.00-00	System Support Laboratory Sustained Support
1A04	F16.00-00	William J. Hughes Technical Center Building and Plan Support
1A13F	G6N.01-04	NextGen – FLEX – Separation Mgmt – Approaches, Optimize Nav Tech
2A04	F28.01-01	ATCSCC – Relocation
2A14	G5C.01-01	System-Wide Information Management (SWIM) – Segment 1a
2A14X	G5C.01-02	System-Wide Information Management (SWIM) – Segment 1b
2D08	A14.02-01	Instrument Flight Procedures Automation (IFPA)
2D08X	A14.02-02	Instrument Flight Procedures Automation (IFPA) – Tech Refresh

FY 2010 BLI	CIP #	CIP Name
2E06	F26.01-01	Decommissioning
3A03	M21.04-01	Logistics Center Support System (LCSS)
3B01	F18.00-00	Aeronautical Center Infrastructure Modernization
3B02	M10.00-00	Distance Learning
4A01A	M03.01-00	CIP Systems Engineering & Technical Assistance – SETA and Other Contractors
4A01B	M08.01-00	Provide ANF/ATC Support (Quick Response)
4A02	M08.06-00	Program Support Leases
4A03	M05.00-00	NAS Regional/Center Logistics Support Services
4A04	F19.00-00	Mike Monroney Aeronautical Center – Leases
4A05	M22.00-00	NAS Implementation Support Contract (NISC)
4A07	M02.00-00	Technical Support Services (TSS)

– **FAA Performance Target 2:** Obtain an unqualified opinion on the agency's financial statements (Clean Audit with no material weaknesses) each fiscal year.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Objective 4:** Make decisions based on reliable data to improve our overall performance and customer satisfaction.

  – **FAA Performance Target 1:** In FY 2009, 90 percent of major system investments are within 10 percent variance of current baseline total budget estimates at completion (BAC).

FY 2010 BLI	CIP #	CIP Name
1A01G	M47.01-01	Dynamic Capital Planning

– **FAA Performance Target 2:** In FY 2009, 90 percent of major system investments selected milestones are achieved.

FY 2010 BLI	CIP #	CIP Name
4A08	M08.14-00	Resource Tracking Program (RTP)

– **FAA Performance Target 3:** Maintain the annual average of FAA surveys on the American Customer Satisfaction Index at or above the average Federal Regulatory Agency score.

FY 2010 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

- **FAA Performance Target 4:** Achieve zero cyber security events that disable or significantly degrade FAA services.

FY 2010 BLI	CIP #	CIP Name
		Projects that support this target are shown under Goal 5 – Security, Preparedness and Response.

- **FAA Objective 5:** Enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters.
  - **FAA Performance Target 1:** Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent.

FY 2010 BLI	CIP #	CIP Name
1A14	G7A.01-01	SSE – Security Integrated Tool Set (SITS)

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix B

Fiscal Years 2010 – 2014

(Page intentionally left blank)

APPENDIX B

DETAILED PROGRAM PLAN DATA

LINKING FAA CIP PROJECTS TO GOALS

The Capital Investment Plan (CIP) projects support the goals, objectives, and performance targets in the Federal Aviation Administration (FAA) Flight Plan 2009-2013 and the Department of Transportation's (DOT) strategic plan. Projects are linked to a single objective and the data provided in Appendix B describes how these projects contribute to the performance target under those objectives. For each project output goals are described for the 5 years of this CIP, and, if the CIP project is delivering air traffic control systems into the National Airspace System (NAS), a graphical representation of the implementation schedule is shown. The CIP projects managed by the Air Traffic Organization (ATO) also show the alignment to Strategic Management Process (SMP) Pathway and Objective.

FORMAT

Appendix B is organized by budget line item (BLI) consistent with the fiscal year (FY) 2010 President's submission to Congress. Several CIP projects may be included in one BLI. In those cases when all of the CIP projects pertain to one specific purpose, they are grouped. However, when the CIP projects have different purposes, they are described with separate CIP entries.

Programs/projects in Appendix B contain a Program Description and Relationship to Performance Target description. FY 2010 Performance Output Goals and FY 2011-2014 Performance Output Goals for all Capital funded CIP projects are reported as outlined below.

BLI numbers with an X (i.e., 1A09X) or project titles with X before the name (X, En Route Automation Modernization (ERAM) – Technical Refresh, A01.10-03) are used to designate programs/projects that are not in the FY 2010 President's Budget (ATO and Safety and Operations Capital) but are planned for future years. Accordingly, their inputs are reflected as follows:

- Programs/projects representing new starts or future programs not currently in the President's budget will report future year Performance Output Goals based on projected funding.

CIP Programs/projects are required to reflect FY 2010-2014 Performance Output Goals, with the exception of the following:

- Programs/projects that do not exceed $5M annually.
- Programs/projects that fund support contracts (such as CAASD, SETA, NISC) or fund program support leases.

Where, 'None' is reflected in the FY 2010-2014 Performance Output Goals sections, it denotes that no funding was allocated for that fiscal year.

EXAMPLE

The following example illustrates how the project data provided is used to support the FAA Flight Plan Goal, Objective, and Performance Target, along with a sample format of CIP project inputs:

PROGRAM DESCRIPTION

Airport Surface Detection Equipment – Model X (ASDE-X) is a modular surface surveillance system that processes multiple radar sources, multilateration, and Automatic Dependent Surveillance-Broadcast (ADS-B) sensor data to provide seamless airport movement area coverage and aircraft identification to air traffic controllers. ASDE-X is being deployed to airports with no surface surveillance systems and….

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 3 –** Reduce the risk of runway incursions.
- **FAA Performance Target 1 –** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.450 per million operations, and maintain or improve through FY 2012.

Relationship to Performance Target

The ASDE-X system provides air traffic controllers with a visual representation of the traffic situation on the airport surface movement area and arrival corridors in the form of aircraft and vehicle position information and flight identifications or call signs. This increased awareness of the situation on the airport surface movement area is essential in reducing runway collision risks…

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals

- Deliver last 9 out of 35 (100%) ASDE-X systems.
- Achieve Initial Operating Capability (IOC) of 13 out of 35 (91%) ASDE-X systems.

Program Plans FY 2011-2014 – Performance Output Goals

- Achieve IOC at the last 3 out of 35 (100%) ASDE-X systems.
- Begin study to determine the equipment and/or software that needs to be included in the tech refresh.
- Begin tech refresh in 2012.

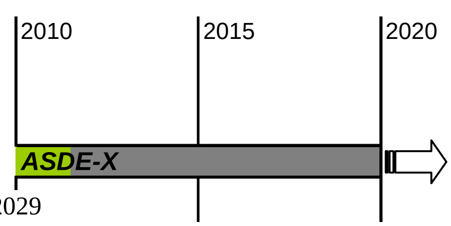
SYSTEM IMPLEMENTATION SCHEDULE

Within this section, system deployment and operational status from 2010 through 2020 for major system acquisitions will be graphically reflected. For example:

Airport Surface Detection Equipment – Model X (ASDE-X)

First ORD October 2003 -- Last ORD: May 2011

First Site Decom: October 2028 -- Last Site Decom: September 2029



* The last three ASDE-X sites are dependent on or impacted by their planned new Airport Traffic Control Tower schedules.

Table of Contents

ACTIVITY 1: ENGINEERING, DEVELOPMENT, TEST, AND EVALUATION

1A01, ADVANCED TECHNOLOGY DEVELOPMENT AND PROTOTYPING (ATDP)

FY 2010 Request $41.8M

- A, Runway Incursion Reduction Program (RIRP) – ATDP, S09.02-00
- B, System Capacity, Planning, and Improvements – ATDP, M08.28-00
- C, Operations Concept Validation and Infrastructure Evolution – ATDP, M08.29-00
- D, NAS Wide Weather Requirements and Strategic Planning – ATDP, M08.27-01
- E, Airspace Management Program (AMP) – ATDP, M08.28-04
- F, Strategy and Evaluation – ATDP, M46.01-01
- G, Dynamic Capital Planning, M47.01-01
- H, Juneau Airport Wind System (JAWS), Harden Prototype and Implementation, W10.01-01
- I, Wake Turbulence Research, M08.36-01
- J, Traffic Alert and Collision Avoidance System (TCAS), A28.01-01
- K, Low Cost Ground Surveillance, S12.01-01
- L, Aeronautical Information Process Improvement, A08.04-01

A, RUNWAY INCURSION REDUCTION PROGRAM (RIRP) – ATDP, S09.02-00

Program Description

The Runway Incursion Reduction Program (RIRP) will continue research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board recommendations and initiatives identified in the FAA Flight Plan, research emphasis will remain on technologies that provide for direct safety warnings to pilots and aircrews, as well as those that can be applied cost effectively at small to medium airports. The program will test alternative small airport surface detection technology and the application of these technologies for pilot, controller, and vehicle operator situational awareness tools. Current initiatives include Runway Status Lights technology enhancements such as Runway Intersection Lights (RIL) logic, Light Emitting Diode (LED) technology, Low Cost Ground Surveillance (LCGS) Pilot, and Final Approach Runway Occupancy Signal (FAROS) for high density airports. When appropriate, investment analyses will be performed to support acquisition and implementation of selected solutions.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 3 –** Reduce the risk of runway incursions.
- **FAA Performance Target 1 –** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.450 per million operations, and maintain or improve through FY 2013.

Relationship to Performance Target

The RIRP is developing and testing technologies that aim to provide direct and preventive alerting to pilots and vehicle operators to reduce both the frequency and risk of runway incursions. Much of the program's research emphasis is based on studies that show that direct pilot and vehicle warning mechanisms are the best defense against the most serious runway conflicts and the relationship to the performance target is thus quite direct. For example, initial operational evaluations of Runway Status Lights (RWSL) technology have yielded a reduction in runway incursions of up to 70% at the test runways. Other RIRP technology development initiatives will aim to further support the performance target.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- Conduct operational evaluation of enhanced FAROS technology.
- Conduct FAROS technology investment analyses.
- Conduct LCGS pilot project to evaluate investment alternatives.
- Conduct operational tests of RWSL/RIL enhancements.
- Conduct evaluation of LED technology applied to RWSL.
- Develop low cost RWSL system design for small/medium airports.
- Conduct runway safety technology international coordination and harmonization outreach.

Program Plans FY 2011-2014 – Performance Output Goals
- Transition LCGS solutions to NAS implementation.
- Complete operational evaluation of low cost RWSL systems.
- Complete evaluations of LED technology applied to RWSL.
- Continue international standardization/harmonization efforts for approved surface technologies.
- Continue to explore and evaluate emergent surface technologies to enhance runway safety.

B, SYSTEM CAPACITY, PLANNING, AND IMPROVEMENTS – ATDP, M08.28-00

Program Description

The System Capacity, Planning, and Improvements program identifies, evaluates, and formulates system capacity improvements for the NAS. This program sponsors NAS capacity and airport capacity studies where experts from the FAA, academia and industry collaborate to analyze and develop recommendations for improving capacity and system efficiency, and reducing delays at specific airports in alignment with FAA Flight Plan targets. In conjunction with providing recommendations for airport improvements, procedural updates, and simulation studies, this program delivers performance measurement systems and operations research to quantify the efficiency of the NAS and form the basis of proposals for system improvements. The Performance Data Analysis and Reporting System (PDARS) is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the ATC system. The tracking and monitoring capabilities of PDARS support studies and analysis of air traffic operations at the service or national level. Also, the capacity and efficiency of the NAS is further expanded through capacity modeling which analyze the impact of NextGen operational improvements.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This program will facilitate the modeling and analysis of new runways, airfield improvements, air traffic procedures, and other technological implementations to improve airport capacity and system efficiency. Study Teams evaluate alternatives for increasing capacity at specific airports that are experiencing or are projected to experience significant flight delays. Capacity studies provide recommendations and solution sets for improving airspace and airport capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.3** – Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals

- Refine and develop new high level outcomes, strategic measures, targets and key initiatives for the five strategic goals in the new Five Year ATO Strategic Plan.
- Develop a new process for implementing and measuring the success of the ATO via the outcomes developed for the Five Year Strategic Plan.
- Develop, analyze and report performance benchmarks with international partners.
- Expand PDARS network to include existing airport ASDE-X surface surveillance data.
- Update current airport capacity estimates, and estimate future airport capacities considering fleet, infrastructure, and procedural changes to support Airport Design Teams, Future Airport Capacity Task (FACT) III report and NextGen modeling and analysis.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue strategic planning and performance measurement and analysis of objectives outlined in the ATO Strategic Plan.
- Develop, analyze and report gate-to-gate performance data.
- Implement interface to allow data exchange between PDARS and the En Route Automation Modernization (ERAM) system.
- Modify PDARS existing software to maintain connectivity to future releases of ERAM.
- Complete PDARS network to include all ASDE-X surface surveillance data.
- Continue updates and support of the Future Airport Capacity Task reports to identify airports where additional capacity development may be necessary.
- Coordinate international cooperative efforts to improve system capacity and efficiency performance measurement and analysis.

C, OPERATIONS CONCEPT VALIDATION AND INFRASTRUCTURE EVOLUTION – ATDP, M08.29-00

Program Description

Developing operational concepts is an Office of Management and Budget (OMB) recommended first step in developing an Enterprise Architecture. This program develops and validates operational concepts that are key to Air Traffic Organization’s (ATO) modernization programs and the Next Generation Air Transportation System (NextGen). This work includes developing and maintaining the overall NAS Concept of Operation and ensuring its compatibility with the International Civil Aviation Organization (ICAO) “Air Traffic Management (ATM) Global Concept”. It also includes developing the detailed second level, subsidiary concepts that support validation and requirements development. Second level concepts identify the personnel and functional changes necessary for the ATO to provide customer service in ways that increase productivity and reduce net cost. Recent work includes developing second level concepts for En Route, Traffic Flow Management (TFM), NextGen Towers, and Integrated Arrival & Departure Operations. This information helps the aviation community anticipate what changes are needed in aircraft equipment in order to operate with the new technology being implemented in the NAS and develop new procedures.

The Operational Concept efforts look at the changing roles and responsibilities of the Air Traffic workforce and the design of Advanced Facilities to derive the associated functional requirements imposed on the NAS infrastructure. Concept development includes preparing system specifications, roles and responsibilities, procedures, training, and certification requirements. These development and validation activities support NAS modernization through: (1) concept/scenario development; (2) concept validation; (3) simulation and analysis; (4) system design; (5) metric development; and (6) modeling.

The "Advanced Facility Planning" identifies the system requirements to meet these operational concept derived needs and identifies opportunities for modernization, modification and/or expansion of air traffic control infrastructure including facilities. Not only physical plant alternatives need to be studied, but also organization of workload distribution and location of new facilities. This program does the upfront analysis to determine the future configuration of a facility, (separate new, refurbish old, collocate with another facility, or consolidation) using considerations such as risk to service. Identifying the correct investment alternative reduces cost and improves efficiency.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Concept validation supports development, analysis, and simulation of new concepts to evaluate the following;

- Alternate roles for Air Traffic Service Providers, airspace users, and automation that could increase capacity,
- Alternative airspace structure which may increase productivity and hence capacity,
- Alternative communication, navigation, and surveillance (CNS) architecture to support the ATO's goal of reducing cost, and;
- Alternative automation, display, and facility configuration to increase productivity and hence capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.2 –** Deliver a future air traffic system that meets customer operational needs.

Program Plans FY 2010 – Performance Output Goals

- Continue concept development and validation to identify opportunities to right size the ATC infrastructure for cost efficiency and productivity.
- Conduct analyses and develop concepts to support the applications of 4-D trajectory management.
- Continue RTCA support.
- Support Action Plans with European organization for the safety of air navigation (EUROCONTROL) to coordinate concept development, validation, and measurement methodologies, including support for the Validation Data Repository.
- Investment analysis/staff studies for NextGen towers and other facility replacement/co-location/consolidation as required.
- Validate the concept for high altitude, generic airspace to minimize controller training and maximize staffing flexibility.
- Expand the concept development and validation of the multi-sector planner to identify opportunities for the utilization of new systems and capabilities.
- Expand cognitive and analytic models to support assessments.

Program Plans FY 2011-2014 – Performance Output Goals

- Develop criteria for evaluation of the standard controller platform to support reduced maintenance, training, and increased flexibility in establishing and implementing changes to controller roles and responsibilities.
- Develop Concept of Use for the advanced flight deck.
- Continue to support Action Plans with EUROCONTROL to coordinate concept development, validation, and measurement methodologies, including support for the Validation Data Repository.
- Expand cognitive and analytic models to support assessments.
- Continue RTCA support.
- Investment analysis/staff studies for NextGen towers and other facility replacement/co-location/consolidation as required.

- Facilities Evolution – Continue analysis of standard controller workstation based on the changes in service providers' roles.
- Define information and display requirements for a multi-sector planner position and a generic, high altitude controller position.

D, NAS WIDE WEATHER REQUIREMENTS AND STRATEGIC PLANNING, M08.27-01

Program Description

This program develops mission need and investment analysis for initial investment decisions for aviation weather sensors, forecasting capability, dissemination systems, and integration capability for the NAS. The focus is on NextGen including collaboration with Single European Sky ATM Research (SESAR) and ICAO for advanced aviation weather standards. The purpose is to reduce the number of weather related accidents, reduce the number of aviation flight delays, diversions and cancellations, improve operational efficiency of the NAS, and harmonize ICAO standards with US practices in weather.

The funding supports contract services to identify future demand for services, identify technological opportunities to address that demand, identify projected supply of services, perform gap analysis, perform mission needs analysis, develop functional and performance requirements and validate requirements through users workshops, demonstrations and simulations. It also supports planning, analysis and documentation studies in support of initial investment decisions for new or modified aviation weather capabilities. Included are (1) requirements cutting across FAA, NWS, and Department of Defense (DoD) boundaries, roles and responsibilities in providing weather support, (2) analysis of and plans for integration of weather information into decision support systems, and (3) standards development for surface and airborne observations, forecasts, and dissemination for both U.S. practices and ICAO Standards and Recommended Practices (SARPS).

This program also funds contract support to develop performance requirements for weather research and development and for transitioning weather research into operations including evaluation of human factors, compatibility of new technology with procedures, and analysis of the impact of new information on controller and pilot workloads.

This program updates weather mission needs document 339. The requirements work in this program builds on the Reduced Weather Impact (RWI) and NextGen Network Enabled Weather (NNEW) Concept and Requirements Document (CRD). That CRD is developed at the portfolio level which is a high level description of requirements across the entire NAS. This program provides the requirements detail needed for investment analysis.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This program contributes to FAA's greater capacity goal by developing and validating mission needs and requirements and identifying research needed to enable the air transportation system to meet NextGen objectives. The program funds analyses and studies that will assist in identifying appropriate weather performance requirements and in identifying opportunities to improve weather products, both of which will lead to increased capacity. The program also facilitates the movement of aviation weather products from research and development into operational use to increase capacity,

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.2** – Deliver a future air transportation system that meets customers' operational needs.

Program Plans FY 2010 – Performance Output Goals

- Validate NextGen weather performance requirements with external customer representatives.
- Refine weather research plans to meet Next Gen weather performance requirements
- Align NextGen with SESAR weather requirements and propose a joint package to ICAO to upgrade Annex 3 weather SARPS.

Program Plans FY 2011-2014 – Performance Output Goals

- Update 2004 NAS Weather Mission Needs Statement for better alignment with NextGen 2025 objectives.
- Develop weather performance requirements for NextGen segment 2, 2013-2018.
- Conduct studies on improved integration of weather information into ATM manual procedures and automated processes.

E, AIRSPACE MANAGEMENT PROGRAM (AMP) – ATDP, M08.28-04

Program Description

This program supports increased capacity by funding the physical changes in facilities necessary to accommodate airspace redesign. Redesign projects will take on increased emphasis at both the national and regional levels to ensure that FAA is able to effectively manage the projected growth in demand at FAA facilities and airports.

Implementation of airspace redesign efforts frequently results in changes in the number and shape of operational positions or sectors, including changes to sector, area or facility boundaries. Transition to the new configuration requires changes in the supporting infrastructure, which depend on the airspace design to be implemented. These infrastructure changes can include communications modifications such as changes in frequencies, connectivity of radio site to the control facility, controller-to-controller connectivity; surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to the host data processing or flight data processing; interfacility transmission modifications; additional consoles and communications backup needs; and modifications to the facility power and cabling.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Airspace redesign will increase system capacity by reducing limitations that the airspace places on the system. Congestion, complexity and limited departure points in the current airspace can result in restrictions, limiting airport departure throughput. Inefficient en route holding and arrival routes can limit airport arrival throughput. Airspace redesign is striving to address these issues both locally and system-wide.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.5** – Identify and prioritize airspace and technical initiatives based on value.

Program Plans FY 2010 – Performance Output Goals

- Implement New York/ New Jersey / Philadelphia (NY/NJ/PHL) Metropolitan Airspace Redesign, initial sectors and routes.
- Implement Chicago Airspace Project, next phase (III).
- Develop and Design Western Corridor Airspace Redesign.
- DC Metro Area Design – including Hyper Binns.

Program Plans FY 2011-2014 – Performance Output Goals

- Implement Western Corridor Airspace Redesign initial sectors.
- Implement NY/NJ/PHL Redesign, next phases (II and III).
- Implement Chicago Airspace Project, final phases (III and IV).
- Implement additional terminal/en route/oceanic changes.

F, Strategy and Evaluation – ATDP, M46.01-01

Program Description

The FAA's Office of Modeling and Simulation is responsible for developing and maintaining mathematical models of the NAS, and using these models to help guide NextGen investments. FAA's modeling suite includes models of varying scope, from systems dynamics models of the entire air transportation system to detailed airport surface models. Several of these models are obsolete and cannot support the analysis of advanced Air Traffic Management (ATM) concepts.

The Strategy and Evaluation program will develop two new computer models to rectify these modeling shortfalls and better support other organizations within FAA that do capacity studies:

1. An Airport Capacity Model will be developed for use in analyzing new airport capacity-related projects. The proposed model will facilitate rapid analysis of airport improvements, demand changes, and ATM technology insertions. In addition to being used by the Office of Modeling & Simulation, the model will be used by the Office of Performance Analysis and Strategy for runway capacity studies, ATO Finance for investment analyses, the Joint Planning and Development Office (JPDO) for NextGen analyses, and the FAA's Office of Airports. The model will also be used by aviation consultants and the academic community to provide a de facto standard for airport capacity analyses.
2. A System-Wide NAS Model will be developed to replace the existing National Airspace System Performance Analysis Capability (NASPAC) model. A new system-wide model is required to analyze advanced ATM concepts and aid with NextGen program trade-off studies, investment analyses, and NAS performance analyses. The new model will support the Office of NextGen Implementation and Integration, Office of Performance Analysis and Strategy, Office of Research and Technology Development (concept validation), ATO Finance (investment analysis), and the JPDO. Additionally, FAA and NASA contractors and the academic community may use the model.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 3 –** Commission nine new runway/taxiway projects, increasing the annual service volume of the 35 OEP airports by at least 1 percent annually, measured as a five-year moving average, through FY 2013.

Relationship to Performance Target

Currently, the FAA relies on a suite of outdated models for analyzing the impact of proposed changes to ATM procedures, equipment, and airport infrastructure, as well as anticipated changes in the quantity, composition, and distribution of air traffic. These models are critical for many decision-making processes associated with the following *Greater Capacity Objective 1* strategies:

- Improve airspace access by studying the impact of modifying separation standards to increase capacity and allow more efficient use of congested airspace.
- Improve departure and landing capacity during low visibility conditions by modeling the improvements gained with new technologies and procedures.
- Evaluate existing airport capacity levels and set investment and infrastructure priorities and policies that enhance capacity.
- Increase aviation capacity and reduce congestion in the seven major metropolitan areas and corridors that most affect total system delay.

In particular, the new Airport Capacity model will aid with the planning and evaluation of new runway/taxiway projects.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.5 –** Optimize NextGen/OEP portfolio.

Program Plan FY 2010 – Performance Output Goals

- Complete Build 2 of Modernized Airfield Delay Simulation Model (ADSIM+).
- Complete design analysis and specification for new NAS-wide simulation model.
- Begin development of core modules of new NAS-wide simulation mode.

Program Plan FY 2011-2014 – Performance Output Goals

- Complete development, validation, and documentation of improved ADSIM+.
- Complete development, validation, and documentation of new NAS-wide simulation model.

G, DYNAMIC CAPITAL PLANNING, M47.01-01

Program Description

The Dynamic Capital Planning tools will allow ATO to make optimal decisions based on best business practices and provide verification that aggressive approval thresholds have been implemented and that disciplined management of capital programs is being carried out. The requirements analysis for selecting Dynamic Capital planning tools is being evaluated through the ATO Office of Finance and includes tools to address the following focus areas: determining quantitative economic value and internal benefits validation for capital projects; milestone tracking and schedule modeling; performance measurement; auditing and trend analysis; earned value monitoring through program life cycle; field implementation planning; and post implementation analysis for corporate lessons learned results.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 4 –** Make decisions based on reliable data to improve our overall performance and customer satisfaction.
- **FAA Performance Target 1 –** In FY 2009, 90 percent of major system investments are within 10 percent variance of current baseline total budget estimates at completion (BAC).

Relationship to Performance Target

The project will allow the initial procurement of financial analysis tools and consultant support to allow a better evaluation of programs through all phases of the acquisition life cycle. The improved data will lead to better decisions on program implementation, improvements in ATO's performance, and the resulting higher level of customer satisfaction.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.5 –** Identify and prioritize airspace and airport initiatives based on value.

H, JUNEAU AIRPORT WIND SYSTEM (JAWS), HARDEN PROTOTYPE AND IMPLEMENTATION W10.01-01

Program Description

The JAWS provides terrain induced wind and turbulence data that addresses safety of flight and decreases the probability of experiencing unnecessary weather related delays in and out of the Juneau International Airport, Alaska. Although JAWS data is provided to the aviation community as advisory, it is essential for pilots to know the wind conditions because of the restrictive geographical features that affect approach and departure paths. The JAWS measures and transmits wind information to the Juneau Automated Flight Service Station (AFSS) for use in preparing pilot briefings; Alaska Airlines for use in complying with their Operations Specification; the National Weather Service for weather forecasting; and to other Alaska aviation users via the Internet.

In 2008 favorable results were realized in the performance of turbulence alerting, and alternatives were analyzed to determine the best business case for the JAWS. The JAWS investment decision approved implementing the hardened prototype as the end-state JAWS, and this system will be certified and maintained by the FAA.

The National Center for Atmospheric Research (NCAR) developed the prototype JAWS and has been operating and maintaining the prototype since 1998. The JAWS prototype does not conform to FAA standards necessary for FAA operations and maintenance, and the current architecture of the prototype JAWS is not supportable beyond 2009. Operating and maintaining the JAWS beyond 2009 requires hardware replacement, a computer technology update, information security compliance, and transfer of the technology from NCAR to the FAA. Transitioning the operations and maintenance of the JAWS to the FAA will involve software development, code, compilers, operating system improvements, obtaining system and training documentation, and receiving access to data on JAWS operating experience and other NCAR, intellectual property. NCAR will provide operations and maintenance history and technical support during the transition.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Flight Plan Goal 1 – Increased Safety.**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 2 –** By the end of FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from the 2000-2002 average of 130 accidents per year to no more than 99 accidents per year. This measure will be converted from a number to a rate at the beginning of FY2010.

Relationship to Performance Target

JAWS contributes to achieving the strategic goal of Increased Safety by providing critical wind information to enable commercial and general aviation RNP operations in Juneau AK, and it disseminates timely turbulence information to the aviation community to reduce cabin injuries caused by turbulence. The JAWS also supports landing and departure capabilities for aircraft during hazardous wind conditions.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plan FY 2010 – Performance Output Goals

- JAWS End-to-End Function Test August 2010.
- JAWS Security Certification and Authorization Package (SCAP) May 2010.

Program Plans FY 2011–FY2014 Performance Output Goals

- JAWS In-Service Decision September 2011.
- FAA Operations and Maintenance begins in 2012.
- Technology Refresh in 2015.

I, WAKE TURBULENCE RESEARCH, M08.36-01

Program Description

This program will evaluate air traffic control decision support tool concept feasibility prototypes as possible enablers to safely meet the predicted NextGen demand for additional flights in the nation's air transportation system. If these prototypes are successful, more flights can be accommodated in the existing airspace because the required wake mitigation separations between aircraft can be safely reduced. This program is taking the results of technology research and development and new wake separation concept modeling and simulation efforts and evaluating the resulting concept feasibility prototypes for flight safety and impact on the NAS capability for meeting the demand for more flights.

In FY 2010, it is expected that research and development will be sufficiently complete to allow the airport environment evaluation of a prototype Wake Turbulence Mitigation for Arrivals (WTMA) decision support tool. This tool would be used by controllers in reducing wake separations imposed on aircraft following behind Boeing 757 or heavier aircraft when landing on an airport's set of closely spaced parallel runways (runways less than 2500 feet apart). Research is ongoing in Europe for developing a similar solution for aircraft landing directly behind each other on a single runway. In FY 2013, it is expected that this program will begin evaluating an FAA R,E&D developed air traffic control prototype system that is based on the European research effort. The "single runway" prototype (WTMSR) will be used to evaluate its overall system safety and its ability to create more NAS capacity.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This program's work in FY 2010 through FY 2012 on WTMA will lead to an FAA acquisition in FY 2013 to transform the capabilities of the prototype into functioning tools for use by the FAA air traffic controllers. First operational benefit will be realized during FY 2015 when the initial system is used in an airport's operation. This solution will allow the reduction of the required diagonal wake turbulence separation distance to 1.5 NM or potentially less when instrument approaches are being conducted to closely spaced parallel runways and there are favorable crosswinds. This translates to 4 to 6 more arrival slots per hour for an airport that uses its closely spaced parallel runways for arrival operations and has a significant percentage of 757 and heavier aircraft traffic.

Strategic Management Process (SMP) and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.3 –** Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals

- Begin WTMA prototype system evaluation in an airport environment.

Program Plans FY 2011-2014 – Performance Output Goals
- 2011 – Continue WTMA prototype evaluation in an airport environment.
- 2012 – Finish evaluation of the WTMA air traffic control decision support tool feasibility prototype.
- 2013 – Begin WTMSR prototype evaluation in an airport environment.
- 2014 – Continue WTMSR prototype evaluation in an airport environment.

J, TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS), A28.01-01

Program Description

Aircraft flying in the NAS began equipping with the Traffic Alert and Collision Avoidance System (TCAS) in 1990. The TCAS display is mounted in the cockpit to warn pilots of collision risks with other aircraft. There are currently two versions of TCAS: TCAS I is a low-cost version of the system that provides traffic advisories only. TCAS II is a more capable version that can provide resolution advisories (RAs) that tell the pilot the specific vertical maneuvers that are necessary to avoid potential midair collisions. TCAS II is required in U.S. airspace for all commercial aircraft with 30 or more seats and on all cargo aircraft with a maximum certified take-off weight greater than 33,000 lb.

In 2004, RTCA reconstituted its TCAS Special Committee (SC-147), as the direct result of a TCAS related crash in Europe and a near mid-air collision that occurred in Japan. The committee examined these events and others to determine the cause and contributing factors. The committee determined that in certain encounters between two aircraft, TCAS does not issue a sense reversal (e.g. change a “Climb” command to a “Descend”) in a timely manner, if at all. The FAA, in coordination with interested parties, has developed a solution for this problem, and it is currently being implemented. In addition, the program office has developed a monitoring system to gather data on the performance of TCAS systems and determine whether additional refinements and improvements are necessary. This system is being transitioned to operational use.

The current TCAS design needs to be refined to become more flexible to adapt to the NAS changes proposed by the Next Generation Air Transportation System’s (NextGen) Concept of Operations. Many elements of the current TCAS design date from research performed in the 1970s and 1980s, and reflect older methods of airspace use such as:
- air traffic control provided separation based on radar data,
- rigid route structures,
- airborne surveillance of Mode C and Mode S transponders provided pilots with range and altitude but not a target’s identity or intent,
- performance-based flight profiles were not issued, and
- situational awareness or separation tools were not available in the cockpit.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

This program is focused on correcting emerging safety issues related to collision avoidance systems carried in aircraft; it improves the TCAS system’s ability to resolve near-midair encounters; and the pilot’s ability to react correctly to TCAS instructions. An independent collision avoidance system for pilots becomes even more essential, when Automatic Dependent Surveillance-Broadcast (ADS-B)-based capabilities enter the NAS and more responsibility for aircraft separation is transferred to the flight deck.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence
- **SMP Objective #1.1 –** Ensure airspace system is safe, efficient, and secure.

Program Plans FY 2010 – Performance Output Goals

- Complete the deployment and transitional coordination and hand-off of the TCAS Resolution Advisory (RA) Monitoring System (TRAMS).
- Complete transition of TCAS version 7.0 / 7.1 activities to an appropriate service unit.
- Continue to monitor and assess TCAS operations to ensure that the recently approved changes to the TCAS logic don't have any adverse effect on the NAS.
- Continue supporting applicable AVS rulemaking and ICAO activities associated with the upgrade of existing TCAS II version 7.0 units, with version 7.1.
- Coordinate with avionics manufacturers and airlines on an implementation plan if a final rule is deemed necessary.

Program Plans FY 2011-2014 – Performance Output Goals

- Transition responsibility of TCAS II version 7.0 / 7.1 to AVS or other applicable service organization.
- Develop a financial plan to address activities associated with future NextGen TCAS version 8.0.

K, LOW COST GROUND SURVEILLANCE, S12.01-01

Program Description

A Low Cost Ground Surveillance (LCGS) program will provide basic ground traffic surveillance capability to enhance safety at small and medium airports where cost-effective deployment of Airport Surface Detection Equipment Model X (ASDE-X) technology is not possible. The LCGS will serve in an advisory capacity providing the air traffic controller with surface surveillance information to reduce the risk of ground traffic incidents, incursions, or accidents. Additionally, the LCGS will provide the basic infrastructure upon which additional runway safety applications such as runway status lights and Surface Movement Guidance and Control Systems (SMGCS) can be built.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 3 –** Reduce the risk of runway incursions.
- **FAA Performance Target 1 –** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.450 per million operations, and maintain or improve through FY 2013.

Relationship to Performance Target

LCGS will provide enhanced surface situational awareness to Air traffic Controllers at small to medium sized airports in low visibility conditions.

Strategic Management Process (SMP) and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals

- Award one or more contracts for deployment of candidate LCGS systems at Pilot program sites.
- Complete Program Safety Plan (PSP).
- Complete Exhibit 300 Program Baseline.
- Obtain Final Investment Decision.
- Review and Update Enterprise A Products.

Program Plans FY 2011-2014 – Performance Output Goals

- Performance Output Goals will be prepared for FY 2011 – FY 2014 after the Final Investment Decision is planned for FY 2010 is approved and the LCGS system is baselined.

L, AERONAUTICAL INFORMATION PROCESS IMPROVEMENT, A08.04-01

Program Description

The purpose of the Aeronautical Information Process Improvement (AIPI) program is to plan how to manage aeronautical information within the ATO. Because aeronautical information is created, managed, distributed and used by multiple administrative and operational organizations, careful data management is needed. AIPI will provide a centralized, consistent approach to managing aeronautical information.

In 2007 and 2008 the FAA Aeronautical Information Working Group met to discuss aeronautical information mission shortfalls and identify strategies for improving aeronautical information service delivery. As a result of that working group several strategies were identified that became the foundation for the AIPI program:

- Identify the scope of aeronautical information.
- Provide a central point for orchestrating aeronautical information to ensure consistency and quality to meet the needs of downstream mission essential and mission critical air traffic management systems.
- Initiate, develop and manage a business process to improve aeronautical information flows, reduce duplication and ensure information consistency for downstream users.
- Develop new capabilities to automate manual aeronautical information processes, increase ICAO compliance and to support future air traffic management capabilities allowed by System-Wide Information Management (SWIM), NextGen and AIM Modernization.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by FY 2025.

Relationship to Performance Target

The Aeronautical Information Process Improvement Program will reduce the proportion of accidents directly attributed to poor aeronautical information. Metrics used to track the success of this program include:

1. Number of NOTAMs issued to correct erroneously published aeronautical information.
2. Number of instrument approach procedure re-work caused by aeronautical information inconsistencies.
3. Number of accidents where faulty aeronautical information was a contributing factor.
4. FAA AIM customer satisfaction.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.8 –** Develop alternative business concepts.

Program Plan FY 2010 – Performance Output Goals

- Benchmark practices of internal and external organizations to identify best practices and performance targets for the FAA.
- Initiate business process analysis and enterprise architecture.
- Initiate AIM Customer Relationship team and AIM Process Improvement teams.
- Complete mission shortfall and problem statement.

Program Plan FY 2011-2014 – Performance Output Goals

- Analyze business processes and architecture to develop solutions.
- Develop business case and achieve executive council approval.
- Complete process improvement projects.

1A02/1A03, NAS IMPROVEMENT OF SYSTEM SUPPORT LABORATORY AND WILLIAM J. HUGHES TECHNICAL CENTER FACILITIES

FY 2010 Request $13.0M

- System Support Laboratory Sustained Support, F14.00-00

Program Description

The William J. Hughes Technical Center (WJHTC) System Support Laboratory provides the facilities to develop, test, and integrate new systems into the NAS. Once prototype systems, used for testing, support the decision for allowing production systems to become operational, they become part of the FAA's test bed and are used to support the operational field sites over their lifecycle. This program sustains the agency's centralized test bed infrastructure. Testing and support facilities include:

- En Route System Support Facility;
- Terminal System Support Facility;
- Oceanic System Support Facility;
- Traffic Management Systems,
- Weather Systems;
- Communications Systems;
- Radar Systems;
- Navigation and Tracking Systems;
- Target Generator Facility;
- Cockpit Simulation Facility;
- Human Factors Laboratory; and
- Fleet of specially instrumented aircraft.

The test beds are also used for developmental activities associated with Research and Development programs. Maintaining a centralized core of test beds reduces the overall cost to the FAA and increases efficiency in testing and preparing new systems for operational use.

The Improvement of the System Support Laboratory Program includes reconfiguring laboratory space and upgrading and enhancing electrical and electronic equipment to allow testing of new or modified systems. It also procures unique equipment and systems that can interface and switch the various systems into multiple test and field support configurations. A centralized laboratory has the flexibility to test both individual systems and the interfaces between systems and avoids the cost of operating multiple test facilities for new equipment testing and support.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1** – Organizations throughout the agency will continue to implement cost efficiency initiatives.

Relationship to Performance Target

This centralized testing facility serves as the FAA's research, development, testing, and field support infrastructure. With this system centralization, each Integrated Product Team/Business Unit need not establish and maintain separate infrastructure to support individual programs and fielded systems. It also enables the FAA to evaluate concepts and programs that span more than one domain of the NAS. This reduces the overall cost to FAA and improves the efficiency of testing new equipment and supporting operational facilities.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.1 –** Be better stewards of public funds.

1A04, WILLIAM J. HUGHES TECHNICAL CENTER INFRASTRUCTURE SUSTAINMENT
FY 2010 Request $5.5M

- William J. Hughes Technical Center Building and Plant Support, F16.00-00

Program Description

The FAA William J. Hughes Technical Center (WJHTC) owns and operates about 1.58 million square feet of test and evaluation, research and development, and administrative facilities, plus numerous project test sites. The value of the buildings and infrastructure is about $190.1 million (FY 2003 figures). These facilities require an annual program of capital improvements and modernization. Example projects include: (1) replacing old heating, ventilation, and air-conditioning systems; (2) upgrading the electrical distribution systems; and (3) upgrading fire-suppression systems to current life safety codes. The average annual expenditure to sustain the WJHTC is about 2.8 percent of the Center's value.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence**.
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

Infrastructure Sustainment at the WJHTC will control costs while delivering quality customer service by replacing old systems /equipment before serious problems occur. It will also reduce energy consumption, and cost, on a per-square-foot basis. This line item will update facilities and facility support systems to ensure that the laboratories and other facilities operate properly and can handle utility loads of the systems being tested. As the WJHTC plays a key role in developing and testing new equipment that will be used in the NAS, it is critical that the facilities operate efficiently. WJHTC effectiveness in testing and approving equipment can result in earlier system deployment and a faster reduction in air traffic delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.1 –** Be better stewards of public funds.

Program Plans FY 2010 – Performance Output Goals

- Water Plant (Building 33) Replacement (construction).
- Center Facility System Improvements (Year 1 of 20 year plan).
- Underground Primary Electric Cable Replacement.
- Building 300 Roof Replacement (design/permits).
- Evaluation of a Combined Heating and Power Facility.

Program Plans FY 2011-2014 – Performance Output Goals

- Replace the remaining 3 electrical substations in Building 300.
- Center Facility System Improvements (years 2 through 5).
- Building 300 Roof Replacement (construction).
- Renovations to Building 316.
- Main Substation Upgrade.

1A05, NextGen Network Enabled Weather (NNEW)

FY 2010 Request $20.0M

- Reduced Weather Impact – NextGen Network Enabled Weather (NNEW), G4W.01-01

Program Description

NNEW is part of an interagency effort to provide quick, easy, and cost effective access to weather information. NNEW will define and provide the FAA's portion of the interagency infrastructure known as the 4-Dimensional Weather Data Cube (4-D Wx Data Cube). The 4-D Wx Data Cube will provide common, universal access to aviation weather data. All categories of weather users will have improved access to timely and accurate weather information to support improved decision making, while enhancing safety. The 4-D Wx Data Cube consists of (1) weather data published in various databases within FAA, National Oceanic and Atmospheric Administration (NOAA), and Department of Defense (DoD), as well as commercial weather data providers that may participate; (2) registries/repositories needed to locate and retrieve published data; (3) the capability to translate among various standards that will be employed, and to provide data in user required units and coordinate systems; and (4) the capability to support retrieval requests for data volumes (such as along a flight trajectory). A subset of the data published to the 4-D Wx Data Cube will be designated the Single Authoritative Source (SAS). The SAS identifies the preferred data source should be used to support collaborative air traffic management decisions and ensures that decisions are based on consistent data.

The initial NNEW requirements and architecture will be developed, and standards for publishing and accessing 4-D Wx Data Cube data will be completed. The interagency partners, led by NOAA, have program responsibilities and tasks to ensure their collaborative efforts are integrated into a single solution. The 4-D Wx Data Cube activities are being integrated so that the 4-D Wx Data Cube benefits extend across Government agencies to all aviation users, including international users. To verify the adequacy of the requirements, and technology readiness, FAA's NNEW program will conduct evaluations to resolve key technical questions and reduce implementation risk while demonstrating and assessing the operational benefits of a network-enabled weather environment to the FAA, other agencies, and aviation system users. Additionally, FAA will develop and deploy network-enabled, weather sensors and systems to support multiagency data access to the virtual weather network. The first operational implementation phase of the 4-D Wx Data Cube is planned for FY 2013. In this phase NNEW will enable common access to advanced weather forecast and observation data by FAA users and systems, such as Traffic Flow Management (TFM) decision-support tools. In subsequent phases, the FAA will incorporate additional data sources, expand SAS requirements, and participate in 4-D Wx Data Cube management to ensure support for progressively more sophisticated decision-support tools required by NextGen operations.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

NNEW is an enterprise service that provides access to common weather observations and forecasts to enable collaborative and dynamic NAS decision making. It enables integration of information from weather sources into all applicable NextGen decision-support systems. It fuses weather observations into a common, virtual, continuously updated, weather information data set available to all network users. NNEW enables Airline Operations Centers and TFM to better develop weather mitigation plans and re-plans, by selecting flight paths that maximize use of available capacity in weather impacted environments, and it enables en route and terminal controllers to provide more precise and timely information to respond to pilot requests for deviations around hazardous weather. NNEW helps maximize use of airport capacity by providing more precise information on weather location and movement, which allows runways to remain in use longer and reopen more quickly after an adverse weather event.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.2 –** Deliver a future air transportation system that meets customers' operational needs.

Program Plans FY 2010 – Performance Output Goals

- Develop Weather Product Data Format Standards v3.
- Develop Weather Specific Services Design Standards v3.
- Demonstrate Interagency Network Enabled Weather Data Sharing.

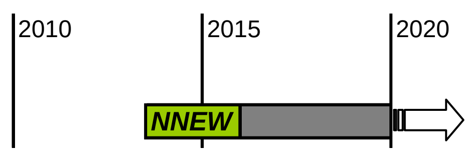
Program Plans FY 2011-2014 – Performance Output Goals

- Research, Development, and Delivery of 4-D Wx Data Cube Initial Operating Capability.
- Development and Deployment of service adaptors for selected FAA weather systems to ensure data sent to the 4-D Wx Cube by FAA sensors is compatible with the formats used by other weather inputs.

System Implementation Schedules

NextGen Network Enabled Weather (NNEW)

First site IOC: September 2013-- Last site IOC: September 2015



1A06, DATA COMMUNICATION IN SUPPORT OF NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN)

FY 2010 Request $51.7M

- NextGen Data Communications – Segment 1a, G1C.01-01
- X, NextGen Data Communications – Segment 1b, G1C.01-02
- X, NextGen Data Communications – Segment 2, G1C.01-03

Program Description

The Data Communications program will provide data communications between air traffic control facilities and aircraft, and will serve as the primary enabler for NextGen operational improvements. Data Communications will improve NAS operations by:

- Improving controller productivity and reducing controller workload by automating delivery of standardized clearances,
- Improving NAS capacity and reducing flight delay by enabling existing controller staffing to handle increased traffic,
- Enhancing safety by reducing operational errors associated with voice communications, and;
- Enabling many of the NextGen operational improvements that require negotiation or exchange of information that cannot be efficiently delivered via voice.

The Data Communications effort will augment the NAS by establishing the applications and infrastructure necessary for data exchange between controllers and pilots, as well as between ground automation systems and the aircraft.

The Data Communications project will be divided into three segments. Segment 1 will deliver the initial set of data communications services, which provides NAS benefits and lays the foundation for a data-driven NAS. Segment 2 will develop the core set of advanced NextGen-enabling operations, which would not be possible without Data Communications. Segment 3 will implement the set of air-ground messaging functions, enabling the full transformation to the NextGen concept.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The capacity and productivity of the NAS will be improved by data communications. Initially, Data Communications will be used in conjunction with the current traffic control strategies as well as planned strategies such as Traffic Flow Management (TFM) reroutes and will reduce controller workload by automating standardized exchanges as well as enabling the initial phase of trajectory based operations. As controllers become more productive, sector capacity will grow without the need to assign additional resources. Data Communications benefits will be realized in en route, Terminal Radar Approach Control (TRACON), and tower/ground operations as controllers are freed up to spend more time moving traffic efficiently. The busiest positions, whether in en route sectors, en route feeder sectors in metro corridors, terminal approach sectors, or airport clearance delivery positions in OEP airport towers, will see the most dramatic benefits.

New services enabled by Data Communications will contribute even more dramatically to air traffic capacity. Advanced 4-dimensional trajectories will enable more strategic operations that can ensure the most efficient use of airspace resources, with greatly reduced ground management oversight. More predictable traffic flows will yield better on-time performance, and minimize service impact associated with weather-related system disruptions. Many of these new services will have positive impact in other arenas: Continuous Descent Approaches, for example, will enable pilots to throttle back to idle on their descent to the airport, reducing noise, emissions, and fuel consumption. Data Communications, by allowing exchange of data to carefully coordinate the aircraft's position in time and space, will allow the FAA to effectively employ these approaches even in congested airspace.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.1** – Assure a sustainable and affordable air traffic system for the future.

Program Plans FY 2010 – Performance Output Goals

- Screening Information Request (SIR) release for Data Comm Network Service Provider.
- Complete System Specifications for Segment 1.
- Initiate En-Route automation subsystem specification development.
- Conduct Segment 2 Project Planning and Industry Coordination.

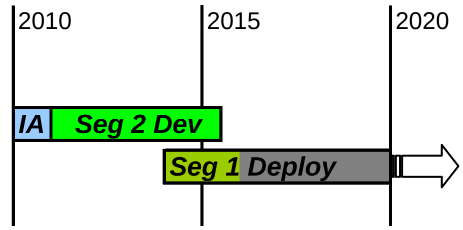
Program Plans FY 2011-2014 – Performance Output Goals

- Final Investment Decision – Segment 1a Data Comm Network Service Provider, FY 2011.
- Segment 1 Data Comm Network Service Provider Contract Award, FY 2011.
- Final Investment Decision – Segment 1b Data Comm enhancements to En-Route Automation, FY 2012.
- Commence Data Comm enhancements to Tower Data Link Systems, FY 2012.
- Commence Data Comm enhancements to En-Route automation applications and interface, FY 2012.
- Segment 1 Deploy Key Site – Tower, FY 2014.

System Implementation Schedule

Data Communications in support of NextGen

Segment 1 IOC: 2014 - 2016



1A07, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – DEMONSTRATIONS AND INFRASTRUCTURE DEVELOPMENT

FY 2010 Request $33.8M

- NextGen - Demonstrations & Infrastructure Development, G8M.01-01

Program Description

During FY 2010 to FY 2015 time frame, demonstration, development, and validation results can lead to implementation of early improvements in the NAS while supporting long-term operational objectives. The initial segment initiatives provide:

- Integrated demonstration and end-to-end demonstration activities.
- Near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and / or emerging customers' NAS initiatives.
- Mid-term development to better understand future operational concepts.
- Integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible.
- Sustainment of the demonstration sites.

FAA's demonstration, development, and validation planning activities will include the following:

International Air Traffic Interoperability – This demonstration is designed to help the FAA promote safe, affordable and rapidly implemented innovations into Air Traffic Management (ATM) along oceanic routes. It will demonstrate and accelerate airline and Air Navigation Service Providers (ANSP) efficiency improvements using existing systems and technologies. The flight trials development stage will include system architecture, design, hardware and software development (where applicable), procedures development, simulations, component/subsystems testing and certification, and system checkout. Flight trial execution could include scripted flight tests, limited operational testing and/or extended operational evaluations. This international interoperability demonstration program contributes directly to NextGen concepts and supports international collaboration, avoids overlap, and will "deconflict" activities with national and international organizations, including DOD. Further, the International Interoperability Air Traffic demonstrations and development initiatives will assist the international communities and the FAA to validate new DOD 4-D TBO and PATM alternatives.

High Density Airport (HDA) Capacity and Efficiency Improvement Project – This demonstration will serve as the first transition step to trajectory based operations. This concept attempts to take advantage of existing ground technologies and functionality while leveraging on airborne navigational capabilities that already exist on most commercial production and many in-service airplanes. Trajectory Based Management will be accomplished using fully defined 3D paths to ensure aircraft sequencing and spacing (path stretching using dog-legs or offsets). The 3D paths permit more orderly and predictable traffic patterns and use path clearances rather than the conventional speed, altitude, and heading clearances to manage aircraft spacing. This technique has the potential to reduce controller workload and allow the airplane to precisely follow a continuous path using the accuracy of Required Navigation Performance (RNP) operations. Execution of the demonstration will include data collection from real operations to show benefits in capacity, environmental (noise, computed emissions), and fuel efficiency. Site selection will require deployment of ATM ground automation prototype to functionally support 3D path operations. The automation tools include the Center TRACON Automation System Traffic Management Advisor (CTAS TMA) and the En Route Descent Advisor (EDA).

Unmanned Aircraft Systems (UAS) 4D Trajectory Based Demonstration – This demonstration project consists of periodic demonstrations of actual and evolving capabilities, and will include corresponding risk assessments. The project has a phased approach with initial concept and requirements definition, performance modeling and simulation, and analyses including operational scenarios, metrics definition and procedures development. This preliminary work transfers to proof-of-concept demonstrations for both laboratory and live flight trials. This demonstration project completely complements and is coordinated with the DoD UAS NAS oriented demonstrations, leveraging community efforts.

Staffed NextGen Tower (Staffed and Autonomous) – The staffed NextGen tower (SNT) project is planned for medium and high density airports as these airports are likely to have most aircraft equipped with avionics that will support SNT operations. A companion vision is for an Automated NextGen Tower (ANT) concept for non-towered and low density airports. The development of both the SNT and ANT automated tower capability are planned as part of this project. The SNT and ANT concepts will require substantial concept engineering funding commencing in FY 2010 as advanced decision support tools will be needed for such events as conformance monitoring using aircraft movement tracking and advanced Data Communications to ensure safe operations at non-towered airports. New capabilities such as pre-departure clearance, coded taxi routes, and runway balancing will lead to increased airport capacity, enhanced safety and increased efficiency as well reducing the user's operational costs.

Test Bed / Demonstration Sites – Demonstrations are envisioned to facilitate development and implementation of the NextGen. NextGen procedures and technologies are intended to transform air transportation by the year 2025. These new procedures and technologies are associated with solution sets and capabilities, which include:

- High Altitude Trajectory-Based Operations (TBO)
- High Density Airports
- Networked Facilities
- Reduced Weather Impact
- Collaborative Air Traffic Management (ATM)
- Flexible Terminal and Airspace
- Safety, Security, Environment.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

FY 2010 demonstration activities are planned to show a near-term strategy for decreasing aircraft delays and a long-term strategy for system capability enhancements. Oceanic 4-D Trajectory Management, En Route 4-D Operations, and High Density Airport time-based RNAV/RNP will identify key implementation issues, assist the FAA in developing its operational improvement plans to meet NextGen goals and objectives, and assist with implementing initiatives in FY 2011 and beyond.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.2 –** Deliver a future air traffic system that meets customer's operational needs.

Program Plan FY 2010 – Performance Output Goals

- Develop final integrated demonstration plan for Unmanned Aircraft Systems (UAS).
- Develop combined Out-the Window (OTW) and integrated displays simulation final report for Staffed NextGen Tower (SNT).
- Develop procedures for SNT field demonstration.
- Conduct SNT field demonstration.
- Initial environmental analysis report for IATI.
- Conduct integrated oceanic arrival demonstration.

Program Plan FY 2011-2014 – Performance Output Goals

- Demonstration of enhanced avionics capabilities.
- Demonstration of synthetic vision systems.
- Demonstration of collaborative end-to-end domain systems.

1A08, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SYSTEM DEVELOPMENT

FY 2010 Request $66.1M

- A, ATC/Tech Ops Human Factors, G1M.02-01
- B, New ATM Requirements, G1M.02-02
- C, Ops Concept Validation Modeling, G1M.02-03
- D, Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction, G6M.02-01
- E, Wake Turbulence Re-Categorization, G6M.02-02
- F, Systems Safety Mgmt Transformation, G7M.02-01
- G, Operational Assessments, G7M.02-02

A, ATC/TECH OPS HUMAN FACTORS, G1M.02-01

Program Description

The significant features of this program are the development of a Human System Integration (HSI) Roadmap to complement the other roadmaps in the Enterprise Architecture, the development of a common air traffic workstation to accommodate the various NextGen technologies when providing services, and a series of integrated workstations that deliver the required services using the common workstation. The HSI Roadmap will explain the roles and responsibilities of the actors in the NAS (air traffic controllers, pilots, dispatchers, traffic managers, etc.), their interactions with NextGen technologies, linkage to required changes to staffing, personnel selection, training, and required research and development activities in the human factors area that are needed to realize the NextGen vision.

Research will examine the roles of Air Navigation Service Provider (ANSP) and maintainer personnel to ensure safe operations at increased capacity levels and how those roles are best supported by allocation of functions between humans and automation. Interoperability of air and ground decision support tools necessitates synchronization of conflict probe look-ahead times, 4D intent information, and alerting functions for Cockpit Display of Traffic Information (CDTI) and Precision Runway Monitor for closely spaced parallel approaches. Pilots and ANSP personnel need a shared understanding of how procedures change during transitions across different types of airspace (from self-separation airspace to traditional ground-based separation airspace). This is a cross-cutting program that is critical to assure that the human element of NextGen is properly integrated into all the development and acquisition programs in NextGen.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity:**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

By 2016, this program will demonstrate sufficient improvement in air traffic controller efficiency (e.g. greater number of aircraft handled) to meet the forecast traffic demand and effectiveness through automation and standardization of operations, procedures, and information. In addition, this program enables NextGen by defining the changes in roles and responsibilities between pilots and controllers and between humans and automation required to implement NextGen.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4** – Ensure Viable Future.
- **SMP Objective #4.2 –** Provide a future air transportation system that meets customers' operational needs.

Program Plan FY 2010 – Performance Output Goals

- Measure efficiency improvements from implementing NextGen technology.
- Determine the value of digital data link in reducing controller workload in the terminal area including data entry requirements and workload benefits.
- Define research questions and methodology for examination of effects on controller workload of merging/spacing tools supporting continuous descent approaches in the terminal area.

Program Plan FY 2011-2014 – Performance Output Goals

- Identify changes in ANSP procedures to support pilot separation responsibility when using cockpit display of traffic information.
- Identify ANSP requirements for use of probabilistic weather information in en route, terminal, tower, and system operation domains.
- Demonstrate ANSP use of NextGen concepts, capabilities and procedures supporting transition of self separation responsibility to pilots.
- Complete a strategic job analysis of the new roles of air traffic service providers using a highly automated system, sharing separation responsibilities with pilots, and moving toward performance-based services.
- Develop a transition plan addressing changes in ANSP roles and responsibilities for different regimes of airborne separation responsibility.
- Redefine ANSP roles in a strategic air traffic environment for en route and terminal domains.
- Demonstrate collaborative air traffic management efficiencies enabled by common situation awareness between flight operators and ANSP.
- Demonstrate increased ANSP efficiencies through new procedures that allow ANSP personnel to manage and introduce routing, airspace, and traffic mix changes in the four dimensional (position plus time) dynamic air traffic environment.
- Demonstrate ANSP procedures in use of workstation tools for weather and wake separation including mixed equipage and variable separation.
- Demonstrate integration of air and ground functional capabilities.

B, NEW ATM REQUIREMENTS, G1M.02-02

Program Description

The NextGen Integrated Plan identifies three key performance targets for 2025: (1) satisfy future growth in demand up to three times current levels, (2) reduce domestic curb-to-curb transit time by 30 percent, and (3) minimize the impact of weather and other disruptions to achieve 95 percent on time performance. This project conducts research to develop systems that support the capacity enhancements for the seven solution sets of NextGen. It will develop requirements for new air traffic management systems and air traffic control processes to achieve the three times capacity target. By 2015, this project will demonstrate (1) the planned system can handle growth in demand up to three times current levels; (2) gate-to-gate transit time can be reduced by 30 percent; and (3) the system can achieve a 95 percent on-time arrival rate. Research supports operational implementation by 2025.

Specifically the project will identify and develop the operational requirements for the following programs:

- Traffic Alert and Collision Avoidance System (TCAS) 8.0 - Analyze the requirements and pseudo-code-supports needed to provide effective collision risk avoidance when flying closely spaced parallel RNP routes from beginning of the descent to the runway;
- Complete evaluation of the L-Band communication standard in applicable operating environment to develop an appropriate L-Band solution for global aeronautical standardization;
- Determine the best C-Band frequencies for airport surface wireless mobile communications;
- Develop a coordinated airborne and ground software assurance standard to support air-ground operational integration;
- Analyze trajectory requirements to determine differences between en route and approach trajectories and develop a proposed standard for transitioning from one to the other;
- Integrate mid-term advances in tactical flow into the Air Traffic Management System;
- Analyze how to integrate weather information into Decision Support Tools;
- Evaluate techniques to deliver RNAV/RNP approaches using Datacomm; and
- Identify information distribution requirements for non-command and control information transmitted by airborne SWIM.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The analysis and demonstration projects support operational improvements that will increase the number of arrivals and departures at major airports.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP Commitments.

Program Plan FY 2010 – Performance Output Goals

- Conduct tradeoff studies to determine approaches to future air-ground data communications requirements implementing flexible airspace management.
- Conduct tradeoff studies to determine approaches to future air-ground and ground-ground data communications requirements implementing flexible terminal management.
- Conduct analysis of common trajectory needs and develop initial implementation strategy.

Program Plan FY 2011-2014 – Performance Output Goals

Trajectory Based Operations:

- Conduct system design for future air-ground data communications requirements implementing flexible airspace management.
- Develop requirements for common trajectory implementation.
- Develop system architecture for common trajectory.
- Develop requirements for development, negotiations and exchange standards trajectories.
- Determine conflict resolution approaches using aircraft intent data.

High Density Arrivals/Departures and Airports:

- Determine requirements for TCAS "8.0" to continue to provide effective collision risk safety net in an environment of closely space parallel RNP route form top-of-descent to the runway approaches for parallel runway operations with spacing down to 750 feet.
- Analyze surface traffic management technologies to support conformance monitoring.

Flexible Terminal and Airports:

- Conduct tradeoff studies to determine approaches to future air-ground and ground-ground data communications requirements implementing flexible terminal management.
- Develop concept of operations for RNAV/RNP operations with data communication.

Collaborative Air Traffic Management:

- Develop software assurance standard for integration of air and ground decision support systems.
- Develop concept of operations, systems requirement, and architecture for airborne SWIM.
- Develop concept of use and systems requirements for integration of weather into ATM decision support tools.

C, OPS CONCEPT VALIDATION MODELING, G1M.02-03

Program Description

The Operations Concept Validation Program addresses developing and validating future end-to-end (flight planning through arrival) operational concepts with special emphasis on researching changes in roles and responsibilities between the FAA and airspace users (e.g., pilots and airlines), as well as the role of the human versus systems, that will increase capacity and improve efficiency and throughput. It will identify procedures that can decrease workload and increase reliance on automation for routine tasking to increase efficiency of the NAS. Furthermore, this program works toward developing operational methods that will meet the NextGen goal of expanding capacity by satisfying future growth in demand (up to three times capacity) as well as reducing transit time (reduce gate-to-gate transit times by 30 percent and increasing on-time arrival rate to 95 percent.).

The research will provide an end-to-end NAS Operational Concept and a complete set of scenarios that describe operational changes for NextGen solution sets including: Trajectory Based Operations (TBO); High Density Arrivals/Departures and Airports; Flexible Terminal and Airports; Collaborative Air Traffic Management; and Networked Facilities. These products will be developed for the Midterm (2018) initially, and subsequently for the NAS in 2025.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The goal is to ensure that the NextGen transformation, as identified in the NextGen concept, is supported by detailed and validated operational concepts to ensure concept feasibility, ensure that the proposed benefits can be achieved, and to understand the human factors implications of the concepts.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4** – Ensure Viable Future.
- **SMP Objective #4.2 –** Provide a future air transportation system that meets customers' operational needs.

Program Plans FY 2010 – Performance Output Goals

- Develop Data Communications Segment 2 Requirements.
- Continue development of a detailed set of scenarios to be used in concept validation.
- Conduct human in the loop simulations of TBO operations for validation of the Midterm NextGen End-to-End Concept of Operations (CONOPS).
- Refine the Midterm NextGen End-to-End CONOPS based on concept validation.

Program Plans FY 2011- 2014 Performance Output Goals

- Develop an End-to-End NAS operational concept for the far-term (2025) that integrates NextGen systems and capabilities across solution sets.
- Develop detailed scenarios of operational changes in support of architecture and research requirements for the far-term.
- Validate the concepts through detailed analyses including analytical modeling, fast-time simulations, and human-in-the-loop simulations and demonstrations. These activities will be done on an iterative and part-task basis with initial task validation results completed in FY 2010 and additional task validations completed in 2011-2014.
- 2011: Demonstrate capacity increase to 166% current levels.
- 2013: Demonstrate capacity increase to 230% current levels.

D, ENVIRONMENT & ENERGY – ENVIRONMENTAL MGMT SYS & NOISE/EMISSION REDUCTION, G6M.02-01

Program Description

This environmental research develops new procedures, technologies, and fuels to reduce emissions, fuel burn, and noise. Robust aviation growth could cause commensurate increases in aircraft noise, fuel burn, and emissions. Environmental impacts could restrict capacity growth and prevent full realization of NextGen. The solution is to reduce the increased environmental impacts of aviation through new operational procedures, technologies, alternative fuels, policies, and market based options to allow the desired increase in capacity. There are two environmental projects under this program.

<u>Environment and Energy – Environmental Management System.</u>
By 2016, this program element will combine system knowledge and new processes to determine how to implement and manage NextGen system alternatives in a cost-beneficial manner that will achieve sufficient environmental improvements to allow sustained aviation growth. This program element will combine research on advanced

technologies, alternative jet fuels and improved operational procedures developed under related programs into a comprehensive Environmental Management System. Progress will be measured by demonstrating no environmental constraints at 166 percent of existing capacity by 2011; at 230 percent of capacity by 2013; and finally at 300 percent capacity by 2016. Research and development supports operational implementation by 2025.

Environment and Energy – Advanced Noise and Emission Reduction.
By 2016, this program element will demonstrate that aviation noise and emissions can be significantly reduced in absolute terms in a cost-effective way through proven ways of managing uncertainties in noise, health and climate impacts to acceptable levels. Progress will be measured by demonstrating that environmental constraints will not restrict capacity at 166 percent of present levels by 2011; at 230 percent by 2013; and at 300 percent by 2016. Research and development supports operational implementation by 2025.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 3 –** Address environmental issues associated with capacity enhancements.
- **FAA Performance Target 2** – Improve aviation fuel efficiency by another 1 percent over the FY 2008 level (for a total of 7 percent) through FY 2009, and 1 percent each subsequent year through FY 2013 to 11 percent, as measured by a three-year moving average of the fuel burned per revenue mile flown, from the three-year average for calendar years 2000-2002.

Relationship to Performance Target

The focus of this R&D program is to identify solutions that mitigate environmental risks while supporting the target of three times capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.5 –** Optimize NextGen/OEP portfolio.

Program Plans FY 2010 – Performance Output Goals

- Applied Research on the Methodologies and Metrics to Assess Health and Climate Change Impacts.
- Applied research on measurement methodologies and metrics to determine how aviation generated particulate matter and hazardous air pollutants impact health, visibility, and global climate.
- Expanded EMS outreach program: Outreach program is initiated to encourage an EMS approach to NextGen environmental performance.
- Framework Refinements: Identify refinements to EMS framework based on lessons learned from adoption of EMS by initial organizations.
- Decision Support Tools: Continue efforts to develop decision support tools for future advanced EMSs that can dynamically manage NAS environmental performance.
- Define existing and planned environmental mitigation methods to counter NAS constraints (today and for NexGen).
- Analyze environmental impacts on NAS of new aircraft types (e.g., aircraft featuring CLEEN technologies, VLJ, UAV) and assess approaches to optimize system environmental performance.
- Analyze the environmental impacts of alternative fuels on NAS and assess approaches to optimize system environmental performance.

Program Plans FY 2011-2014 – Performance Output Goals
2011:

- Refined and Expanded EMS Framework: An EMS approach to achieve NextGen environmental protection goals is available to all aviation organizations in the US. Further improvements to the EMS framework continue for subsequent applications.
- Refined NextGen environmental protection goals: NextGen environmental protection goals and targets are informed and refined with improved scientific understanding, enhanced metrics, and advanced aviation noise and emissions modeling capabilities.

- Applied Research on Noise, Emissions, and Performance Trade-offs for N+1 Aircraft: Applied research to understand the realizable benefits and tradeoffs in the noise, emissions, and performance (fuel burn and take-off and landing field length) "corners of the design space" for the next generation (N+1) conventional subsonic aircraft.
- Decision Support Tools: First generation decision support tools for future advanced EMSs are developed and allow selection of the optimum environmental performance characteristics, including informed decisions on any necessary trade-offs
- Define existing and planned environmental mitigation methods to counter NAS constraints (today and for NexGen).
- Analyze environmental impacts on NAS of new aircraft types (e.g., aircraft featuring CLEEN technologies, VLJ, UAV) and assess approaches to optimize system environmental performance.
- Analyze the environmental impacts of alternative fuels on NAS and assess approaches to optimize system environmental performance (Advanced Noise and Emission Reduction).
- Conduct significant exploration and demonstration of environmental control algorithms for surface (taxi/ramp) area operational procedure to reduce emissions.
- Conduct significant exploration and demonstration of environmental control algorithms for terminal area operational.

2012:

- Applied Research on the Policy and Procedures to Reduce Aviation Environmental Impact: Applied research of potential policies and procedures for aircraft surface movement, arrival and departure, and en route procedures specifically designed to reduce noise and air quality impacts, and fuel burn.
- Environmental Impact Modeling and Assessment: Initial environmental impact modeling and assessment using first generation integrated environmental models to inform decisions on tradeoffs.
- Analyze the benefits of integration of CLEEN mitigation technologies with NAS infrastructure.
- Analyze the benefits of integration of Alternative Fuels with NAS infrastructure.
- Initiate development of guidance for NAS adaptations do realize full benefits of CLEEN technologies and alternative fuels.
- Define standards, policy and procedures for environmental control logic for use in automated systems for surface and arrival operations.

2013:

- Environmental Impact Management Capability: Development of a capability to dynamically manage environmental impacts while addressing the needs of the National Airspace System (NAS) (including metrics, performance goals, and operational controls for automated systems).
- Initiate Applied Research on Noise and Emissions Analysis Tools: Initiate applied research on noise and emissions analysis tools for all classes of air vehicles to provide a higher-fidelity capability to data-driven decision-making environmental management system tool suites.
- Applied Research on Environmental Metrics for New and Alternative Vehicle Classes: Applied research on environmental impact metrics for new and alternative vehicle classes, including but not limited to rotorcraft to support definition of environmental metrics for new vehicles.
- Conduct significant demonstration of CLEEN mitigation technologies and NAS infrastructure integration.
- Conduct significant demonstration alternative fuels and NAS infrastructure integration.
- Define standards, policy and procedures for environmental control logic for use in automated systems for en route (Oceanic) operations

2014:

- R&D for Improved Environmental Performance: R&D to advance science, technologies, fuels, operational procedures, and policies
- Applied Research on Noise and Emissions Relationship Science and Models: Applied research identifying the relationship between noise and various emissions to inform the implementation of next generation environmental analysis tools to support environmental management systems (EMS) and policy decisions.
- Refined Decision Support Tools: First generation decision support tools for future advanced EMSs are refined

- CLEEN/Alternate fuels and NAS impacts analysis.
- Continued demonstration analysis of CLEEN and Alternative Fuels for NAS integration.
- Define standards, policy and procedures for alternative fuel integration into the NAS.
- Assess the potential environmental benefits of improved efficiency coupling of separate automated system for surface, en route and arrivals/departures.
- Continue Operational procedure exploration and control algorithm development.

E, WAKE TURBULENCE RE-CATEGORIZATION, G6M.02-02

Program Description

This research and development program focuses on satisfying future growth. The last full review of wake separation standards used by air traffic control occurred nearly 20 years ago in the early 1990's. Since then, air carrier operations and fleet mix have changed dramatically, airport runway complexes have changed and new aircraft designs (A-380, very light jets, unmanned aircraft systems) have been introduced into the NAS. The 20 year old wake separation standards still provide safe separation of aircraft from each other's wakes but no longer provide the most capacity efficient spacing and sequencing of aircraft in approach and en-route operations. This loss of efficient spacing is adding to the gap between demand and the capacity the NAS can provide.

This project is part of a joint EUROCONTROL and FAA project to review the current wake mitigation required aircraft separations used in both the USA's and Europe's air traffic control processes and determine if the current standards can be safely modified to increase the operational capacity of airports and airspace that will have heavy operational demand in the NextGen era. Recently work was done to accommodate the A380 class of aircraft and work continues to address introduction of other large aircraft into the NAS. This project builds on that joint work and will accomplish a more general review to include regional jets, Unmanned Aerial Vehicles (UAV's), microjets, etc. The work is phased, starting with optimizing the present "1990's" standards to reflect the change in fleet mix that has occurred over the last 20 years. By the end of 2010, the project will have a set of recommendations for international review that focuses on changes to the present static wake separation standards. To accomplish this, the project will develop enhanced analysis tools to link observed wake behavior to standards, determine safety risk associated with potential new standards relative to existing standards; simulate and validate new separation standards; integrate the work being accomplished by EUROCONTROL; and conduct analyses to link wake transport and demise characteristics to aircraft flight and surrounding weather parameters.

The next phase of this project will develop by 2014, sets of separation standards whose application would depend on flight conditions and aircraft performance; resulting in being able to get more aircraft into and out of airports and through the same volume of airspace. By 2020, the final phase of the project will have developed the aircraft and ground based capabilities required to achieve the NextGen concept of safe, efficient dynamic pair-wise wake turbulence separation of aircraft. The dynamic pair-wise separation capability will allow the densest feasible safe separation of aircraft in a given airspace.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This project is addressing one of the major constraints in implementing processes and procedures that will allow more aircraft flights into and out of airports and through congested air corridors. Rebalancing the wake turbulence separation standards to address today's mix of aircraft utilizing the nation's OEP airports is expected to yield more arrival and departure slots per airport. This will directly increase the average daily airport arrival and departure capacity.

Strategic Management Process (SMP) and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.4 –** Refine Separation Standards.

Program Plans FY 2010 – Performance Output Goals

- Deliver a set of wake mitigation separation standard recommendations for international review and approval.

Program Plans FY 2010-2014 Performance Output Goals

- 2011 – Determine optimal set of aircraft flight characteristics and weather parameters for use in setting wake separation minimums.
- 2013 – Begin international coordination of Air Navigation Service Provider wake separation standards that better utilize aircraft flight characteristics and information concerning surrounding weather conditions.
- 2014 – Complete international coordination of Air Navigation Service Provider wake separation standards that better utilize aircraft flight characteristics and information concerning surrounding weather conditions.

F, SYSTEMS SAFETY MANAGEMENT TRANSFORMATION, G7M.02-01

Program Description

This program provides research leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. The implementation of these capabilities will require changes in the process of safety management, the definition and implementation of risk management systems, and management of the overall transformation process to ensure that safety is not only maintained but improved. A core foundation of the system safety transformation is the introduction of system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders. Capabilities to merge and analyze diverse sets of aviation information will be provided to expose and track precursors to incidents/accidents, allowing safety analysts within the FAA and aviation industry to understand emerging risks before they become potential safety issues. This research also enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand economic (including implementation) and operational and performance impacts (with respect to safety) of NextGen system alternatives. This project supports the development and implementation of integrated safety management systems across the air transportation system to understand what is required to ensure that the safety risk throughout the system is managed to an acceptable level. A demonstration will be conducted of a National Level System Safety Assessment working prototype that will proactively identify emerging risks as NextGen capabilities are defined and implemented. Mechanisms to define and support overall systematic, cooperative and risk-based approaches to safety and safety oversight will be prototyped. Mechanisms to operationally monitor safety operations and changes (primarily NextGen related) will be introduced to more efficiently understand the safety impacts of the operational air transportation system.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by FY 2025.

Relationship to Performance Targets

The planned significant growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. Introduction of system safety management transformation research provides a shared, proactive approach to cooperatively identifying, assessing and mitigating risk that make all stakeholders more effective in their approach to managing safety. Processes will be re-engineered, safety cultures will change and new technologies that prevent and mitigate incidents and accidents will be deployed within the air transportation system. This effort develops prototype systems, functioning models, safety tools, sharing environments and safety management analyses that are integrated with the on-going safety efforts within the FAA and air transportation stakeholders at home and abroad. The results will be shared and integrated with the aviation community to reduce the cost and increase the effectiveness of deploying NextGen capabilities within their internal organizations. On-going efforts will monitor impacts of changes within the air transportation system and ensure that, once implemented, NextGen technologies continue to provide the operational benefits that they were intended to provide within the aviation industry.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future
- **SMP Objective #4.3 –** Deliver the NextGen/OEP Commitments

Program Plans FY 2010 – Performance Output Goals

Aviation Safety Information Analysis and Sharing (ASIAS)
- Begin implementing enhanced ASIAS, including the selected support architecture and requirements for information security, near real-time operations, and new and expanded participants.
- Begin making analytical text mining tools available for stakeholder use at the local level.
- Execute recommendations from the FY 2009 data quality assessment and mitigation analysis across all primary data sources of ASIAS.
- Introduce support for remaining maintenance Aviation Safety Action Programs (ASAPs), and original equipment manufacturers (OEMs) as necessary to reach threshold by 2011. Evolve to more comprehensive tool suite for maintenance ASAP programs that support integration with OEM and Flight Operational Quality Assurance (FOQA) archive data and tools.
- Integration of initial limited set of data from JPDO participating agencies into ASIAS, using suitable data protection policies and procedures.

System Safety Assessment (SSA)
- Extended Baseline risk assessment process to incorporate human performance and infrastructure assessment modules, including airport surface and terminal area airspace specific data. Baseline comparison report (from FY 2009) provided.
- Extended safety performance assessments for mid-term concepts (2018) NextGen implementation program in addition to long-term NextGen plan.
- Extended application of FY 2009 concept demonstration of the integrated assessment process to include demonstration program data collection, risk baseline comparison using demonstration results, translation to national system impact assessment for mid-term concept NextGen enhancements.
- Validation test on human performance and safety operating characteristic measures as evaluation tools and real-time trend indicators.

Safety Management Systems (SMS)
- Detailed Implementation and Action Plan for OEM and SMS.
- Codified results of FY 2009 analysis into standard operating procedures (SOPs) for carrier and OEM.

Safety Risk Management (SRM)
- Promote guidance on taxonomy, analytical methods and integrated evaluation applications that ensure that consistent risk assessment processes are employed throughout AVS. Conduct Test Case demonstration for airports, system management, infrastructure, human performance, and aircraft performance.
- Integrated assessment of NextGen performance against 2009 baseline, with explicit impacts of system performance elements in other transformation areas (environment, cost and capacity) on safety.)

Operational Safety Assessment (OSA)
- Develop Operational Services and Environment Description (OSED) for NextGen that will characterize the high-level safety implications of the proposed capabilities and operational improvements.

Program Plans FY 2011-2014 – Performance Output Goals

- Develop proof of concept for NextGen Safety Management System including a prototype to implement on a trial basis with selected participants that involve a cross-section of air service providers.
- Validate the Net Enabled Operations (NEO) proof-of-concept architecture for the sharing of aviation information among JPDO member agencies, participants and stakeholders.
- Complete the ASIAS pre-implementation activities, including concept definition, with other JPDO member agencies, participants and stakeholders.
- Demonstrate a National Level System Safety Assessment working prototype that will proactively identify emerging risk across the NextGen.

G, OPERATIONAL ASSESSMENTS, G7M.02-02

Program Description

The transition to NextGen requires NAS operational assessments to ensure that safety, environmental, and system performance considerations are addressed throughout the integration and implementation of NextGen. Such assessments are particularly important as the NextGen program evaluates current airspace design and develops new procedures to be implemented within the NAS. This project will continue to conduct system safety assessments, environmental-specific assessments, system performance evaluations, and risk management activities. This research will include initial NAS-wide assessment of methods to mitigate NextGen environmental impacts and developing cost-beneficial options to support decision making. This research will also continue to explore integration of advanced performance assessment capability with NAS models for other NextGen programs. This project will contribute to system safety enhancements across the NAS, reducing aircraft emissions and noise, and improving capacity, efficiency, and delay reduction.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 3 –** Address environmental issues associated with capacity enhancements.
- **FAA Performance Target 2** – Improve aviation fuel efficiency by another 1 percent over the FY 2008 level (for a total of 7 percent) through FY 2009, and 1 percent each subsequent year through FY 2013 to 11 percent, as measured by a three-year moving average of the fuel burned per revenue mile flown, from the three-year average for calendar years 2000-2002.

Relationship to Performance Target

The program supports the transition to NextGen by providing comprehensive assessment of its environmental, safety, and operational performance impacts and by developing mitigation options and providing guidance on safe and environmentally effective and cost-beneficial solutions to reduce the system constraints that might otherwise hinder capacity increases. By 2016, this program element will enhance assessment capability and will help evaluate the local, regional and NAS-wide performance, safety and environmental impacts of NextGen and the benefits of impact mitigation options. This work needs to begin now, so solutions can be developed and system constraints addressed before they become a limiting factor in implementing NextGen.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.5 –** Optimize NextGen/OEP portfolio.

Program Plan FY 2010 – Performance Output Goals

- Enhance the regional scale analysis capability of Aviation Environmental Design Tool (AEDT).
- Assess and integrate the local-regional-NAS-wide analysis capability of AEDT and develop plans for further enhancements.
- Enhance the regional scale analysis capability of Aviation Portfolio Management Tool (APMT).
- Assess and integrate the local-regional-NAS-wide analysis capability of APMT and develop plans for further enhancements.
- Develop options to integrate environmental assessment capability with NextGen NAS models.
- Develop NextGen NAS wide environmental mitigation and cost-beneficial options for decision support.
- Enhance Safety Model to support NextGen Operational Assessments.
- Enhance Operational Performance Model to support NextGen Operational Assessments.

Program Plan FY 2011-2014 – Performance Output Goals

- Develop, evaluate and implement further enhancements for the NextGen local-regional-NAS wide scale analysis capability in the AEDT.
- Develop, evaluate and implement further enhancements for the NextGen local-regional-NAS wide scale analysis capability in the APMT.
- Continue NAS-wide NextGen operational assessments.
- Continually identify potential further improvements in NextGen operational assessments.
- Continue exploration of options to integrate environmental assessment capability with NextGen NAS models.
- Continue initial assessment of NextGen NAS wide environmental mitigation and cost-beneficial options for decision support.

1A09, Next Generation Air Transportation System (NextGen) – Trajectory Based Operations (TBO)

FY 2010 Request $63.5M

- A, Separation Mgmt – Modern Procedures, G1A.01-01
- B, Separation Mgmt – High Altitude, G1A.01-02
- C, Trajectory Mgmt – En Route, G1A.02-01
- D, Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt, G1A.02-02
- E, Trajectory Mgmt – Conflict Advisories, G1A.02-03
- F, Capacity Management – NextGen DME, G1N.01-01

A, SEPARATION MGMT – MODERN PROCEDURES (SEPARATION AUTOMATION ENHANCEMENTS), G1A.01-01

Program Description

This project will perform pre-implementation activities necessary to transition Separation Management automation enhancements to implementation. The Separation Management automation enhancements to be addressed include concepts and technologies initially developed by research organizations such as MITRE/CAASD and NASA, as well as performance enhancements to existing Separation Management automation functions identified through the development, deployment, and operational use of ERAM and predecessor systems such as URET and the Host Computer System (HCS).

Pre-implementation activities to be performed by this project include:

- Operational Risk reduction
    - Concept validation and documentation
    - Prototype demonstration
- Technical Risk Reduction

  - Technology Transfer from research organizations
  - Pre-production prototyping of key technical components
  - Test and evaluation of candidate automation enhancements
- Acquisition artifact development
  - Documentation of system development requirements
  - Implementation cost estimates
  - Benefits estimation

Separation Management automation is defined to include all ATC automation capabilities that assist controllers in maintaining safe aircraft separation while optimizing use of airspace system capacity. Categories of Separation Management automation enhancements to be addressed include:

- Radar Controller Position automation capabilities:
  - Conflict Alert tactical safety alert (existing)
  - Flight data display and data entry capabilities (existing)
  - Strategic Conflict Detection (new on R-Side)
  - Conflict Resolution assistance (new on R-side)
- Data Controller Position automation capabilities:
  - Flight data display and data entry capabilities (existing)
  - Strategic Conflict Detection (existing)
  - Automated Conflict Resolution (currently manual on D-side)
- Technical performance and accuracy enhancements:
  - Aircraft trajectory modeling
  - Conflict prediction (tactical and strategic)
  - Use of aircraft Performance-Based Navigation (PBN) data

This project will apply pre-implementation processes to define, validate and transition to implementation the above-identified R-Side and D-side controller capabilities and technology enhancements.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Enhancements to ATC automation will allow controllers to make fuller use of available airspace, TBO requires this capability to increase airspace capacity and provide more efficient routes and altitudes to accommodate demand.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Develop the material to support Final Investment Decision for the ERAM Post Release 3 Baseline in FY2010. This material may include:
  - Requirements,
  - Business Case,
  - Alternatives Analysis,
  - Safety Case, and
  - Enterprise Architecture Artifacts.

Program Plan FY 2011-2014-Performance Output Goals

- Initiate the work to necessary to define the ERAM Post Release 3 Baseline. Candidate functional areas include:
  - Radar Controller Position automation capabilities,
  - Data Controller Position automation capabilities, and
  - Technical performance and accuracy enhancements.

- The work may include the development of artifacts necessary to mitigate risk and transition to solution implementation. Specific products include:
  - Concepts of Operations and Concepts of Use,
  - Prototypes,
  - Analyses,
  - White Papers and Studies,
  - Human-in-the-Loop Studies,
  - Demonstrations,
  - Enterprise Architecture Artifacts, and
  - Acquisition Management System Artifacts.

B, SEPARATION MANAGEMENT – HIGH ALTITUDE, G1A.01-02

Program Description

With the implementation of TBO, high altitude air traffic controllers will not require the same level of knowledge of specific local airspace procedures as is the case with today's geographically-based environment. This activity will determine what local knowledge and information display ("cognitive support") is needed for air traffic controllers to provide air navigation services in a high-altitude airspace domain.

Currently, controllers are certified on operational positions only after demonstrating extensive local knowledge, such as the structured route system, surrounding sector configurations, and policies and procedures that may not have NAS-wide applicability. This time-consuming and expensive process requires 3 to 5 years before an en route controller is certified to work a sector under general supervision.

The product of this activity is an air traffic control workstation that displays information needed for an air traffic controller to deliver air navigation services in high altitude sectors using standard operating procedures that are applicable across the NAS. The FAA will be able to staff those sectors with air traffic controllers who can be certified on those positions rapidly.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This program element will develop the tools needed to increase capacity in high altitude airspace through increased air traffic controller efficiency (e.g. able to control a greater number of aircraft) to meet forecast traffic demand.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Display Information Requirements and Decision Support Tool Requirements for Phase I of High Altitude Airspace Specialty.
- Prototype and evaluate display change requirements and Decision Support Tools for early transition to support Phase I of High Altitude Airspace Specialty.

Program Plan FY 2011-2014 – Performance Output Goals

- Development of Phase I High Altitude Airspace Displays and Decision Support Tools.
- Human in the loop simulations of advanced high altitude concepts (e.g., flexible airspace management) to assess operational feasibility.
- Requirements development to support implementation of advanced concepts in High Altitude Airspace.
- Airspace Analysis and Design to support advanced concepts in High Altitude Airspace.

C, TRAJECTORY MGMT – EN ROUTE (POINT-IN-SPACE METERING), G1A.02-01

Program Description

Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. Current TMA functionality, known as TMA – Segment I, is in daily use throughout the NAS. Sustaining the existing TMA system beyond April 2009 is necessary to encourage continued use of TMA data by the airlines. Expediting Enhancement of the existing TMA to create Time Based Flow Management (TBFM) – Segment II (TMA with mid-term NextGen enhancements), is necessary to support the end-state portfolio of NextGen enhancements, known as Integrated Enterprise Solution (IES) – Segment III.

Each of the Segments, which will be implemented simultaneously, contributes to the achievement of the following NextGen Operational Improvements and Decision Points within the NAS Enterprise Architecture;

- Point in Space Metering,
- Time-Based Metering using RNAV and RNP Route Assignments,
- TBFM Final Investment Decision,
- TBFM/IES initial investment decision, and
- TBFM/IES final investment decision.

Segment I

The current contract expired October 2008, but a six month extension was negotiated to extend work until April 2009. A bridge contract will be implemented to support Segment I (TMA Legacy System development). The bridge contract will ensure uninterrupted sustainment of operational TMA with agreed upon near-term enhancements, and hardware/operating system re-architecture to replace end-of-life servers and workstations during the transition from ATO-E to ATO-R. The bridge contract will begin April 2009 and the period of performance is anticipated to be no longer than one year or until the TBFM contract is awarded.

Segment II

The TBFM contract will address TMA's performance gap and mitigate the risk of not providing NextGen TBO capabilities on time. The TBFM Program Office intends to expedite Segment II and request tailoring, of the acquisition process to achieve a combined Initial and Final Investment Decision (FID) in September 2009.

This new contract will develop the NextGen midterm and operational initiatives in FY 2010 – this will be Segment II. The TBFM program will use the enhanced TMA system to apply time based metering through-out the En-Route environment. It will also support further concept engineering on Integrated Metering and Dynamic Metering through this time frame. TBFM will satisfy the Operational Improvement (OI) "Point in Space Metering" with the further implementation of Coupled Scheduling followed by the incremental concept engineering development of the Integrated Metering and Dynamic metering initiatives. Coupled Scheduling expands the TMA capability by adding an additional scheduling point along the route of flight. This will push the arrival delay farther into the En-Route flow – therefore providing better fuel burn and predictability along the route of flight.

Segment III

The final segment of integration focuses on investment and engineering activities that support the more advanced NextGen Portfolio Management of enhancements and Operational Initiatives (OI). Segment II Concept and Engineering results will be mature enough to be considered for implementation in this phase. Any concepts that cannot be implemented in the timeframe April 2014-April 2018, will be deferred for later development. Segment III will examine the integration of the TMA functionality into systems such as TFMS and/or ERAM. This will further support the NextGen goal of common trajectories and common platforms.

Trajectory Management En Route will provide complete time based metering solutions across all flight phases to include pre-departure through post-arrival for the NAS. Point in space metering is a key capability that is part of the FAA's effort to achieve the NextGen. This program supports the beginning steps such as developing functional and technical requirements, planning spiral development, and determining cross-platform interfaces that are needed to lead up to the implementation of point in space metering.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Trajectory Management En Route will provide complete time based metering solutions across all flight phases to include pre-departure through post-arrival for the NAS.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway # 4 –** Ensure Viable Future.
- **SMP Objective #4.1** – Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- In accordance with the Enterprise Architecture (EA), this program will complete those pre-implementation activities to include: concept engineering, maturity and integration assessment and final investment analysis for integration of advanced traffic management initiatives into the NAS. Specifically, the program will:
  - Perform concept development activities,
  - Develop and analyze operational implications through simulations and human in the loop exercises, and
  - Develop and evaluate demonstration/prototype capability.
- Advance the design and development of integrated metering functions by extending the coupled scheduling capability to allow static en route meter points (MP) to be connected to (1) other en route MPs and to (2) En Route Departure Capability (EDC) MPs. This enables ARTCCs to conduct time-based metering at longer distances from the arrival airport and in en route airspace.
- Initiating the design and development of configurable en route MPs which will allow ARTCCs better manage traffic flows in response to changing weather conditions or routing programs by:
  (1) Advancing the design and development of *pre-adapted selectable MPs.* Pre-adapted selectable MPs allow ARTCCs to activate MPs at pre-defined locations in en route airspace when an operational need to meter arises; and
  (2) Advancing concept engineering on *dynamic MPs*. Dynamic MPs allow ARTCCs to create en route MPs at any location in en route airspace where an operational need to meter arises.

Program Plan FY 2011-2014-Performance Output Goals
- Begin development of integrated metering functions and prototype the pre-adapted selectable MPs.
- Demonstrate integrated metering functions and begin software design of pre-adaptable meter points.
- Begin demonstration of pre-adaptable meter point.

D, TRAJECTORY MGMT – OCEANIC TACTICAL TRAJECTORY MGMT, G1A.02-02

Program Description

The Oceanic Tactical Trajectory Management program is a critical NextGen capability that addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment.

FY 2009 will be used to address the three initial Oceanic TBO initiatives: Automatic Dependent Surveillance (ADS) In-Trail Procedures (ITP), web-enabled Collaborative Trajectory Planning (CTP) and Four Dimensional Oceanic Trajectory Management (4D-OTM).

Based on the results of the FY 2009 work, FY 2010 will be used to expand these initiatives to other geographical areas, perform operational trials, further refine longer-term objectives, include new initiatives to investigate separation assurance systems using Automatic Dependent Surveillance (ADS) technology, and begin concept development activities for Oceanic Airspace Management.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Increased Capacity/Efficiency: Aircraft will fly more efficient, user-preferred routes. Increased system precision and enhanced automation support the more efficient use of flight levels so that aircraft can more closely fly routes that maximize the airlines' goals for fuel efficiency, aircraft operations, and schedule. Reduced separation standards for aircraft that provide state and intent data will lead to fewer predicted problems, and as a result, fewer diversions from the preferred routing. Reduced separation standards will also result in increased capacity within flow constrained airspace, allowing more aircraft to fly through those areas, rather than being rerouted or delayed to avoid them.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plans FY 2010 – Performance Output Goals
- ADS-C ITP Operational trials.
- Pre-Departure OTM-4D Requirements Development.
- In-Flight OTM-4D Prototype Definition.
- Web-Enabled CTP Enhancement.
- Oceanic Airspace Management Concept Development.

Program Plans FY 2011-2014 – Performance Output Goals

- ADS-C ITP
  - Expand Operational trials
  - Petition ICAO for adoption of ADS-C ITP procedures
- Pre-Departure OTM-4D
  - De-confliction engineering analysis
  - Develop Prototype Requirements
  - Conduct Operational trials
- In-Flight OTM-4D
  - Develop operational prototype
  - Conduct human-in-the-loop simulation
  - Conduct operational trials
- Web Enabled CTP
  - Performance evaluation
  - Enhance Web Enabled CTP tool capability
  - Integrate with OTM-4D
- Oceanic Airspace Management
  - Develop operational concepts for airspace structure
  - Conduct CNS and automation analysis
  - Develop prototype requirements

E, TRAJECTORY MGMT – CONFLICT ADVISORIES, G1A.02-03

Program Description

This project provides the analysis, development and pre-implementation activities required to ease en route controller workload and eliminate controller tasks associated with determining conflict resolutions. It implements conflict resolution advisories, first over voice and data communications, and ultimately over data communications when equipage permits. It investigates the impacts of various equipage levels on the benefits associated with this solution as well as on controller workload and task performance. High performance aircraft will directly connect via air-ground data communications to the flight management system, facilitating electronic data communications between the ATC automation and the flight deck automation. As a first step and in mixed performance airspace, the controller will still be responsible for aircraft separation by responding to problems predicted by the ATC automation. Instead of monitoring the sector airspace display to predict potential problems and mentally calculating problem resolutions, the automation will not only predict the problems but determine the best solution. The controller will transmit the solution via voice initially, and then via data link. This level of automation support helps manage controller workload as a means of safely dealing with the predicted increases in traffic volume. This program will prototype earlier and easier resolutions capabilities (such as pre-probed altitude and speed amendments) that can be transferred verbally by controllers and evaluate the impact these have on the Computer-Human Interface (CHI) design and system performance and conduct research into more complex issues for future implementation such as vector advisories as well as the role of the human versus automation in voice clearance, mixed voice and data communications environments, and data communications only.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Automated problem prediction and resolution will allow the controller to handle more aircraft (i.e., demand) because predicted problems will be resolved strategically, reducing the number of situations that require multiple time-critical actions.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Prototype earlier and easier resolutions capabilities (such as pre-probed altitude and speed amendments) that can be transferred verbally by controllers.
- Evaluate the impact that simple conflict resolution advisories have on the Computer-Human Interface (CHI) design and system performance including controller performance.

Program Plan FY 2011-2014 – Performance Output Goals

- Conduct research into more complex issues for future implementation such as vector advisories as well as the role of the human versus automation in voice clearance, mixed voice and data communications environments, and data communications only.
- Prototyping and development of display and functional changes to support conflict resolution over voice and data link.

F, CAPACITY MANAGEMENT – NEXTGEN DME, G1N.01-01

Program Description

This is a national program to provide the necessary equipment enhancements, relocations, and replacements to ensure that Distance Measuring Equipment (DME) facilities are able to sustain the NAS in accordance with the FAA's NextGen Implementation Plan - 2008. DMEs will be procured to support DME-DME RNAV/RNP en route operations (Q and T routes) in order to partially or fully divest the VOR network in accordance with the NAS Enterprise Architecture. This divestment is in support of the transition to the satellite based navigation system. Additionally, DMEs will be procured for use with an Instrument Landing System (ILS), to improve the transition onto an ILS final approach and to provide a guided missed approach by the use of RNAV/RNP based Standard Instrument Departures (SIDs) and Standard Terminal Approach Routes (STARs).

This program provides a pathway for the development of the NextGen DME network to support the RNP/RNAV concept and roadmap while reducing and replacing high cost facilities and at the same time increasing the availability/accuracy of positioning/navigation capability to the NAS users. In accordance with the NAS Enterprise Architecture scenarios, the VOR network is to be drawn down to a yet to be determined number of systems. Concepts and criteria are being developed to determine which VORs to retain and which to divest.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The DME-DME network is a key element of RNAV/RNP. Advisory Circular 90-100A requires participating aircraft to be equipped with Global Navigation Satellite System (GNSS) or Distance Measuring Equipment (DME)/DME/inertial positioning capability, a suitable RNAV system, and to comply with the published operational guidance. Both RNAV and RNP will enable more efficient aircraft trajectories and combined with airspace changes, increase airspace efficiency and capacity Traditional airways are based on a system of routes that connect ground-based navigational aids (NAVAIDS). These routes require significant separation buffers. The constraint of flying from one navigational aid to another generally increases user distance and time in flight. It can also create choke points and limit access to NAS resources. Today, terminal operations are constrained by ground-based arrival and departure procedures and airspace design. This limits terminal ingress/egress and access to and from the overhead streams. Additionally, terminal operations are constrained by terrain, environmental requirements/restrictions, special use airspace, and adjacent airport traffic flows.

RNAV and RNP will permit the flexibility of point-to-point operations and allow for the development of routes (Q and T), procedures, and approaches that are more safe, efficient and free from the above constraints and inefficiencies. These procedures will include the ability to implement curved path procedures that can address terrain, and noise-sensitive and/or special-use airspace. Terminal and en route procedures will be designed for more efficient spacing and will address complex operations thus increasing capacity.

The high power DME will increase the service volume by 80 miles and is capable of handling over 150 additional aircraft simultaneously when compared to the Low Power DME, and High Power Distance Measuring Equipment (HPDME) provides:

- Improved efficiency
- Increased access and capacity
- Reduced fuel-burn and engine emissions

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Procure 23 DME systems.
- Service Available (Establish) for approximately 3 DMEs in support of RNP.

Program Plan FY 2011-2014 – Performance Output Goals

- Procure 30 systems per year for a total of 120 systems.
- Service Available (Establish) for approximately 40 DMEs per year for a total of approximately 143 DMEs.

1A10, Next Generation Air Transportation System (NextGen) – Reduce Weather Impact

FY 2010 Request $35.6M

- A, Weather Observation Improvements, G4W.02-01
- B, Weather Forecast Improvements, G4W.03-01

A, RWI – Weather Observation Improvements, G4W.02-01

Program Description

Reduce Weather Impact (RWI) is a planning and development portfolio to ensure NextGen operational weather capabilities utilize a broad range of weather improvements and technologies to mitigate the effects of weather in future NAS operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. This portfolio will address many weather problems including, but not limited to, rightsizing the observations network, transition of weather research to operations, development of weather impact metrics, development of weather decision support tools, integration of weather information into operations, weather processor architecture redesign and restructuring and the transition planning for legacy systems. RWI will conduct planning, prototyping, demonstrations, engineering evaluation and investment readiness activities leading to an implementation of operational capabilities throughout NextGen near, mid and far term.

A consistent and effective weather observation sensor network will be a cornerstone to improved NextGen weather capabilities. RWI weather observation improvements will focus on evaluating the current observation capability against that needed to support NextGen. This evaluation will include a gap analysis to determine the optimal quantity and quality of ground, air and space based sensors. The analysis will determine whether cost effective sensor densities and performance, redundancies, or inconsistencies impact aviation operations. One example of tasks to be performed is evaluation of concepts for replacement of current weather radar with a single integrated radar technology or other new sensors.

Weather plays a significant role in all NAS operations. RWI is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. RWI will address improvements in weather observation quality and forecast integration into user decision support tools. Advanced weather forecast research is conducted under the Aviation Weather Research Program (AWRP), and RWI will transition these AWRP efforts for operational use. The NextGen Network-Enabled Weather (NNEW) transformational program will provide universal common access to weather information through the 4D Weather Data Cube. Weather Technology in the Cockpit Program (WTIC) research efforts will work to develop weather improvements suitable for in-flight operational use. Collectively the effect of the NextGen portfolio will result in weather no longer being just a stand-alone display, requiring cognitive interpretation and impact assessment, with limited ability to significantly impact delays; instead, weather information is being designed to integrate with, and support NextGen decision-oriented automation capabilities and human decision-making processes.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Reduce Weather Impact provides improved weather observations and forecasts and tailors weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It enhances capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of usable airspace and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver a future air traffic system that meets customers' operational needs.

Program Plans FY 2010 – Performance Output Goals

- NextGen Weather Transition Plan for Sensors
- Radar pre-prototype element analysis to resolve critical performance and cost issues

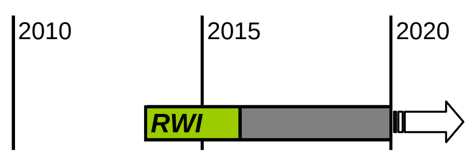
Program Plans FY 2011-2014 – Performance Output Goals

- Evaluate ground-based and airborne sensors and observing networks
- Initiate development of space weather capabilities plan.

System Implementation Schedules

Reduce Weather Impact (RWI)

First site IOC: September 2013-- Last site IOC: September 2015



B, RWI – WEATHER FORECAST IMPROVEMENTS, G4W.03-01

Program Description

Reduce Weather Impact (RWI) is a planning and development portfolio to ensure NextGen operational weather capabilities utilize a broad range of weather improvements and technologies to mitigate the effects of weather in future NAS operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. This portfolio will address many weather problems including, but not limited to, rightsizing the observations network, transition of weather research to operations, development of weather impact metrics, development of weather decision support tools, integration of weather information into operations, weather processor architecture redesign and restructuring and the transition planning for legacy systems. RWI will conduct planning, prototyping, demonstrations, engineering evaluation and investment readiness activities leading to an implementation of operational capabilities throughout NextGen near, mid and far terms.

The second element, RWI weather forecast improvements, addresses the need to enable better weather decision making and use of weather information in the transformed NAS. This includes: 1) integrating weather information tailored for decision support tools and systems into NextGen operations, 2) implementing improved forecasts by transitioning advanced forecast capabilities from aviation weather research, 3) developing and using metrics to evaluate the effectiveness of weather improvements in the NAS, 4) developing probabilistic forecasts which can be effectively used in air traffic and traffic flow management, 5) determining most effective solution for a processor architecture to support these capabilities. RWI will propose recommendations for near, mid and far time frames which will include a recommendation for transition of FAA legacy systems.

Weather plays a significant role in all NAS operations. RWI is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. RWI will address improvements in weather observation quality and forecast integration into user decision support tools. Advanced weather forecast research is conducted under the Aviation Weather Research Program (AWRP), and RWI will transition these AWRP efforts for operational use. The NextGen Network-Enabled Weather (NNEW) transformational program will provide universal common access to weather information through the 4D Weather Data Cube. Weather Technology in the Cockpit Program (WTIC) research efforts will work to develop weather improvements suitable for in-flight operational use. Collectively the effect of the NextGen portfolio will result in weather no longer being just a stand-alone display, requiring cognitive interpretation and impact assessment, with limited ability to significantly impact delays; instead, weather information is being designed to integrate with, and support NextGen decision-oriented automation capabilities and human decision-making processes.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Reduce Weather Impact provides improved weather observations and forecasts and tailors weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It enhances capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of usable airspace and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.2 –** Deliver a future air traffic system that meets customers' operational needs.

Program Plans FY 2010 – Performance Output Goals

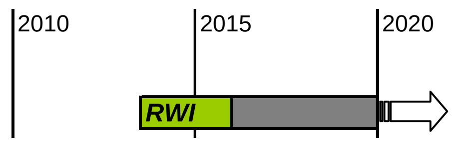
- Evaluation of prototype weather decision support tools.
- Conduct advanced convective weather forecast demonstration.
- Conduct evaluations of advanced weather national ceiling and visibility analysis and forecast icing products.

Program Plans FY 2011-2014 – Performance Output Goals

- Evaluate, transition, and integrate maturing R&D (e.g., improved forecasts for thunderstorms, icing, turbulence, etc.).
- Develop indices for weather (e.g., icing), calibrate weather phenomena to aircraft types, and characterize weather information in probabilistic terms.
- Evaluate improved weather forecast information in candidate decision support environments.

System Implementation Schedules

Reduce Weather Impact (RWI)
First site IOC: September 2013-- Last site IOC: September 2015



1A11, Next Generation Air Transportation System (NextGen) – Arrivals/ Departures at High Density Airports

FY 2010 Request $51.8M

- A, Trajectory Mgmt – Surface Tactical Flow, G2A.01-01
- B, Trajectory Mgmt – Surface Conformance Monitor, G2A.01-02
- C, Trajectory Mgmt – Arrival Tactical Flow, G2A.01-03
- D, Capacity Management – Integration Arrival & Departure Operations, G2M.02-01

A, TRAJECTORY MGMT – SURFACE TACTICAL FLOW, G2A.01-01

Program Description

The Trajectory Management – Surface Tactical Flow project is focused on the development of trajectory -based surface operations in support of the Next Generation Air Transportation System (NextGen) initiative. It leverages the development efforts of the NASA Surface Management System (SMS) and provides a road map to the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This environment is required to safely enable the airport capacity necessary for operations in 2025 and to enable trajectory based operations on the airport surface.

The NextGen Concept of Operations, authored by the Joint Planning and Development Office (JPDO), states that "4DTs [four-dimensional trajectories] may be used on the airport surface at high-density airports to expedite traffic and schedule active runway crossings." Achieving this vision will require a series of advances in procedures, supporting automation systems, and collaboration between air traffic control (ATC) and the flight operators.

This project will demonstrate and document requirements for a series of capabilities that build to the NextGen vision for surface trajectory-based operations. Examples include local data exchange, leading to the sharing of flight readiness information and collaboration, which will enable pre-planned runway schedules integrated with airborne trajectory-based operations. Surface flow management will reduce surface engine operating times, resulting in fuel savings and reduced environmental impacts, and lead to collaborative resource allocation and avoidance of surface gridlock. Digital taxi clearances will enable pre-planned and coordinated airport surface trajectories and will lead to taxi conformance monitoring, which could reduce the risks of runway incursions and runway incidents such as the 2006 Comair accident at Lexington, KY.

The Trajectory Management – Surface Tactical Flow project will require changes to procedures in the flight operator and ATC Tower (ATCT) environments. The concept and requirements development and acquisition process is designed to allow incremental steps toward the complete concept, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies. Testing and extraction of requirements will be realized through several phases, referred to as segments.

This project intends to expand on the development initiated by the NASA SMS project to mature surface management capabilities in multiple phases leading to trajectory-based operations on the surface, and perform the Acquisition Management System (AMS) analysis and documentation needed to support an FAA initial investment decision (JRC-2A). The initial capabilities of SMS provide information to users and allow the exchange of data between the ATCT, ramp towers, and other facilities such as the TRACON, the ARTCC, and the airline operational control centers (AOCs). In addition to displaying necessary airport surface and flight plan information in a comprehensive user interface, SMS generates predictions and provides decision support to the user.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

By allowing aircraft to be more closely spaced and improving the efficiency of operations in the terminal area, airports will be able to handle more aircraft with their existing capacity. This creates an increase in their average daily capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plans FY 2010 – Performance Output Goals
- Install Orlando (MCO) Surface Trajectory Based Operation (STBO) (Demo) Prototype System.
- Complete Segment 1 Concept/Requirement Definition.
- Segment 1 Investment Analysis Readiness Decision.
- Complete Segment 1 Initial Investment Analysis.

Program Plans FY 2011-2014 – Performance Output Goals
- Complete Segment 2 Concept Requirements Definition.
- Segment 1 Initial Investment Decision (JRC2A).
- Segment 2 Investment Analysis Readiness Decision.
- Segment 1 Final Investment decision (JRC2B).
- Complete Segment 2 Initial Investment Analysis.
- Complete Segment 3 Concept Requirements Definition.
- Segment 2 Initial Investment Decision (JRC2A).
- Segment 2 Final Investment decision (JRC2B).

B, Trajectory Mgmt – Surface Conformance Monitor, G2A.01-02

Program Description

The Surface Conformance Monitoring – Taxi Conformance Monitoring (TCM) effort is designed to show the potential safety and workload benefits that can be achieved through a comprehensive taxi route management and conformance monitoring capability. The end state would allow a precise, unambiguous taxi clearance to be generated by the Air Traffic Controller (ATC), communicated to the aircraft via data link and conformance to the clearance would be monitored by automation in the Air Traffic Control Tower (ATCT). An important consideration is the development and demonstration of user-friendly, minimal-workload methods for the controller to specify the taxi route. Conformance monitoring can be limited to route adherence only, or both route and timing through the incorporation of timed check points. By using a proactive approach to separation on the airport surface, taxiing aircraft can be "de-conflicted" with other aircraft in the taxi, landing, and takeoff phases of flight, resulting in safer ground operations. The additional time component will support trajectory-based operations (TBO) on the airport surface. In the future, TCM concepts can be applied to staffed and automated virtual ATC towers.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for Taxi Conformance Monitoring in an ATCT.
- Evaluate performance of pre-established taxi routes vs. controller-generated taxi routes in a TCM environment.
- Evaluate performance of prototype taxi conformance algorithms.
- Demonstrate trajectory-based operations (TBO) on the airport surface.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

By allowing aircraft to be more closely spaced and improving the efficiency of operations in the terminal area, airports will be able to handle more aircraft with their existing capacity. This creates an increase in their average daily capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plans FY 2010 – Performance Output Goals

- Complete Initial Taxi Conformance (2D) CONOPS, Requirements, Standards and Procedures Draft.
- Conduct Initial Taxi Conformance (2D) Simulation.
- Complete Initial Safety Analysis.
- Complete Refined Initial Taxi Conformance (2D) CONOPS, Requirements, Standards and Procedures Draft.

Program Plans FY 2011-2014 – Performance Output Goals

- Conduct High Fidelity Initial Taxi Conformance (2D) Simulation.
- Complete Final Safety Analysis.
- Complete Initial Taxi Conformance (2D) CONOPS, Requirements, Standards and Procedures Final Draft.
- Conduct Initial Taxi Conformance (2D) Field Demonstrations.
- Complete Segment 1 concept/Requirements Definition (Integrated with Surface TBO Segment 4).
- Complete Final Initial Taxi Conformance (2D) CONOPS Requirements, Standards and Procedures Requirements Document.

C, TRAJECTORY MGMT – ARRIVAL TACTICAL FLOW, G2A.01-03

Program Description

Traffic Management Advisor (TMA) is an effective and well-tested decision support tool that allows air traffic management to schedule and optimize the arrival load for major airports. That scheduling and optimization algorithm, however, generally is confined to the immediate area of the controlling Center, out to about 200 miles. Since all Centers have TMA installed, the algorithms can be expanded, so schedule data can be exchanged and a larger planning horizon developed, thus becoming a strategic network. Further, integrating airport surface, tower, and terminal approach information into this network will lead to better and more efficient trajectory planning.

To extend the planning "horizon" to neighboring facilities and develop a strategic scheduling capability, the TMA program will include linking to terminal and tower automation displays for TMA schedules. Integration of precise aircraft state and intent information with terminal and tower traffic flow management decision-support automation will increase efficiency through arrival and departure scheduling.

TMA is the only decision support tool currently available for implementation of time-based metering. TMA has been field-tested over the past 10+ years and is already installed in the twenty ARTCCs and adapted for most of the major airports served by those Centers. No support for continued development and implementation of time-based metering strategies using TMA is currently in place.

The Time Based Flow Management (TBFM) is a continuation and support of TMA that will fulfill operational user needs and NextGen goals. TBFM will achieve and close the performance gap in transitioning TMA to Time Based Operations (TBO).

The TBFM program is part of the FAA's Operational Evolution Partnership (OEP) and efforts to develop the Next Generation Air Transportation System (NextGen). This program will implement NextGen concepts such as RNP/RNAV route selections, weather integration, optimized profile descent, and integrated enhanced solution.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity**.
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

By implementing NextGen concepts, Arrival Tactical Flow will provide a more efficient time based metering solution for arrivals in the NAS.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway # 4 –** Ensure Viable Future.
- **SMP Objective #4.1 –** Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- In accordance with the Enterprise Architecture (EA) the program will perform work in the following categories: concept engineering, development and implementation and engineering/investment analysis. Specifically, the program will:
  - Analyze architectural changes necessary to reconcile TMA functionality,
  - Design the decision support automation to apply metering techniques,
  - Integrate algorithms across multiple platforms, and
  - Develop implement decision support tools.

- Initiate the design and development of functions that integrate data into TMA from external systems such as Traffic Flow Management Systems (TFMS) and new weather systems. This will increase the efficiency of arrivals and departures by including surface movement data, RNAV/RNP route selection data, international traffic data, and sector capacity data. Design and deliver the TMA system to enhance the current operational system to further the efficiency of the TMA system with NextGen initiatives and Operational enhancements. Continue the deployment of the FAA Time Based Flow Management (TBFM) system to continue the efficiency of the system.

Program Plan FY 2011-2014 – Performance Output Goals

- Continue development and deployment of TBFM enhancements and continue to fund the activities leading up the initial investment decision (EA 44).
- Continue development and deployment of TBFM enhancements and deliver JRC documentation to gain Initial Investment approval.
- Continue development of JRC documentation for Final Investment Decision in 2013.
- Continue development and deployment of TBFM enhancements and deliver JRC documentation to gain Final Investment approval.

D, CAPACITY MANAGEMENT – INTEGRATION ARRIVAL & DEPARTURE OPERATIONS, G2M.02-01

Program Description

The program improves operational efficiencies in major metropolitan areas through expanded use of 3-mile separation standards and not exceeding current minima for diverging flight paths in all arrival and departure airspace, as well as the use of visual separation standards above 18,000 feet, dynamic airspace reconfiguration of bi-directional arrival/departure routes, and improved traffic flow management. These operational changes will enable creation of additional area navigation arrival and departure routes. The program also calls for integrating arrival and departure airspace systems into one control service as well as one facility. This concept is a step toward the NextGen concept for Super Density Operations and a step toward General Service Delivery Points.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

It is estimated that for a generic airspace with the volume of air traffic projected in the 2012 time frame that implementation of the changes mentioned above [expanded use of 3-mile separation standards and not exceeding current minima for diverging flight paths in all arrival and departure airspace, as well as the use of visual separation standards above 18,000 feet, dynamic airspace reconfiguration of bi-directional arrival/departure routes, and improved traffic flow management] could lead to an average flight time savings of 0.31 minutes, in the case without inclement weather conditions, and 0.96 minutes in the case of a weather scenario. These time savings would allow more aircraft to arrive and depart an airport which would increase airport capacity. Site specific airspace design analysis will develop estimates for airport capacity increases at selected locations

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Conduct airspace and facilities analyses to support implementation of an integrated arrival/departure control service for major metropolitan areas.
- Conduct safety assessments.
- Begin development of transition strategy plans and procedures.
- Analyze requirements for software changes including Surveillance Data Processing, Traffic Management Advisor, and Flight Data Processing upgrades and Computer-Human-Interface changes to support Integrated Arrival/Departure management.

Program Plan FY 2011-2014 – Performance Output Goals

- Continue airspace and facilities analyses to support implementation of an integrated arrival/departure control service for major metropolitan areas.
- Conduct safety assessments.
- Continue development of transition strategy plans and procedures.
- Begin design, development and implementation of software changes including Surveillance Data Processing, Traffic Management Advisor, and Flight Data Processing upgrades and Computer-Human-Interface changes to support Integrated Arrival/Departure management.

1A12, Next Generation Air Transportation System (NextGen) – Collaborative Air Traffic Management (CATM)

FY 2010 Request $44.6M

- A, Flow Control Mgmt – Strategic Flow Mgmt Integration, G5A.01-01
- B, Flow Control Mgmt – Strategic Flow Mgmt Enhancement, G5A.01-02
- C, Flight & State Data Mgmt – Common Status & Structure Data, G5A.02-01
- D, Flight & State Data Mgmt – Advanced Methods, G5A.02-02
- E, Flight & State Data Mgmt – Flight Object, G5A.02-03
- F, Capacity Management – Dynamic Airspace, G5A.04-01

A, Flow Control Mgmt – Strategic Flow Mgmt Integration, G5A.01-01

Program Description

Strategic Flow Management Integration (Execution of Flow Strategies into Controller Tools) provides funding for the implementation of the En Route Automation Modernization (ERAM) modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline timeframe (releases 2 and 3). These improvements include automatic identification to controllers of aircraft affected by Traffic Flow Management (TFM) TMIs, electronic communication of the TMI information in a timely manner to the relevant ATC operational positions, tools that help monitor how well aircraft are conforming to the TMI, and tools that suggest controller actions to achieve the flow strategy.

While the process of executing a TMI is time consuming and mostly manual today, improvements in the TFM and ATC infrastructure over the next several years will make this process more efficient. ERAM is implementing flight information services as part of System Wide Information Management (SWIM) segment 1. Flight Information Services will be used to exchange of flight data amendments with other Air Traffic Management (ATM) Automation. SWIM is funding the infrastructure improvements for data exchange, but not the applications.

This activity will also fund the requirements definition, investment analysis and risk mitigation for increments of Flow Strategy integration in the Post-release 3 timeframe. The implementation of the post-release 3 portion will be included in the ERAM Post-Release 3 baseline.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Supporting the CATM performance objectives of Execution of Flow Strategies by making the strategy execution more timely, efficient, accurate and targeted will create an increase in the average daily capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Implementation of Pre-departure Reroute in ERAM with no automated coordination with Terminal.
- Development of requirements definition, investment analysis activities, and acquisition artifacts in support of En Route and Terminal Automation investment decisions. Specific artifacts include concept of operations, requirements analyses and business case development.

Program Plan FY 2011-2014 – Performance Output Goals

- The work necessary to define risk mitigation to the Post Release 3 Baseline. Specific activities include: detailed concepts of use, human-in-the-loop simulations, cross-domain integration prototyping, and analyses. Candidate functional areas include extending the execution of TFM flow strategies received from TFM to include active aircraft.
- It also includes work necessary to define inputs to the En Route Mid-Term Baselines. Investigations include requirements definition, investment analyses activities, and acquisition artifacts. Specific artifacts include items such as: concepts of operation and concepts of use, prototypes, analyses, white papers, demonstrations, human-in-the-loop investigations, requirements analysis, and business cases.

B, FLOW CONTROL MGMT – STRATEGIC FLOW MANAGEMENT ENHANCEMENT, G5A.01-02

Program Description

Currently flow strategies developed from the various decision support tools used by the Traffic Management Units (TMU) are manually intensive because the tools are not integrated. Traffic Management specialists have to work out the impacts of multiple Traffic Management Initiatives (TMI), and the solutions may not be optimal because the current tools do not support analyzing the linkages between multiple TMIs. This project would allow TMU specialists to automatically explore various reroute options and the impact of multiple TMIs and how they fit with efforts to accommodate NAS customer preferences. By automating this process, much more rapid flight reroutes can be developed, which would lead to fewer delays and less congestion.

The primary goal of Air Traffic Management (ATM) is addressing demand/capacity imbalances within the NAS. This program will analyze the mid-term (FY2012-2018) ATM building blocks needed for the transition to the future NextGen system and the capability to improve the predictions for both capacity and demand. The FAA needs to improve implementing Traffic Management Initiatives (TMI) such as Ground Delay Programs (GDP), Airspace Flow Programs (AFP), Ground Stops (GS), Reroutes, and Miles-In-Trail (MIT). To improve TMIs, the FAA needs more sophisticated modeling capabilities that would assess the impact of implementing a combination of TMIs, determine how to incorporate user feedback data, and project the impact of multiple TMIs on overall NAS efficiency. We need to share these modeling results with the aviation community when evaluating these initiatives. We also need to automate some of the post analysis capabilities so that results can be feed back to the TMU originating the initiative. The FAA needs a solution that allows electronic negotiation with aviation users to manage congestion.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Automating the process for implementing Traffic Management Initiatives would result in more efficient use of congested airspace and reduce delays and operational restrictions. Imposing fewer and shorter ground delays and stops would effectively increase airport capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.1** – Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- Initial planning/exploration activities will be continued.
- Identify at least two promising improvements and generate plans to mature the concept.

Program Plan FY 2011-2014 – Performance Output Goals

- Design, development and deployment of an automated a strategic flow enhancement capability.

C, FLIGHT & STATE DATA MGMT – COMMON STATUS & STRUCTURE DATA, G5A.02-01

Program Description

The Common Status and Structure program provides the information and service foundation for the FAA to deliver NextGen operational capabilities. Achieving NextGen goals of "Shared Situational Awareness" and "Trajectory Based Operations" will require unprecedented levels of information integration. The integration activities include provision of comprehensive flight planning and pilot briefing services, on-demand NAS operational performance information and integrated airspace management. This program enables the FAA to provide integrated lifecycle management of the aeronautical information necessary to support NextGen capabilities. Cornerstones of the Common Status and Structure program include:

- Capturing and maintaining digital information about flow constraints, traffic management initiatives and other status information affecting operations,
- Publishing aeronautical status information digitally using international standards,
- Providing value added services using aeronautical status information such as improved flight planning and briefing services, and
- Using the status information to improve operational performance metrics calculations and forecasting of airspace system performance.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Common Status and Structure Data provides the information, systems and tools necessary to implement comprehensive NAS safety and capacity management. When fully realized the FAA will have the ability to monitor how new procedures, new regulations and new airspace changes affect current and future NAS capacity.

Enhancing flight planning and briefing to include flight constraint information will lead to better flight planning and arrival/departure capacity plans. The resulting efficiency gains will enable the FAA to maximize NAS capacity.

A comprehensive NAS data warehouse along with new benchmarking and forecasting capabilities will enable the FAA to intelligently manage the NAS resources to optimize capacity in the face of changing conditions.

Strategic Management Process (SMP) and Objective

- **SMP Pathway # 4 –** Ensure Viable Future.
- **SMP Objective #4.1** – Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- Complete detailed Concept of Operations & Joint Requirements for leading scenarios.
- Develop a concept of operations for additional scenarios and use cases.
- Develop the infrastructure for data warehousing and performance metrics.
- Develop tools to assist with digital capture and analysis of common status data for leading scenarios.

Program Plan FY 2011-2014 – Performance Output Goals

- Complete digital capture of constraints and rules contained in facility standard procedures and letters of agreement.
- Provide evaluative tools to assist facilities with managing constraint information.
- Provide common services for aeronautical data delivery and performance metrics calculations.

D, FLIGHT & STATE DATA MGMT – ADVANCED METHODS, G5A.02-02

Program Description

The project objective is to provide well defined and well understood methodologies to support the advancement of Traffic Flow Management capabilities. This activity is structured into three parts – probabilistic Traffic Flow Management (TFM), integration of weather and the TFM flow object as an extension to the Flight Object.

The activity to define Probabilistic TFM includes the development of a concept of use for this capability. This will be followed by analyses of current operational procedures in the movement of trajectories based on forecast data (weather and demand). Modeling and simulation of probabilistic TFM scenarios to support the development of high level requirements and interfaces document for Decision Support Tool (DST).

The activity to integrate weather into the Traffic Flow Management decision support tools includes the assessment of existing and planned weather products. This will be followed by an assessment of the TFM concepts of use to derive requirements for weather information to support future capabilities. Algorithm(s) will be created for simulation model(s) to support the development of performance requirements for the weather products. This activity includes interaction with the weather community and NAS users through RTCA, Joint Planning and Development (JPDO) and Collaborative Decision Making (CDM) working group.

The activity to develop the TFM Flow Object includes the development of the Flow Object concept of use to support advance TFM capabilities. This will be followed by the definition and analyses of the TFM data elements and methodologies of the Flow Object. The project will prepare and execute analyses and simulations to support the definition of high level interfaces and requirements. This activity includes interaction with the FAA automation programs, NAS users through RTCA, JPDO and ICAO.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Greater Capacity Performance Target 1 is to increase airport capacity at the 35 OEP airports by 2011. The target represents an interim step toward achieving the NextGen target of three times capacity by 2025. Advanced methods for TFM will leverage different technologies, infrastructure enhancements, and procedural changes that will improve airport capacity, increase sector throughput, and reduce sector delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future
- **SMP Objective #4.1 –** Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- Define initial requirements for weather information and needs.
- Refine weather information for collaborative decisions in decision support tools.
- Assess industry standard exchange formats for inclusion into decision support tools.
- Develop initial Concept of Use for Flight and State Information for complexity probe.
- Evaluate display characteristics for use of flight state data for area planner.
- Define initial data requirements to support flow activities.
- Assess collaboration and consistency methods to manage flow object.
- Define initial requirements for integrating flow object into CATM.

Program Plan FY 2011-2014 – Performance Output Goals

- Develop advanced algorithms to support the area planner decision support tool.
- Update requirements for weather information.
- Develop standard exchange formats for weather inclusion.
- Develop requirements for display for the area planner.
- Develop data requirements to support flow activities.
- Develop methods for collaboration and consistency to manage flow data.
- Develop requirements for integrating flow object into CATM.

E, FLIGHT & STATE DATA MGMT – FLIGHT OBJECT, G5A.02-03

Program Description

The Flight Object (FO) is intended as the future medium for capturing and sharing the most up-to-date information on any flight. The flight object is the single common reference for all system information about a flight. A flight object is created for each proposed flight. The airline operator or pilot provides a request for service that includes a declaration of the aircraft’s flight capabilities, what the aircraft operator intends to do, and the operator's preferences and constraints to be considered if changes are imposed on the plan. The flight object information is updated as the flight progresses from gate to gate.

From the ATM perspective, the flight object contains information for planning system resources and ensuring safety of flight while providing the requested service to the extent possible in the dynamic ATC environment. As the single common reference for all systems for up-to-date information about a flight, the flight object will aid and improve:

- Flight notification
- Collaborative decision making
- Traffic flow management initiative planning
- ATC flight coordination
- Search and rescue operations

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1** – Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The target represents an interim step toward achieving the NextGen target of three times capacity by 2025. Both the users and the ATM service providers can benefit from the increased efficiency of well-coordinated capabilities that share common flight information elements.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4** – Ensure Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP Commitments.

Program Plan FY 2010 – Performance Output Goals

- Develop preliminary requirements for Flight Object.
- Develop initial set of Architecture Artifacts.
- Initiate Safety Management System activities for Flight Object.
- Develop findings from Integrated International Flight Data Object (IFDO) Demo.

Program Plan FY 2011-2014 – Performance Output Goals

- Conduct IFDO Operational Trial.
- Develop system requirements for the Flight Object.
- Identify initial system alternatives and allocations.
- Update Safety Management systems for Flight Object.
- Obtain investment decision for Flight Object implementation.

F, CAPACITY MANAGEMENT – DYNAMIC AIRSPACE, G5A.04-01

Program Description

The CATM – Dynamic Airspace and Capacity Management (Flexible Dynamic Airspace, Airspace Resource Management System) effort will provide the tools to air traffic managers to increase capacity by reconfiguring airspace for demand and capacity predictions and to dynamically deactivate restrictions. The Airspace Resource Management System (ARMS) will provide the tools for controlling the reconfiguration of the NextGen networked communications infrastructure in response to an operational requirement for reconfigurable airspace.

It is expected that airspace reconfiguration will be flexible, and it can be applied across time horizons of varying scale – from year to month to day to hours.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Greater Capacity Performance Target 1 is to increase airport capacity at the 35 OEP airports by 2011. The target represents an interim step toward achieving the NextGen target of three times capacity by 2025. In NextGen, Flexible/Dynamic Airspace and ARMS will allow traffic managers to optimize the airspace design across the NAS to maximize capacity of workload-constrained airspace while addressing weather and Special Use Airspace (SUA).

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future
- **SMP Objective #4.1 –** Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals
- Define criteria/metrics for evaluating radio spectrum coverage.
- Develop initial Concept of use for Dynamic Airspace Management.
- Develop initial requirements for radio spectrum coverage.
- Evaluate processes for moving sector boundaries and airspace configurations.
- Develop documentation for information loading of new airspace frequency plan into ERAM.

Program Plan FY 2011-2014 – Performance Output Goals
- Update requirements for radio spectrum coverage.
- Update Concept of Use for Dynamic Airspace Management.
- Develop initial interface requirements.
- Develop architecture artifacts.
- Develop final interface requirements.

1A13, Next Generation Air Transportation System (NextGen) – Flexible Terminal Environment
FY 2010 Request $64.3M

- A, Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD), G6A.01-01
- B, Surface/Tower/Terminal Systems Engineering, G6A.02-01
- C, Separation Mgmt – Approaches (Ground Based Augmentation System), G6N.01-01
- D, Separation Mgmt – Closely Spaced Parallel Runway Operations, G6N.01-02
- E, Separation Mgmt – Approaches, NextGen Navigation Initiatives, G6N.01-03
- F, Separation Mgmt – Approaches, Optimized Navigation Technology, G6N.01-04
- G, Trajectory Mgmt – Arrivals, G6N.02-01
- H, Flight & State Data Mgmt – Avionics, G6N.03-01

A, SEPARATION MGMT – WAKE TURBULENCE MITIGATION FOR DEPARTURES (WTMD), G6A.01-01

Program Description

The Wake Turbulence Mitigation for Departures (WTMD) Program captures the outcome of NASA research, applied to aviation needs, leading to a new F&E program to provide greater capacity. The WTMD effort includes two tasks. First, a national rule change is needed to allow increased departures from closely spaced parallel runways (CSPR) when WTMD is being utilized. Second, this WTMD program will field new equipment in Air Traffic Control Towers. WTMD equipment applies NASA research using MIT Lincoln Laboratory (MIT/LL) software algorithms to process both surface wind observations and forecast winds aloft, to determine when favorable crosswinds exist in relation to the CSPR. WTMD alerts Air Traffic Control (ATC) supervisors when these favorable meteorological conditions might allow reduced departure spacing. The ATC supervisors use WTMD inputs and other operational decision aids, when to decide when to reduce departure spacing. WTMD also provides alarms when such favorable crosswind conditions cease to exist. Reduced spacing on departure yields significant improvements in use of available capacity at airports with CSPR. Ten of thirty-five Operational Evolution Plan (OEP) airports are candidates for WTMD. Benefits range between two and eleven more departures per hour, weather permitting, through the use of WTMD techniques.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity**.
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

This program implements a technology based solution that will allow reduction of the required wake mitigation separation for aircraft departing on an airport's closely spaced parallel runways. This solution will allow, when the runway crosswind is favorable, the lifting or reduction of the wake turbulence separation time constraint. This translates to 2 to 11 more departures per hour for an airport that uses its closely spaced parallel runways for departures and has a significant percentage of B757 and heavier aircraft traffic. The direct result is an increase in airport average daily arrival/departure capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase Capacity Where Needed.
- **SMP Objective #3.2 –** Build capacity safely to meet demand.

Program Plans FY 2010 – Performance Output Goals

- Complete systems requirements review.
- Complete systems design review.
- Complete preliminary design review.
- Complete critical design review of hardware and software.
- Initiate implementation and maintenance planning.
- Complete design and procurement of hardware for first site.
- Complete WTMD production system test and evaluation (first system installed at WJHTC).

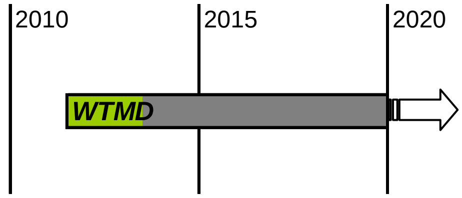
Program Plans FY 2011-2014 Performance Output Goals

- 2011 – WTMD capability operational at first airport September 2011.
- 2013 – WTMD capability operational at last airport February 2013.

System Implementation Schedule

Wake Turbulence Mitigation for Departures (WTMD)

First site IOC: September 2011-- Last site IOC: February 2013
First Site Decom: December 2031 -- Last Site Decom: July 2032



B, SURFACE/TOWER/TERMINAL SYSTEMS ENGINEERING, G6A.02-01

Program Description

The primary goal of this project is to provide engineering analyses, evaluations and assessments to establish and evaluate concepts of utilizing integrated electronic flight data management, clearance delivery data, coded taxi, conformance monitoring, and flow of flight information between air navigation service providers and users of flight information to enable more efficient and safer movement and control of air traffic in the terminal airport arena and ensure smoother transition into and out of the NAS operational airspace in support of the NextGen Concept of Operations.

The enabling technologies/information will be assessed to identify and simulate methods of integrating information (Flight data object, clearance (taxi/takeoff) information, surveillance information, user (aircraft/pilot/AOC/airport operators) receipt/acceptance of that data into a series of decision support tools that will enhance/optimize airport surface traffic management efficiency, mitigate risk of safety related incidents, and support the overall movement of air traffic in the airport environment. The decision support tools will provide the following NextGen functionality:

- Efficient management/control of surface air traffic,
- Optimization of sequencing, departures, and arrivals to enhance capacity and reduce delays,
- Efficient pre-departure clearance operations,
- Coded taxi routes, and
- Conformance monitoring of surface traffic movement.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The Surface/Tower/Terminal Systems Engineering project, will support greater capacity and increased safety Flight Plan strategic goals by analyzing and evaluating concepts and methodologies that will support more efficient and safer movement and control of air traffic in the terminal airport arena and ensure smoother transition into and out of the NAS operational airspace in support of the NextGen Concept of Operations.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 - Ensure Viable Future.**
- **SMP Objective #4.1 -** Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

The Surface/Tower/Terminal Systems Engineering project will support transfer of electronic flight data management information across the NAS. This Engineering project will support the integration of Arrival/Departure and Surface Traffic Flow Manager for improved decision-making and flow management. The decision support tools will enable flow managers to work collaboratively with flight operators and with flow contingency managers to effectively manage high-capacity arrival and departure flows in the presence of various weather conditions.

Specific output goals are:

- Pre-Production Field Operational Evaluation.
- Refine functional/operational requirements.
- Develop a Concept of Operations and the required procedures.
- Identify Benefit.
- Concept Requirements Development/Investment Analysis (CRD/IA) leading to Investment Analysis Readiness Decision (IARD), Initial investment Decision (IID) and Final Investment Decision (FID).

Program Plan FY 2011-2014 – Performance Output Goals

Continue the development, install, test, and operate a pre-production unit of Arrival/Departure Management Tool (A/DMT) with appropriate interfaces with ERAM/TMA, TFM/ Integrated Departure Arrival Capability (IDAC)), TRACON, Route Availability Planning Tool (RAPT), airport authority, and aircraft/airlines at an operational site to support analysis and assessment of near term benefits available from the A/DMT:

- Departure Route Assurance ----- Reduce departure delays
- Reduce Departure Queue Lengths ----- Reduce emissions/fuel burn
- Taxi Conformance Monitoring ----- Improve Airport Operations
- Enhanced Situational Awareness ----- Enhance Airport safety

Continue development of near term functionality, testing of interfaces with systems and stakeholders identified above to acquire the information required to realize the benefits listed and measure those benefits in an operational environment. The task will also provide insight into the requirements needed to initiate development of the mid-term surface Separation and Trajectory Management Enablers.

C, SEPARATION MGMT – APPROACHES (GROUND BASED AUGMENTATION SYSTEM), G6N.01-01

Program Description

The Local Area Augmentation System (LAAS) is the United States system that meets internationally accepted standards for a Ground Based Augmentation System (GBAS).

LAAS augments the current Global Positioning System (GPS) service for terminal, non-precision, and Category I/II/III precision approaches in the NAS. LAAS is the only cost effective alternative to ILS for Category II/III operations because a single facility can serve an entire airport versus multiple ILS facilities (one at each runway end).

The FAA identified LAAS as an “Enabler” for the Next Generation Air Transportation System (NextGen). The FAA plans to replace legacy navigation systems with satellite based navigation technology. The strategy to achieve this capability is to initially build a single frequency LAAS to provide Category-I service and improve this architecture to provide Category-II/III service.

The Department of Defense also plans to implement GBAS –Technology in their Joint Precision Approach and Landing System (JPALS) program. Civil interoperability is a “Key Performance Parameter” to this DoD system. The FAA’s LAAS program is a key dependency for the funding and implementation of the JPALS system.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

LAAS will allow for increased flexibility in the Terminal Area by eliminating the capacity constraint due to ILS critical areas and allowing reduced aircraft separation in all weather conditions. Similarly, LAAS will provide an increased capability to the air traffic management system by allowing the use of continuous descent approaches (CDAs) and curved-segmented approaches in extremely low visibility conditions.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Complete CAT-III Validation Report.
- Complete CAT-III prototype.
- Complete single frequency CAT-III acquisition plans.

Program Plan FY 2011-2014 – Performance Output Goals

- Complete JRC decision.
- Award single frequency CAT-III contract.
- Continue Research & Development work for CAT II/III.

D, SEPARATION MGMT – CLOSELY SPACED PARALLEL RUNWAY OPERATIONS, G6N.01-02

Program Description

The Separation Management – Closely Spaced Parallel Runway Operations (CSPO) initiative will accelerate activities to provide increased arrival, departure and taxi service to closely spaced parallel runways in all weather conditions. This initiative will also enhance procedures to allow dependent operations to closely spaced parallel runways or converging approaches to runways closer than 2500 feet, and independent operations to parallel runways between 2500 ft and 4300 ft.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

CSPO research is focused on finding safe ways to recover lost capacity induced by the current aircraft-to-aircraft separation procedures required for Instrument Meteorological Conditions (IMC) operations. The research is directed towards providing the aircrew with a monitoring capability that mimics the visual monitoring the aircrew uses to self-separate from other aircraft and obstacles, as allowed in Visual Meteorological Conditions (VMC) operations.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.1** – Assure a sustainable and affordable air traffic system for the future.

Program Plan FY 2010 – Performance Output Goals
- Develop functional architecture and requirements for independent and dependent approaches.
- Develop potential alternatives identified for meeting functional requirements.
- Concept and requirements validated from demonstrations and safety analysis.

Program Plan FY 2011-2014 – Performance Output Goals
- Continued development of RNAV/RNP, spacing and merging, parallel runway operations, equivalent visual operations.

E, SEPARATION MGMT – APPROACHES, NEXTGEN NAVIGATION INITIATIVES, G6N.01-03

Program Description

This program supports NextGen goals related to maintaining/improving capacity during instrument meteorological conditions, focuses on potential navigation service improvements supporting both the terminal and approach phases of flight as well as improving situational awareness on the airport surface. Some of these improvements are expected to become effective in the near-term.

The work to improve flight in low visibility is a collaborative effort between Navigation Services and Flight Standards. Its goal is to provide lower approach minima during periods of Instrument Meteorological Conditions (IMC), which would allow a greater number of take offs and landings when visibility is limited. One program element supports use of Category I runways during runway visual range (RVR) conditions down to 1800 feet, a 25% improvement over the current 2400-foot requirement. Another program element supports the use of DME-DME area navigation (RNAV) down to 1000 feet above ground level (AGL) without the need for an inertial reference unit (IRU), thus enabling many more aircraft to achieve lower altitudes during IMC and support increased capacity.

One factor that supports increased traffic flow on the airport surface is improving situational awareness for aircraft on the taxiways and runways, which is a NextGen goal. This program element will leverage the capabilities of existing systems to the extent possible and explore how new pilot-avionics interfaces may be used to deliver service to the cockpit. Systems to be leveraged include: Automatic Dependent Surveillance-Broadcast (ADS-B), Airport Surface Detection Equipment, Model X (ASDE-X), Global Positioning System (GPS) augmentation systems (Local Area Augmentation System (LAAS) and Wide Area Augmentation System (WAAS)), and systems providing RNAV and RNP. This program element will also coordinate with existing efforts by the surface movement working group. This program will provide NextGen benefits in the near-term, as well as help anchor down many of the NextGen initiatives in the mid- and far-term.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Increased Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Moving to RNAV and RNP operations increases flexibility in the NAS. Greater numbers of aircraft are equipping to take advantage of these approaches, which will allow lower separation and effectively increase airport capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase Capacity where needed.
- **SMP Objective # 3.3** – Implement airspace and airport capacity enhancements safely.

Program Plan FY 2010 – Performance Output Goals

- Finalize selection of site(s) for RNAV improvements and develop implementation schedule for NAS-wide implementation with emphasis on top OEP airports.
- Procure necessary subsystems to support RNAV approaches.
- Complete test and demonstration for RNAV DME-DME in terminal area.
- Achieve lower RVR minima and benefits at second site.
- Perform integration research for surface navigation and ties to NextGen.

Program Plan FY 2011-2014 – Performance Output Goals

- As coordinated with AFS, determine NAS-wide schedule for implementation of terminal RNAV based on DME-DME.
- Determine NAS-wide schedule for implementation of lower RVR minima.
- Define current arrival variability, runway occupancy times (day/light, clear/low-vis) as a baseline to improving exiting from the runway.
- Define a future set of taxi-out and taxi-in time-based performance requirements that reduce variability in surface operations. Use these requirements to assess the current performance at OEP airports to define how much change will be needed and the feasibility of those changes.

F, SEPARATION MGMT – APPROACHES, OPTIMIZE NAVIGATION TECHNOLOGY, G6N.01-04

Program Description

This program supports developing new technology for existing Navigation systems that improve reliability and lower the cost of operations.

The Navigation systems to be improved include all existing approach lighting systems, other lighted navigation aids, precision and non-precision approach systems, and terminal and en route navigation systems. The new technology efforts will include analyses of the physical, electrical (electronic) and economic characteristics of these systems to determine what type of technology insertion or changes in the system would result in improved efficiency.

Two of the initiatives will focus on the current Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). These lights are required when pilots are making Category I precision approaches in the NAS. The first initiative is to replace the existing incandescent lamps with Light Emitting Diode (LED) technology, without modifying the rest of the MALSR system. The second initiative is to redesign the entire MALSR system to include LED technology, and solid state switching and electrical distribution technology. This technology redesign will provide a more reliable lighting system (with at least 2 times the mean time between failures) that will consume approximately one-third of the electrical energy that existing MALSR systems with incandescent lamps and mechanical switching and distribution system use.

LED Lamps have been under prototype development for some time. In order to gain the full benefits of modernizing the MALSR, the second initiative for a complete MALSR redesign of the power and control system is needed to optimize efficiency and reliability. Development of a new system is estimated to take approximately 3 years.

A third initiative is to develop an LED based Precision Approach Path Indicator (PAPI) to replace incandescent based Visual Approach Slope Indicators (VASI) and existing PAPI Systems in the NAS. This redesigned system would improve efficiency and reliability and result in cost savings.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1** – Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing

Relationship to Performance Target

The older visual guidance systems are maintenance intensive, and use a large amount of electrical energy. This produces excessive downtime, and wastes electrical energy, which affects the life-cycle cost of lighting systems. The replacement and upgraded equipment will require less maintenance, repair time, and electrical energy.

For the first initiative, a cost benefit analysis was conducted in 2006 to determine the Benefit to Cost Ratio of incorporating new LED Lamps to replace the existing incandescent lamps in the MALSR. The results of the analysis concluded that the Benefit to Cost Ratio is 26.6 with a payback period of just 2.7 years. This analysis included acquisition costs, implementation costs, and operation and maintenance (O&M) costs. For the third initiative, a cost benefit analysis was conducted on the LED based PAPI versus the existing incandescent lamp based PAPI. The Return on Investment of going to LED based technology on PAPI is 41 percent per visual glide slope system and the break-even point will be achieved in 2.4 years. For example, the yearly saving per system is $2,781.30 on an investment of $6,710.00 (the anticipated cost difference of $30,000 for a LED PAPI system versus $23,290 for an incandescent system). The percentage of savings attributed to energy cost is 10.2 percent; to lamp replacement cost is 47.7 percent; and to lamp replacement labor is 42.1 percent.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce Unit Cost of Operations.

Program Plan FY 2010 – Performance Output Goals

- MALSR LED Lamp Solution Development (initial development and design).
- LED PAPI System Solution Development (initial development and design).

Program Plan FY 2011-2014 – Performance Output Goals

2011:

- MALSR LED Lamp Solution Development (initial development and design).
- LED based MALSR Solution Development (initial development and design of the Solid-State MALSR).

2012:

- LED based MALSR Solution Development (initial development and design of the Solid-State MALSR).
- ALSF-2 LED Lamp Solution Development (initial development and design).

2013:

- LED based MALSR Solution Development (initial development and design of the Solid-State MALSR).
- ALSF-2 LED Lamp Solution Development (initial development and design).

2014:

- LED based MALSR Solution Development (initial development and design of the Solid-State MALSR).
- ALSF-2 LED Lamp Solution Development (initial development and design).

G, TRAJECTORY MGMT – ARRIVALS, G6N.02-01

Program Description

The FLEX – Trajectory Management Arrivals – RNAV/RNP with 3D and Required Time of Arrival (RTA) program will ensure that the safe and efficient transition of aircraft from en route to terminal airspace with appropriate sequencing and spacing. Several key mechanisms will be necessary to support this more efficient transition. RNAV/RNP procedures with vertical constraints and required time of arrival will provide the precision necessary to avoid using extra separation between aircraft. Use of metering times at key merge points will be used by air traffic managers as used today in Center-TRACON Automation System Traffic Management Advisory (CTAS TMA). In this type of operation, an aircraft's meter point time (MPT) is used to determine when it enters into the TRACON airspace and is given clearance to continue to the assigned runway. Metering must take into account runway load balancing and will serve to reduce (but not eliminate) the need for delay absorption needed inside the TRACON.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The RNAV/RNP Approaches with 3D and Required Time of Arrival (RTA) procedures provide for fuel efficient arrivals with less vertical restrictions than Continuous Descent Arrivals (CDA). The RTA supports effective management of flow, which allows more efficient use of terminal capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.1 –** Assure a sustainable and affordable air traffic system for the future.

Program Plan FY 2010 – Performance Output Goals
- Assess the ability of aircraft to accurately meet vertical constraints and RTA.
- Evaluate use of data communication for aircraft messaging for RTA, reroutes, and waypoint verification data integrity.
- Complete safety analysis.
- Begin in-flight trials using data communications for RTA.

Program Plan FY 2011-2014 – Performance Output Goals
- Design and evaluate ground merging and sequencing tools that will employ control by time of arrival.
- Human factors analysis of the impact of shifting to control by time of arrival through controller-in-the-loop simulations and field trials.
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance.

H, FLIGHT & STATE DATA MGMT – AVIONICS, G6N.03-01

Program Description

This project intends to conduct research towards the development of initial requirements, concept of operations, and certification standards for cockpit moving map avionics that support automated taxi delivery, conformance monitoring and surface separation management. This capability represents the cockpit component of the Trajectory

Management - Surface Conformance Monitoring project. It also represents a stand-alone capability to support surface separation in NextGen Flexible Terminal operations.

This project intends to expand on the development that was initiated by the NASA Surface Management System (SMS) project to mature surface management capability in multiple phases (spirals) leading to trajectory based operations on the surface, and perform the Acquisition Management System (AMS) analysis and documentation to support an FAA initial investment decision (JRC-2A). The initial capabilities of SMS provide information to users and allow the exchange of data between the ATCT, ramp towers, and other facilities such as the TRACON, the ARTCC, and the airline operational control centers (AOCs). In addition to displaying necessary airport surface and flight plan information in a comprehensive user interface, SMS generates predictions and provides decision support tools to the user.

The Separation and Trajectory Management Enablers effort is designed to show the potential safety and workload benefits that can be achieved through a comprehensive taxi route management and conformance monitoring capability and support for surface separation. The end state will be a precise, unambiguous taxi clearance to be displayed in the cockpit, alerts to the flight crews to maintain conformance to the clearance, and overlay of surveillance information to assist in surface separation. Conformance monitoring can be limited to adherence to route only, or both route and timing through incorporation of timed check points. By using a proactive approach to separation on the airport surface, taxiing aircraft can be "deconflicted" from other aircraft in the taxi, landing, and takeoff phases of flight. This results in safer ground operations. The additional time component mentioned above will support trajectory-based operations (TBO) on the airport surface.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

By allowing aircraft to be more closely spaced and improving the efficiency of operations in the terminal area, airports will be able to handle more aircraft with their existing capacity. This creates an increase in their average daily capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plans FY 2010 – Performance Output Goals

- Develop Initial Cockpit Display of Taxi Clearance & Instructions CONOPS, RTCA Minimum Operational Performance (MOPS) Draft.
- Conduct Cockpit Display of Taxi Clearance and Instructions (2D) Simulation.
- Complete Initial Safety Analysis.
- Develop refined Cockpit Display of Taxi Clearance and Instructions (2D), CONOPS, RTCA MOPS Draft.

Program Plans FY 2011-2014 – Performance Output Goals

- Develop High Fidelity Cockpit Display of Taxi Clearance and Instructions (2D), CONOPS, RTCA MOPS Draft.
- Conduct Final Safety Analysis.
- Develop Cockpit Display of Taxi Clearance and Instructions (2D), CONOPS, RTCA MOPS Final Draft.
- Conduct Cockpit Display of Taxi Clearance and Instructions (2D) Field Demonstrations.
- Develop Final Cockpit Display of Taxi Clearance and Instructions (2D) CONOPS, RTCA MOPS.
- Develop Cockpit Display of Taxi Clearance and Instructions (2D) TSO.

1A14, Next Generation Air Transportation System (NextGen) – Safety, Security, and Environment

FY 2010 Request $8.2M

- Security Integrated Tool Set (SITS), G7A.01-01

Program Description

The Security Integrated Tool Set (SITS) is part of the Next Generation Air Transportation System (NextGen). It is an automated system used to identify airborne security threats in the National Airspace System (NAS) and communicate that information to the appropriate information system or agency. It will collect data from several sources to determine the level of the security threat or, in the case of lost pilot or NORDO (no radio), whether it is a threat or not. It will collect data from several automation systems and be able to share it with agencies with a national security responsibility. This data will be provided to select FAA users and to inter-agency defense and homeland security partners (e.g., Department of Defense, Transportation Security Agency, and Customs and Border Protection) through a secure network to allow real-time collaboration and a Common Operational Picture to monitor these threats, determine the threat level, and help to facilitate the operational response.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 5 –** Enhance our ability to respond to crises rapidly and effectively, including security related threats and natural disasters
- **FAA Performance Target 1 –** Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent.

Relationship to Performance Target

Provide a system which distributes airspace security related information in a secure infrastructure so that a common situational awareness can be achieved among all of the agencies involved in providing for National Security. Develop preparedness tools that enable us to sustain this common security situational awareness.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway # 4 –** Ensure Viable Future.
- **SMP Objective #4.1 –** Assure a sustainable and affordable air transportation system for the future.

Program Plan FY 2010 – Performance Output Goals

- Conduct an evaluation of Preliminary Engineering Development candidate concepts and systems, refine operational concepts and requirements, obtain Initial Investment Decision (JRC 2A).
- Initiate the design, development, and deployment of the SITS system.

Program Plan FY 2011-2014 – Performance Output Goals

- Complete the design, development, and deployment of the SITS system.

1A15, Next Generation Air Transportation System (NextGen) – Networked Facilities
FY 2010 Request $24.0M

- A, Future Facilities Investment Planning, G3F.01-01
- B, Integration, Development, & Operations Analysis Capability, G3M.02-01

A, Future Facilities Investment Planning, G3F.01-01

Program Description

The Next Generation Air Transportation System (NextGen) program upgrades air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize present air traffic control and leads to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. Infrastructure, automation, equipage, procedures, and regulations will be designed to support this seamless operational concept and must evolve from a geographical focus to a broader air traffic management concept. The facilities and the personnel who staff them must also be changed to implement these new concepts.

The facilities component of NextGen focuses on optimization of air navigation service provider (ANSP) resources. This includes both the establishment and elimination of facilities, resulting in changes to the numbers and sizes of control facilities, and the thinning or elimination of other facilities such as navigational aids. It also includes the allocation of staffing and facilities to provide expanded services; service continuity; best deployment, management, and training of the workforce; and the use of more cost-effective and flexible systems for information sharing and back-up.

Because of the net-centric capabilities and the geo-independence that NextGen provides, facilities do not require proximity to the air traffic being managed. Facilities will be sited and occupied to provide for air traffic management facility optimization. This includes combining facilities (e.g., air route traffic control centers (ARTCCs), terminal radar approach control (TRACONs), and air traffic control towers (ATCTs) towers when appropriate.

Preliminary work for NextGen facility planning indicates that multiple NextGen facilities will need to be deployed beginning in 2014 and operated concurrently with existing facilities for some period so that service continuity during transition is ensured. NextGen facilities may consist of several different types, housing appropriate complements of Air Traffic, System Operations, and Technical Operations personnel.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Improving the configuration of air traffic control facilities and improving communications links among them allows higher levels of traffic to be handled during peak periods. There are also efficiencies gained by allocating larger amounts of air space to consolidated terminal facilities so aircraft can be sequenced for landing further from the airport.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals
- Continue the optimization of the size and location of ANSP facilities.
- Continue engineering support for the implementation of NextGen facilities.
- Continue enhancement of network-enabled operations and infrastructure management services to provide continuity of operations in the event of a major outage.
- Achieve Initial Investment Decision.

Program Plan FY 2011-2014 – Performance Output Goals
- Continue providing some of the NextGen capabilities in near or zero visibility conditions, and maximize air traffic navigation services provided at collocated facilities and virtual towers.
- Continue to co-locate facilities to support robust plan for continuity operations when failure occurs.
- Achieve Final Investment Decision.

B, INTEGRATION, DEVELOPMENT, & OPERATIONS ANALYSIS CAPABILITY, G3M.02-01

Program Description

The NextGen redesigns the air traffic control systems and technologies to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. Infrastructure, automation, equipage, procedures, and regulations are designed to support this seamless operational concept and must evolve from a geographical focus to a broader air traffic management concept. The integration, development, and operations analysis capability project provides a real-time, flexible, component/object oriented environment to develop and validate the broad framework of concepts, technologies, and systems introduced by NextGen.

NextGen introduces evolutionary and revolutionary concepts of operation and new technologies into the air traffic system. These concepts of operation and technologies are not only sophisticated, but very complex. As a result of this, implementation of NextGen requires extensive work in the area of early evaluations, concept development, and/or demonstrations in a real-time environment without being encumbered by the present structure of the NAS. The requirements in this area will continue to grow as NextGen matures.

This program provides a real-time, flexible, component/object oriented simulation environment to develop and validate the broad framework of concepts, technologies, and systems introduced by NextGen. It provides for the ongoing conduct of early evaluations, concept development, and/or demonstrations in a flexible, real-time NextGen integrated environment that is unencumbered by the NAS infrastructure. It also provides the capability for these activities to be developed and validated in parallel to ongoing NAS activities and research. The program enables FAA to bring in technologies to conduct low to medium fidelity high-value exercises. The integration, development, and operations analysis capability uses low fidelity java-based rapidly configurable interfaces and evolves into a medium to high-fidelity capability in a controlled environment, emulates information flow and system performance characteristics, and is adaptable to illustrate and assess NextGen human-machine-interface concepts. An ongoing capability is required to conduct early concept validation, alternatives analyses, and requirements development.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Improving the configuration of air traffic control facilities and improving communications links among them allows higher levels of traffic to be handled during peak periods. There are also efficiencies gained by allocating larger amounts of air space to consolidated terminal facilities so aircraft can be sequenced for landing further from the airport.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure a Viable Future.
- **SMP Objective #4.3 –** Deliver the NextGen/OEP commitments.

Program Plan FY 2010 – Performance Output Goals

- Continued development of the NextGen Integration and Evaluation Capability (NIEC) at the Technical Center.
- Focus on support to develop iterative designs to evaluate concepts and alternatives; determine quantitative metrics to define and validate human performance, usability, workload, and safety indications.
- Design and conduct experiments (software assessment and/or prototype development, hardware assessment and integration, development and validation of system prototypes, candidate solutions to research questions, system analyses, and/or definition and refinement of requirements
- Enhance NIEC simulation infrastructure and data collection capabilities.

Program Plan FY 2011-2014 – Performance Output Goals

- Continued development of the integration, development, and operations analysis capability.

ACTIVITY 2. PROCUREMENT AND MODERNIZATION OF AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. EN ROUTE PROGRAMS

2A01, EN ROUTE AUTOMATION MODERNIZATION (ERAM)

FY 2010 Request $171.8M

- En Route Automation Modernization (ERAM), A01.10-01
- X, En Route Automation Modernization (ERAM) – Technical Refresh, A01.10-03

Program Description

The ERAM program comprises four segments: Enhanced Backup Surveillance (EBUS), En Route Information Display System (ERIDS), ERAM Release 1, and ERAM Releases 2/3 (maintenance and upgrade releases). The first segment, EBUS was completed during FY 2006. It is a fully functional backup if the primary automation system fails.

ERIDS – The En Route Information Display System distributes important information such as Notices to Airmen, Pilot Reports, aeronautical charts and airport information, instrument approach and departure procedures, letters of agreement, and local procedures to air traffic controllers electronically to improve productivity and efficiency. Additionally, ERIDS reduces, and in some cases eliminates, the time necessary to process, print, manage, and distribute paper. Three prototype ERIDS systems were completed in FY 2003. National deployment of 20 systems began in FY 2006 and was completed in FY 2008.

ERAM Release 1 – ERAM Release 1 replaces the current Host Computer System with a new automation system to enable improvements in airspace capacity, efficiency, and safety that cannot be realized with the current system. Additionally, today's Host Computer hardware can only be maintained through 2012. Designed to handle traffic growth through the year 2020, ERAM enables controllers to better handle unplanned events, offers flexible routing options, and provides additional safety alerts to prevent collisions and congestion. Fully integrated with ERAM Release 1 is a technology refresh of the radar controller position display processors to bring them into line with ERAM's modern, redundant architecture. The current processors were deployed in 1998 and are reaching their end of service life. Their processing power is inadequate for advanced applications, and their resident graphics software language is both proprietary and outdated.

To mitigate risk, ERAM is leveraging existing FAA products and lessons learned rather than building brand-new products. Specifically, the Display System Replacement program that was completed during the 1990s forms the basis of ERAM radar controller display functionality; the User Request Evaluation Tool forms the basis of the flight data processing and data controller display functionality; the Standard Terminal Automation Replacement System radar data tracker provides the technology for a standard tracker, and the Microprocessor En Route Automated Radar Tracking System forms the basis for ERAM separation assurance and safety functions. ERAM Release 1 will complete the delivery of a new automation system at each En Route Air Route Traffic Control Center in the continental United States. ERAM Release 1 national deployment begins in FY 2009 and concludes in FY 2011.

ERAM Release 2/3 – These ERAM maintenance and upgrade software releases are planned for 2009 and 2010 respectively. These releases are required for ERAM maintenance and will include incremental functional enhancements not available in ERAM Release 1.

The ERAM technology refresh project covers future technology refresh development and procurement activities required to extend the service life of ERAM hardware and software. The initial work will involve the replacement of the ERAM D-position processor and display. This is legacy hardware that was not replaced with the ERAM Release

1 deployment. Additional hardware refresh and system enhancements will provide increased functionality, address capacity needs, and resolve equipment end-of-life issues as En Route mid-term automation release packages are developed and implemented. The technology refresh program is scheduled to begin in FY 2012.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

ERAM contributes to the FAA's greater capacity goal by providing a fully redundant system with no loss of service when either the primary computer fails or is not available during planned system maintenance. The current Host Computer System has only limited backup functionality during an outage or maintenance action. This improved availability will preclude the need to impose restrictions on airspace users when the primary channel is not available. ERAM also increases the number of flight plans that can be stored to 7,080 (versus the current 2,600); provides flexibility in airspace configuration; and extends the radar coverage in all En Route Centers by increasing the number of radar feeds from 24 to 64. This reduces controller workload, increases productivity, and provides the necessary infrastructure to handle the anticipated growth and complexity of the NAS.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.4 –** Manage airspace use and traffic optimally.

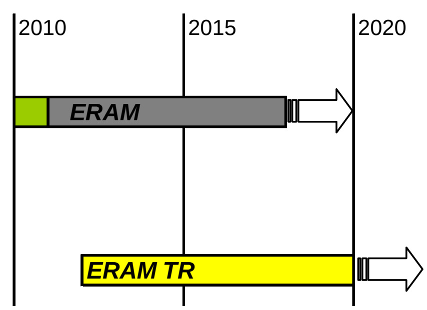
Program Plans FY 2010 – Performance Output Goals
- ERAM Key Site Operational Readiness Demonstration (ORD).
- ERAM release 2 available.
- Initiate planning for Tech Refresh.

Program Plans FY 2011-2014 – Performance Output Goals
- ERAM release 3 available.
- ERAM Last Site ORD.
- Tech Refresh activities baselined and execution started.

System Implementation Schedule

En Route Automation Modernization (ERAM)
First site ORD: December 2009 -- Last site ORD: December 2010

En Route Automation Modernization (ERAM) – Tech Refresh (TR)
Start TR Activities 2012 -- Complete TR Activities TBD



2A02, EN ROUTE COMMUNICATIONS GATEWAY (ECG)

FY 2010 Request $3.6M

- En Route Communications Gateway – Technology Refresh, A01.12-02

Program Description

The En Route Communications Gateway (ECG) system is a computer system that formats and conveys critical air traffic data to the Host Computer System and the Enhanced Backup Surveillance (EBUS) System at the Air Route Traffic Control Centers (ARTCC's). ECG increases the capacity and expandability of the NAS by enabling the current automation systems to use new surveillance technology. ECG introduces new interface standards and data formats—which are required for compatibility with International Civil Aviation Organization (ICAO) standards—and adds capacity to process data from additional remote equipment such as radars. The ECG provides the automation system capacity and expandability to support anticipated increases in air traffic and changes in the operational environment. The ECG was a prerequisite to deploying the En Route Automation Modernization (ERAM) software and hardware.

The ECG is fully operational at the ARTCC's. Technology refresh will be used to sustain the capability of the ECG system and to ensure that new capabilities or functionality can be incorporated.

The ECG program Sustainment and Technology Evolution Plan (STEP) provides the strategy to sustain the viability of hardware (HW), software (SW), and firmware (FW) products used in the ECG system. STEP facilitates Post Production Support of the ECG system and identifies the processes/procedures that will be implemented to support the evolution and sustainment of the ECG system. Replacements of products occur due to product end-of-life, end-of-service, support termination and performance or supportability limitations.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ECG Technology refresh project will replace some of the hardware and update critical software in this key air traffic control automation system. It is important to keep these systems up to date to avoid failures and system outages. The product performance is based on the measurement of response time, system function time and reserve capacity in reference to the requirements. Supportability limitations can occur due to various product factors that may include cost constraints, system failures, licenses, spare quantities, and repair turn-around time. This investment will reduce supportability limitations and increase availability and reliability.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Identify technology refresh and obsolescence issues.

Program Plans FY 2011-2014 – Performance Output Goals

- Develop, install, test, and implement technology solutions nationally.
- Deploy software changes in support of ERAM at all ARTCC's.

2A03, NEXT GENERATION WEATHER RADAR (NEXRAD)
FY 2010 Request $6.9M

- NEXRAD – Legacy, Icing & Hail Algorithms, W02.02-01
- X, NEXRAD – Technical Refresh, W02.02-02

Program Description

This modern, long-range weather radar detects, analyzes, and transmits weather information for use by en route and terminal radar control facilities. This helps traffic management units determine the location, time of arrival, and severity of weather conditions to determine the best routing for aircraft controlled by these facilities. Currently there are 158 NEXRAD systems and one supplemental weather radar funded, owned and operated jointly by the Tri-Agency partners— the National Weather Service (NWS), the Federal Aviation Administration, and the Department of Defense. The NWS is the lead agency for the NEXRAD program.

Open system upgrades to the NEXRAD processors and receiver will extend NEXRAD's capabilities by improving data quality and detection ability to support increasing the number of data products generated. The Open System Upgrades improve the NEXRAD's detection capability, update rate, resolution and clear definition of additional types of weather conditions within discrete atmospheric regions.

The NWS awarded a $43M contract in 2007 to acquire the dual polarization capability for the full complement of NEXRADs. A significant portion of the FY 2010 appropriation will be used to cover costs to procure and install dual polarization hardware on the FAA's independently owned 12 NEXRAD platforms. Dual polarization will improve overall data quality of existing NEXRAD weather radars. In addition, this capability will provide the ability to detect in real time, regions of icing aloft (in-flight icing). When fully developed, and implemented on appropriate down stream system/platforms (e.g., FS21, ITWS…), this capability offers the potential to significantly reduce icing-induced accidents (and fatalities) that are common in the General Aviation (GA) community.

The NWS collects and redistributes NEXRAD weather data nation-wide and creates forecasts that are used in all phases of flight. Terminal and En route air traffic control systems and the ATC Systems Command Center are able to use the NEXRAD products and services, which are processed by the Weather and Radar Processor, Integrated Terminal Weather System, and the Corridor Integrated Weather System.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The NEXRAD program contributes to greater capacity goals by ensuring sustained operational availability of NEXRAD. NEXRAD measures precipitation intensity, storm motion, and weather echo tops, and provides this data in varied displays directly or indirectly to all OEP airports and most other air traffic control facilities in the continental United States.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Provide funding to the Department of Commerce (DOC)/NWS (Lead Agency) for NEXRAD Product Improvement / Open Systems Upgrade.
- Update all NEXRAD systems with Clutter Mitigation and Detection (CMD) algorithm.
- Fund the procurement of Dual Polarization Hardware for 12 FAA NEXRAD Platforms.

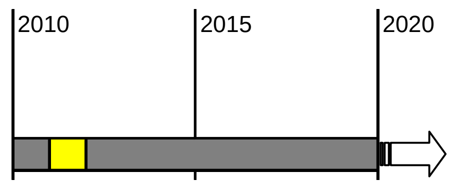
Program Plans FY 2011-2014 – Performance Output Goals

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Product Improvement / Open Systems Upgrade.
- Implement Dual Polarization Hardware and software modifications onto 12 FAA NEXRAD Platforms.
- Support roll-out of operationally suitable in-flight icing dissemination capabilities onto existing FAA display platforms.

System implementation schedule

Next Generation Weather Radar (NEXRAD) - Open System Upgrades

Dual Pol Upgrade : 2011



2A04, AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER (ATCSCC) RELOCATION

FY 2010 Request $10.3M

- ATCSCC – Relocation, F28.01-01

Program Description

The Air Traffic Control System Command Center (ATCSCC) Infrastructure Planning program will plan and finance the relocation of the command center from its present location in Herndon, VA. For the past thirteen years the facility has been housed in commercially leased space with a current cost in excess of four million dollars annually. The long-term lease expires on September 30, 2013. The FAA must have a location for this critical NAS function that meets FAA security standards. There are also many physical constraints in the existing leased ATCSCC facility operations room for reconfiguration and expansion of new Traffic Flow Management (TFM) equipment deployments. In the past, in order to meet new equipment deployments, the FAA has had to pay significant amounts for modifications to the existing leased space to accommodate the new TFM equipment deployments.

The FAA ATCSCC is responsible for monitoring air traffic flows nationwide and implementing programs to reduce delays and to allow aircraft to avoid severe weather areas on a daily basis. It plays a key role in the safe and efficient operation of the NAS. In addition, it also plays a key national security role, which requires that it be protected as part of the nation's critical infrastructure. The current leased facility does not meet FAA security standards.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing

Relationship to Performance Target

This project will collocate the ATCSCC with another FAA facility, offering lower life cycle costs. Collocation will eliminate the need for continuing the current lease, and it will avoid potentially higher capital costs by eliminating the need for land acquisition, reducing the amount of site preparation, and significantly reducing the need for additional backup power and utility systems. The FAA will achieve cost avoidance benefits projected at $121.4 million from fiscal year 2011 through 2031.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce Unit Cost of Operations.

Program Plans FY 2010 – Performance Output Goals

- Partial Building Occupancy Date (May 2010).
- Complete ATCSCC facility construction (July 2010).
- Begin Installation and Checkout at new ATCSCC (May 2010).

Program Plans FY 2011-2014 – Performance Output Goals

- Complete Installation and Checkout at new ATCSCC (January 2011).
- ATCSCC Facility Commissioning (March 2011).
- Disposition of Equipment/Property at leased ATCSCC facility (April 2011).

2A05, ARTCC Building Improvements/Plant Improvements

FY 2010 Request $51.3M

- ARTCC Plant Modernization/Expansion – ARTCC Modernization, F06.01-00

Program Description

The Air Route Traffic Control Center (ARTCC) Modernization and Expansion program supports En Route Air Traffic operations and service-level availability through facility lifecycle program management of the 21 ARTCCs and two Center Radar Approach Control (CERAP) facilities. This program expands and modernizes these facilities to accommodate growth in en route operations and new air traffic control equipment. It also renovates and upgrades en route centers to prevent outages that would delay air traffic.

This is a long term program, and it is comprised of 13 standard projects that are implemented at all of the ARTCCs. To date, nine of these standard projects are complete at all the ARTCCs. ARTCCs and CERAPs must be modernized and expanded to support ATC operational requirements and to minimize ATC delays or outages caused by infrastructure failures. The program also includes funding for near-term improvements, configuration management, and numerous special projects.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ARTCC Modernization/Expansion program contributes to the FAA's greater capacity goal by ensuring that buildings that house en route control equipment are modified, as necessary, to meet traffic growth and accept new equipment. The program also maintains these buildings in good condition to avoid air traffic control outages due to failures in such infrastructure systems as electrical distribution systems. The program maintains the integrity of 21

ARTCCs, and two CERAP facilities, as well as upgrades facilities for integration and transition of new NAS systems. Modernizing ARTCC and CERAP building infrastructure with such projects, such as electrical wiring, heating and ventilation systems, reduces the chances of outages, which can cause air traffic delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Fund Combination M-1/Automation Wing Rehabilitation project at Kansas City and Memphis.
- Fund Automation Wing Abatement and Demolition project at Albuquerque.
- Fund M-1 control room build-out project at Denver, Fort Worth and Boston.
- Fund Administration Wing Mini Mod project at Houston.
- Provide $400,000 per ARTCC for mission critical failure mode mitigation.
- Provide $100,000 per ARTCC for local sustain.
- Conduct facility condition assessments at five ARTCCs.
- Update the national Facility Condition Assessment database.

Program Plans FY 2011-2014 – Performance Output Goals

- Fund Automation Wing Rehabilitation project at Atlanta.
- Fund Automation Wing build-out at Albuquerque.
- Fund Wing Basement Sustain project at Minneapolis, Los Angeles, Boston, Memphis, Chicago, Jacksonville, Seattle, Indianapolis, Fort Worth, Miami, Oakland, Cleveland, Albuquerque, Salt Lake, Kansas City, Denver, Atlanta, Washington, Houston, and New York.
- Provide $500,000 per year per ARTCC for critical mission failure mode mitigations, local sustain, repairs and upgrades.
- Conduct facility condition assessments.
- Update the national Facility Condition Assessment database.

2A06, Air Traffic Management (ATM)

FY 2010 Request $31.4M

- TFM Infrastructure – Infrastructure Modernization, A05.01-06
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1, A05.01-10
- Route Availability Planning Tool (RAPT), A05.05-01

BLI 2A18 – Collaborative Air Traffic Management Technologies (CATMT)

- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G5A.05-01
- X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G5A.05-02
- X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4, G5A.05-03

Program Write ups for 2A18 CATMT WP2, WP3, and WP4 are combined in the following program information

Program Description

The Traffic Flow Management (TFM) system is the automation backbone for the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units that assist the ATCSCC in strategic planning and management of air traffic. The TFM system is the nation's primary source for capturing and disseminating air traffic information and is the key information source for coordinating air traffic in the NAS. TFM hosts the software decision support systems that assist in managing and metering air traffic to reduce delays and make maximum use of system capacity to balance growing flight demands with NAS capacity within a dynamic environment. The FAA uses the information from this system to collaborate with aviation customers to implement programs that reduce delays and ensure smooth and efficient traffic flow through FAA-controlled airspace, thereby saving the flying public and airlines millions of dollars. TFM's customers include the airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, industry, and partner countries.

The TFM Modernization (TFM-M) component modernizes the TFM infrastructure by replacing hardware and software, which is approaching functional obsolescence. The core system software has become increasingly difficult to maintain and to modify, and it will not support the emerging ATM structure and system requirements. The follow-on work packages for Collaborative Air Traffic Management Technologies (CATMT) are developing more sophisticated software to refine out management of airspace and better collaborate with users.

CATMT capabilities will:

- Provide more accurate forecasting of system capacity and user demand.
- Improve modeling, evaluation and optimization of traffic management initiatives.
- Improve information dissemination, coordination and execution of traffic flow strategies.
- Minimize and equitably distribute delays across airports and users.
- Collect and process more performance data to define metrics and identify trends.

CATMT Work Package 1 (WP1) provides new decision-support tools to deliver additional user benefits and increase the effective capacity of the NAS. WP 1 leverages the cooperative environment that was used in its predecessor, the Collaborative Decision Making Program. WP 1 enhancements include:

- Airspace Flow Management Suite (enables voluntary rerouting around constrained areas avoiding overuse of ground delay programs);
- Impact Assessment and Resolution Suite, (provides the capability to analyze multiple traffic management initiatives before they are put in place);
- Domain Integration, (enables data sharing across internal service delivery points); and
- Performance Measurement Suite (enhance TFM data collection and analysis).

CATMT Work Package 2 (WP 2) identifies additional new enhancements that will continue to improve the TFM decision support tool suite. The FAA baseline for WP 2 is defined to be the following capability enhancements:

- Arrival Uncertainty Management (AUM), Automates the use of historical data for determining the number of arrival time slots to be reserved for flights outside of the regular schedule, when a GDP is generated;
- Weather Integration, Integrated high confidence 2 hour weather predictions onto the primary display used by Traffic Managers and for use by decision support tools;
- Collaborative Airspace Constraint Resolution (CACR), Automated decision support tool that identifies constrained airspace and provides potential solutions for airborne and pre-departure flights; and
- Airborne Reroute Execution (ABRR), Provides the ability to electronically send TFM generated airborne reroutes to En Route automation for ATC execution.

CATMT Work Package 3 has now been defined as:

- Modernization of the decision support tool suite through Traffic Situation Display Re-engineering (TSDE);
- Additional capabilities through software enhancements;
- Integrated Departure Arrival Capability (IDAC), Phase 1, Automation of the coordination and management of departures over shared and congested NAS resources (fixes, airways) ; and
- Collaborative Information Exchange (CIX), Manages information exchange between the TFM system and external systems through software interfaces.

CATMT Work Package 4 is currently being defined.

The Route Availability Planning Tool (RAPT) is a prototype system developed on behalf of the New York Port Authority for the New York airports, and it is being developed and evaluated by the FAA. This tool helps to identify possible routes for departure during periods of severe weather. RAPT will be deployed operationally as part of the WP 2 Weather Integration enhancement.

Relationship of Program to FAA Strategic Goal, Objective and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 2 –** Increase reliability and on-time performance of scheduled carriers.
- **FAA Performance Target 1 –** Achieve a NAS on-time arrival rate of 88.0 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

Relationship to Performance Target

The ATM program will support the Greater Capacity goal through the use of automated systems that provide more accurate and timely information for all TFM system users, improve operator and passenger access to flight information, and reduce system delays. TFM-M will upgrade the existing TFM infrastructure and will increase integration and interoperability by establishing a robust, commercially-available, and standards-compliant system. This will accelerate development and implementation of technology and tools that will improve traffic management synchronization, traffic management flow, and information management services. CATMT WP 1 and RAPT will develop and deploy critical add-on automation enhancements to help reduce airway and airport congestion. CATMT WP 2 enhancements will ultimately lead to improved passenger throughput, equitable allocation of capacity resources among users, and significant improvement in air traffic operations on-time system performance metrics.

Strategic Management Process (SMP) Pathway and Objective

TFM-M, CATMT, & RAPT:

- **SMP Pathway #1 –** Achieve Operational Excellence
- **SMP Objective #1.5** – Minimize impacts of weather on the operation.

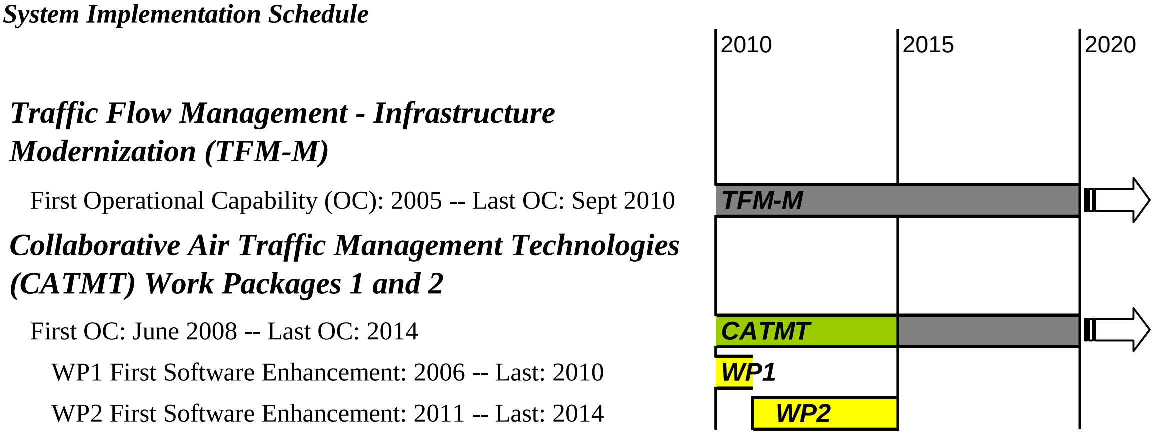
Program Plans FY 2010 – Performance Output Goals

- Complete deployment of TFMS (TFM-M system).
- Deploy the Impact Assessment and Resolution capability.
- Deploy and evaluate RAPT at a 4-corner terminal.

Program Plans FY 2011-2014 – Performance Output Goals

- Close out of WP 1 activities.
- Deploy CATMT WP 2 performance enhancements.
- Complete RAPT Technology Transfer.

System Implementation Schedule



2A07, AIR/GROUND COMMUNICATIONS INFRASTRUCTURE
FY 2010 Request $8.6M

- Radio Control Equipment (RCE) – Sustainment, C04.01-01
- Communications Facilities Enhancement – Expansion, C06.01.00

Program Description

The Air-to-Ground (A/G) Communications Infrastructure Sustainment program enhances operational efficiency and effectiveness by replacing old radio equipment. This radio equipment is installed at remote sites that allow communications between pilots and controllers when an aircraft is beyond normal direct transmission range. The program also renovates buildings and improves site conditions and access for these remote radio sites.

The Communications Facilities Enhancements (CFE) program provides new or relocated radio control facilities to enhance the A/G communications between air traffic control and aircraft when there are gaps in coverage or new routes are adopted by aircraft flying through the facility's airspace

The Radio Control Equipment (RCE) program replaces obsolete radio signaling and control equipment, which allows a controller to select and use a remote radio channel. It improves operational performance and reduces maintenance costs. RCE is required at control end sites, such as ARTCCs, TRACON facilities, ATCTs, CERAP, Radar Approach Control, and AFSSs. This equipment is also installed at supporting facilities such as, Remote Center Air/Ground facilities that serve centers, Remote Transmitter/Receiver facilities that serve terminal facilities, and Remote Communications Outlet facilities that serve flight service stations.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

This A/G Communications programs provide communications infrastructure that makes airspace restructuring feasible. It also will reduce the number of outages and enhance communications capacity by replacing aging and increasingly unreliable communications equipment with modern equipment. These programs improve and upgrade associated sites and facilities. In addition, they enable additional capacity by providing new communications sites to conform to new air traffic patterns.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.3** – Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals
- Attain service availability for four CFE projects.
- Complete investment analysis for new RCE procurement.

Program Plans FY 2011-2014 – Performance Output Goals
- Provide support to CFE critical sites.
- Install RCE units for sustainment as required.

2A08, ATC BEACON INTERROGATOR (ATCBI) – REPLACEMENT
FY 2010 Request $4.7M

- ATC Beacon Interrogator (ATCBI) Replacement, S02.03-00

Program Description

The Air Traffic Control Beacon Interrogator Replacement - Model 6 (ATCBI-6) is a secondary radar used for en route air traffic control. The ATCBI-6 provides aircraft position information and identification to ATC facilities, for separation assurance and traffic management. The ATCBI-6, in conjunction with co-located primary long-range radar, also provides back-up radar approach surveillance service to numerous Terminal Radar Approach Control (TRACON) facilities in the case of lost terminal radar services and/or scheduled maintenance downtime. The ATCBI-6 system is a low-cost, highly reliable, very accurate, and more capable replacement for old, high-cost beacon interrogators with higher failure rates.

The ATCBI-6 sensors replace 30-year old ATCBI-4/5's systems, which are past their 20-year design life span and many of the parts for these older systems are obsolete. Replacement of these systems will provide improved system reliability and reduce operating costs.

The ATCBI-6 program will replace all existing en route ATCBI-4/5 systems and establish new beacon only sites. The original ATCBI-6 Replacement Program included 129 ATCBI-6 systems to replace existing operational beacons; establish support systems for training, testing, logistics, and operational support; and provide systems for three new sites. An additional 10 ATCBI-6 systems were added, due to Congressional establishments, agency cost share agreements, other government projects, and the need for additional support systems, for a total of 139 systems.

Performance data from ATCBI-6 systems already deployed shows increased mean time between outages and decreased time to restore service, which results in increased system availability and reduced maintenance staffing needs. The ATCBI-6 provides digital outputs that support other NAS modernization including Standard Terminal Automation Replacement System and common Automated Radar Terminal System user workstations.

The ATCBI-6 Beacon Only Sites (BOS) – Facility Establishment project establishes the infrastructure to support new beacon interrogators that will add radar coverage to areas that currently have none. Infrastructure to support these new systems includes property, buildings, antenna towers, power, and communications.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ATCBI-6 systems provide aircraft position and identification data with significantly improved reliability and availability.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
ATCBI-6:

- Continue Rotary Joint Modification and installation.
- Complete construction activities at the cost share sites, Provo, UT and Santa Fe, NM.
- Complete commissioning activities at remaining replacement sites.
- Complete disposal of ATCBI-4/5 systems.
- Complete the annual 800-26 Information System Security (ISS) Report.

Beacon-Only Sites (BOS) Facility Establishment:

- Complete construction at Yakutat, AK and Freeport, BH.

Program Plans FY 2011-2014 – Performance Output Goals
ATCBI-6:

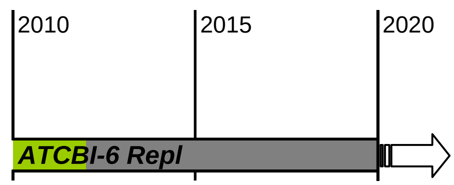
- Close out activities for the Prime Contractor, Raytheon.
- Complete acquisition and deployment activities for the program.
- Complete Rotary Joint Modification and installation.
- Complete installation and commissioning activities at the cost share sites, Provo, UT and Santa Fe, NM.
- Complete commissioning activities at all remaining Beacon Only Facility Sites.
- Complete the transition of the program to steady state in 2012.

BOS Facility Establishment:

- No activity.

System Implementation Schedule

Air Traffic Control Beacon Interrogator - Model 6 (ATCBI-6) Replacement
First site ORD: July 2002 -- Last site ORD: September 2011



2A09, AIR TRAFFIC CONTROL EN ROUTE RADAR FACILITIES IMPROVEMENTS
FY 2010 Request $5.3M

- LRR Improvements – Infrastructure Upgrades/Sustain, S04.02-03

Program Description

The Long Range Radar (LRR) Infrastructure Upgrades program sustains and improves the facilities where LRRs are installed to provide aircraft position information to FAA en route control centers and to other users (e.g., Department of Defense and Homeland Security). These planned improvements also support the installation and lifecycle support of the secondary beacons radars (Mode Select and Air Traffic Control Beacon Interrogator); both standalone and those co-located with the long-range primary radars. Secondary radars typically have their antennas mounted above the long-range primary radar antennas, and the processors are installed in facilities that were constructed in the 1950's and 60's. Many en route secondary radar service outages can be linked to failing infrastructure. This project finances upgrades to the antenna drive systems and improvements to facility infrastructure, such as power panels; engine generators; environmental control systems; electrical systems; and lightning protection, grounding, bonding, and shielding (LPGBS). Multiple contracts are needed to do the necessary upgrades. Contracts are specific to the component being repaired and sometimes also specific to the site where the improvement is needed.

LRR Infrastructure Upgrades consist of two phases:

Phase I – Short-Term Upgrades to Facility Infrastructure. These are limited to refurbishing heating, ventilation, and air-conditioning, engine generators, uninterruptible power supply, and lightning protection, grounding, bonding, and shielding systems and minimum structural upgrades to support ATCBI-6 deployment.

Phase II – Long-Term Upgrades to Facility Infrastructure. These will replace critical infrastructure systems if required for en route secondary beacon operations. Phase II brings all 150 LRR sites up to a 20-year supportable baseline for infrastructure. Requirements are being defined after each site survey is completed.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase airport capacity to meet projected demand
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The LRR program is required to support the capacity performance goal in the NAS. This infrastructure upgrade project ensures that LRRs maintain high reliability and availability required to support the performance goal.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Upgrade the existing Heating, Ventilation & Air Conditioning systems and Uninterruptible Power Sources at two sites
- Continue upgrades to Lightning, Grounding, Bonding, and Shielding (LPGBS) in accordance with FAA-STD-19E at ten sites
- Continue Phase II – Long-term upgrades to facility infrastructure at eight sites.
- Perform en route in-service engineering.
- Continue program management support.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue Phase II – Long Term Upgrades to Facility Infrastructure at ten sites per year and a total of forty four sites to completion.
- Perform en route radar in-service engineering at eight sites per year.
- Continue program management support.
- Perform site condition assessments on Air Route Surveillance Radar Model 1s and 2 & Air Force long-range radars (FPS) at eighteen sites per year and a total of seventy four sites to completion.
- Select upgrades identified by the condition assessments.
- Upgrade the existing Heating, Ventilation & Air Conditioning systems and Uninterruptible Power Sources at two sites per year for a total of ten sites.

2A10, VOICE SWITCHING AND CONTROL SYSTEM (VSCS)
FY 2010 Request $16.7M

- Voice Switching and Control System (VSCS) – Tech Refresh – Phase 2, C01.02-03

Program Description

The Voice Switching and Control System (VSCS) Technology Refresh program will replace and upgrade hardware and software components for the voice switching systems in all 21 en route air traffic control centers (ARTCCs). The real time Field Maintenance/Testing System at the FAA William J. Hughes Technical Center (WJHTC) and the Training System at the FAA Academy will also be upgraded to perform the same as an operational site. These upgrades will ensure that the air-to-ground and ground-to-ground communications capabilities are reliable and available for separating aircraft, coordinating flight plans, and transferring information between air traffic control facilities in the en route environment. To date, this program has replaced all VSCS internal control systems. Equipment has been procured to replace the VSCS Traffic Simulation Unit at the FAA WJHTC. This test bed is being used to test the capabilities of the upgraded systems to determine if they meet the formal baseline requirements established for VSCS performance. Additional upgrades will be completed to ensure that the VSCS continues to provide reliable voice communications, which can support future en route operations.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The VSCS Technology Refresh program supports the greater capacity goal by improving the system reliability of en route voice communications for both current and future operations by replacing and upgrading components of the obsolete, non-supportable VSCS hardware and software. In addition, there are ongoing system expansions at specific ARTCCs to support greater capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Continue PECO Inc. power supply redesign.
- Continue Repeater/LAN modification.
- Continue PLM to C software conversion for G/G Switch, VSCS Common Equipment (VCE) and initiate conversion for A/G Switch.
- Continue modification of the Training and Backup System (VTABS) Test Controller (VTC).
- Continue development of replacement depot test equipment.
- Continue Power Supply refurbishment.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue PECO Inc. power supply design.
- Complete development and testing of Repeater/LAN, PLM to C software, depot test equipment, and VTABS Test Controller modification.
- Initiate delivery of new PECO Inc. power supply.
- Initiate delivery of modifications that result from internal LAN, PLM to C software conversion, depot test equipment, and VTABS and Test Controller modification.

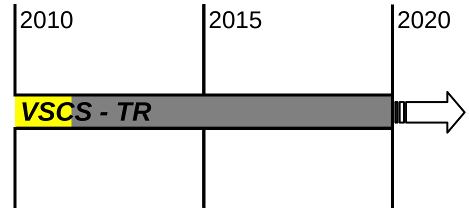
System Implementation Schedule

Voice Switching and Control System (VSCS) - Tech

First site IOC: 2002 -- Last site IOC: 2011

First site Decom: 2020 -- Last site Decom: 2025

Replacement System: NAS Voice Swtich (NVS)



2A11, OCEANIC AUTOMATION SYSTEM
FY 2010 Request $7.7M

- Advanced Technologies and Oceanic Procedures (ATOP), A10.03-00

Program Description

The ATOP program replaced oceanic air traffic control systems and procedures, and it modernized the Oakland, New York, and Anchorage ARTCCs, which house these oceanic automation systems. ATOP fully integrates flight and radar data processing, detects conflicts between aircraft, provides data link and surveillance capabilities, and automates the previous manual processes. The program office will conduct modeling and simulations, to forecast benefits, and now that ATOP is in operational use, will gather and document performance data and metrics to measure productivity, efficiency, and user satisfaction. Current efforts are underway that will provide technology refresh for the automation equipment and make improvements to software functionality.

ATOP allows the FAA to discontinue the use of the difficult communications and intensively manual processes that limited controller flexibility in handling airline requests for more efficient tracks over long oceanic routes. The program provides the automation, Automatic Dependent Surveillance-Contract (ADS-C), and conflict resolution capability required to reduce oceanic aircraft separation from 100 nautical miles to 30 nautical miles.

ATOP has been implemented at New York, Oakland and Anchorage. There is a need to analyze the benefits data and provide a baseline and a model to show the fuel savings from ATOP. Further development of the fuel burn model through the use of a comprehensive oceanic analysis, simulation and modeling capability, will be used to further explore how ATOP contributes to fuel efficiency.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 2 –** Increase on-time performance of scheduled carriers.
- **FAA Performance Target 1 –** Achieve a NAS on-time arrival rate of 88.00 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

Relationship to Performance Target

ATOP will allow properly equipped aircraft (i.e., ADS-C, Controller-Pilot Data Link Communications (CPDLC), Required Navigation Performance-4 nm (RPN-4)) and qualified aircrews to operate using reduced oceanic separation criteria. This will enable more aircraft to fly optimal routes and reduce aircraft flight time (and increase fuel and payload efficiency) during oceanic legs of their flights. Reduced lateral (side-to-side) separation may provide space for additional routes between current locations or new direct markets. Reduced longitudinal (nose-to-tail) separation may provide more opportunities to add flights without delays (e.g., climbs, descents, reroutes, or speed penalties.) This will increase the on-time arrival rate.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.4 –** Refine separation standards.

Program Plans FY 2010 – Performance Output Goals

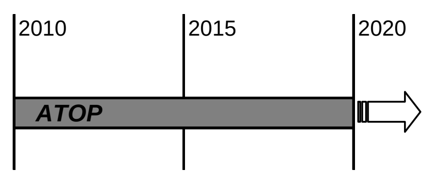
- Complete hardware/software technology refresh cycle to all sites.
- Initiate integration of radar control in ATOP for aircraft that are in range of radar sites that cover airspace in transition sectors in New York and Oakland airspace (Awaiting decision from Safety and Operations requirements/benefits revalidation activity prior to committing program resources).
- Transfer Bermuda airspace from New York ERAM to New York ATOP (Dependent on decision from Safety and Operations requirements/benefits revalidation).
- Continue quarterly software releases of Preplanned Product Improvements to ATOP sites, including software changes that increase the overall system functionality and usability. The planned changes include an advanced minimum separation warnings, FTI compliance initiatives (X.25 to IP transition), increased communication and data transmission capabilities, the suppression of unnecessary conflict/separation alerts while an aircraft is transitioning to a radar control environment.

Program Plans FY 2011-2014 – Performance Output Goals

- Support transition between original ATOP contract and new follow on ATOP contract in FY2011 (Follow-on contract required to support Ops baseline elements through 2017)
- Complete Phase B of facility modifications at Oakland Center.
- Complete implementation of radar control in transition sectors in New York and Oakland (Dependent on decision from Safety and Operations requirements/benefits revalidation).
- Calculate baseline fuel efficiency for additional market pairs and for all Oakland, New York and Anchorage flights.
- Continue providing support of the ATOP facilities with the implementation of additional Preplanned Product Improvements, including NAS Change Proposal items that will support the future system growth while enhancing system functionality, maintainability, and usability for both service providers and customers.

System Implementation Schedule

Advanced Technologies and Oceanic Procedures (ATOP)
First site IOC: June 2004 -- Last site IOC: March 2006



2A12, CORRIDOR INTEGRATED WEATHER SYSTEM (CIWS)
FY 2010 Request $2.3M

- Corridor Integrated Weather System (CIWS), W07.02-00

Program Description

CIWS improves use of en route airspace capacity during adverse weather affecting the most heavily traveled corridors. The system uses data from weather radars to portray severe weather phenomena such as thunderstorms to help traffic management efforts to select the most efficient routes for aircraft to follow when direct routes are unavailable due to severe weather. Accurate and timely prediction of hazardous weather activity is essential to minimizing the amount of time lost from flying a longer route to avoid the severe weather.

The CIWS prototype demonstration began in 2001 and has been evaluated at 15 FAA locations in the congested northeastern quarter of the contiguous United States. CIWS provides coverage over the Continental United States (CONUS) and southern Canada. Canadian coverage allows assessment of the usage of important Playbook routes during periods of significant convective weather. The playbook is used by the air traffic command center to select the most efficient alternate routes when major corridors are restricted by severe weather. CIWS prototype displays currently operate at eight Air Route Traffic Control Centers (Cleveland, Washington, Chicago, Boston, New York, Indianapolis, Minneapolis, and Kansas City), the Air Traffic Control System Command Center, six major terminals

(New York City, Chicago, Detroit, Pittsburgh, Cleveland, and Cincinnati), as well as several major airline operations centers. CIWS display functions will be integrated into the Traffic Flow Management Situation Display (TSD) extending the use of CIWS beyond the 15 current FAA locations. CIWS processing functionality will be included in a future investment and will be deployed as a component in the NextGen Weather Processor in the 2013 timeframe. The CIWS prototype will continue operating until NextGen Weather Processor is deployed.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The CIWS will minimize the restrictions on en route airspace capacity, when adverse weather is affecting operations, by providing more accurate and timely prediction of the present and future location of that weather. The CIWS prototype demonstration efforts have shown that finer positional and temporal resolution of storm location can improve the use of airspace capacity in congested airspace. Air routes can be kept open longer before being impacted by weather and can be reopened earlier. Similarly, better knowledge of future storm position enables controllers to reroute pilots around storms more efficiently. Increased information on current and predicted storm heights allows users to identify opportunities to safely fly over storm areas. The CIWS prototype demonstration has also shown that providing more accurate and timely weather predictions to NAS users improves collaborative decision-making to minimize delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plans FY 2010 – Performance Output Goals

- Complete Technology Transfer documentation package for software Build 5.
- Complete risk mitigation activities to continue CIWS prototype operations until NextGen Weather Processor is deployed.

Program Plans FY 2011-2014 – Performance Output Goals

- CIWS F&E program will end in FY 2010.
- Continue operation and maintenance of CIWS prototype until NextGen Weather Processor is deployed in the 2013 timeframe.

2A13 Next Generation VHF Air-to-Ground Communications System (NEXCOM)
FY 2010 Request $70.2M

- A, Next-Generation VHF A/G Communications System (NEXCOM)– Segment 1a, C21.01-01 and Next-Generation VHF A/G Communications System (NEXCOM) – Segment 2 , C21.02-01
- B, Communications Facilities Enhancement – Ultra High Frequency Radio Replacement, C06.04.00

A, Next-Generation VHF A/G Communications System (NEXCOM) – Segment 1a, C21.01-01 and, Next-Generation VHF A/G Communications System (NEXCOM) – Segment 2, C21.02-01

Program Description

The NEXCOM program replaces and modernizes the aging and obsolete NAS air-to-ground (A/G) analog radios that allow direct voice communication with pilots. Replacing the radios is part of a larger program to address the limitations on expanding the number of available frequencies that will affect the air traffic system's capability to effectively manage the projected U.S. air traffic requirements of the future. In addition, replacement of these radios improves A/G radio equipment maintainability and reliability, and enhances A/G information security and communications control.

The NEXCOM program was rebaselined in December, 2005. NEXCOM will be implemented in two segments, 1a and 2. Segment 1a addresses the high- and ultrahigh-sector air traffic voice channels for aircraft flying en route above 24,000 feet. Only Segment 1a has been approved to date.

Segment 1a will replace all en route radios with Multimode Digital Radios (MDRs) by 2013. The first installation was in 2004. The program has been designed for growth and flexibility. The MDRs can emulate the existing analog protocol, thus facilitating transition, or they can operate in the more efficient 8.33 kHz voice mode currently in use in Europe, or with additional expenditures in a later phase they can operate in the VDL-3 mode especially designed for Air Traffic Control. The VDL mode provides integrated data and voice. The spectrally efficient 8.33 kHz voice-only mode recovers the spectrum needed for a stand-alone data communications system (i.e., Datacom program). The integrated plan for NextGen envisions an automated air/ground trajectory capability which requires a data link, and the MDR will provide the spectrum for this link and has the option to provide the link itself directly.

Segment 2 will implement new radios that will service the high-density terminal areas and the flight service operations. The NEXCOM procurement for Segment 2 will deliver Very High Frequency (VHF) radios for civil aviation and Ultrahigh Frequency (UHF) radios for military aviation.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

NEXCOM will reduce the number of unplanned outages by replacing existing communications equipment with modern digital communications A/G equipment. The second stage of the program will increase capacity by expanding the number of communication channels within the spectrum assigned to the FAA. This capability increases the capacity to meet current and near-term air traffic control radio communication demands.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase Capacity Where Needed
- **SMP Objective #3.3 –** Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals

- Segment 1a: Procure 1,996 MDRs and install 2,026.
- Segment 2: Procure a combination of 1,250 MDR and UHF radios and install 525 of those radios in the high-density terminal areas and the flight service operations.

Program Plans FY 2011-2014 – Performance Output Goals

- Segment 1a: Install 5,912 additional MDRs in En Route facilities by September 30, 2013.
- Segment 2: Begin procurement and implementation of new VHF and UHF radios.
- Segment 2: Procure 10,098 MDRs and install 3385 in the high-density terminal areas and the flight service operations.

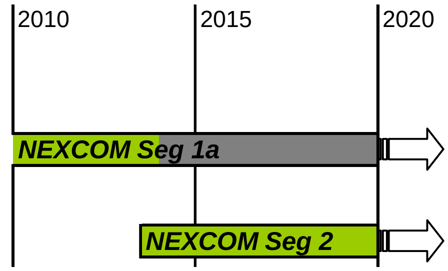
System Implementation Schedule

Next-Generation VHF A/G Communications System (NEXCOM) – Segment 1a & 2

First site IOC: July 2002 -- Last site IOC: September 2013

First Site Decom: July 2022 -- Last Site Decom: September 2032

First site IOC: September 2013 -- Last site IOC: August 2023



B, COMMUNICATIONS FACILITIES ENHANCEMENT – UHF REPLACEMENT, C06.04.00

Program Description

The ultra high frequency (UHF) radio replacement project replaces aging equipment used to communicate with Department of Defense aircraft. The FAA maintains the UHF A/G communications service for air traffic control of military operations in the United States.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

This UHF radio replacement program replaces communications infrastructure used for communicating with military aircraft. It will reduce the number of outages and enhance communications capacity by replacing aging and increasingly unreliable communications equipment with modern equipment. This program also improves and upgrades associated sites and facilities.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase capacity where needed.
- **SMP Objective #3.3 –** Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals

- Procure and begin installation of 1,582 UHF Radios.

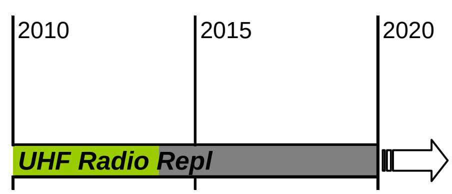
Program Plans FY 2011-2014 – Performance Output Goals

- Procure and begin installation of 1,600 UHF Radios.

System Implementation Schedule

Communications Facilities Enhancement – Ultra High Frequency (UHF) Radio Replacement

First ORD: June 2004 -- Last ORD: September 2013



2A14, SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM)
FY 2010 Request $54.6M

- System Wide Information Management (SWIM) – Segment 1a, G5C.01-01
- X, System Wide Information Management (SWIM) – Segment 1b, G5C.01-02

Program Description

The System Wide Information Management (SWIM) Program is an information management and data sharing system for NextGen. SWIM will provide policies and standards to support data management, secure its integrity, and control its access and use. SWIM is being developed incrementally. The initial phase of SWIM, which is referred to as Segment 1, includes capabilities that were selected based upon the needs of various data communities, maturity of concepts of use, and the ability of existing programs to accommodate development of these SWIM capabilities within their existing program plans. Future segments will be defined in a similar manner and will include additional capabilities that move the FAA toward the data sharing required for NextGen programs.

SWIM will reduce the number and types of interfaces, reduce unnecessary redundancy of information and better facilitate information-sharing, improve predictability and operational decision-making, and reduce cost of service. The improved coordination that SWIM will provide will allow for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. In addition, SWIM will provide the foundation for greatly enhanced information exchange and sharing with other agencies.

Segment 2 is currently being defined.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

SWIM will support a transition to network-enabled operations, providing the same high quality, timely data to many users and applications, therefore reducing the number of unique, point-to-point interfaces for application-to-application data exchange. SWIM will reduce redundancy of information (multiple sources of information add cost and increase risk for using slightly different information for similar decisions) and will facilitate horizontal (cross-federal) information-sharing. SWIM is a program for collaboration and consolidation through information technology. For Segment 1, SWIM will be built into existing NAS systems instead of being acquired as a new, standalone capability.

- **Program Performance Target –** Reduce cost of developing an application-to-application interface by 10% in FY 2011.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2** – Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce Unit Cost of ATO Operations.

Program Plans FY 2010 – Performance Output Goals
- Development and test of the Aeronautical Information Management (AIM) portion of the Special Use Airspace (SUA) capability.

Program Plans FY 2011-2014 – Performance Output Goals
- Achieve initial standardized SWIM segment 1 capability in traffic flow and flight management between the traffic flow management system (TFM) and en route automation modernization (ERAM).

2A15, AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) – NATIONAL AIRSPACE SYSTEM (NAS) WIDE IMPLEMENTATION
FY 2010 Request $201.4M

- High Density Arrivals/Departures – Automatic Dependent Surveillance Broadcast (ADS-B) NAS-Wide Implementation – Segments 1 and 2, G2S.01-01

Program Description

The Surveillance and Broadcast Services (SBS) program office is implementing Automated Dependant Surveillance – Broadcast (ADS-B), Traffic Information Services – Broadcast (TIS-B) and Flight Information Services – Broadcast (FIS-B) NAS Wide. ADS-B is the cornerstone technology for the Next Generation Air Transportation System. This new system promises to significantly reduce delays and enhance safety by using aircraft broadcasted position based on precise signals from the Global Navigation Satellite System instead of those from traditional radar to pinpoint aircraft locations to track and manage air traffic.

ADS-B: ADS-B is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information via a broadcast communication link. ADS-B receives flight data from aircraft, via a data link, derived from on-board position-fixing and navigational systems. Aircraft position (longitude, latitude, altitude, and time) is determined using GPS, an internal navigational reference system, or other navigation aids. The aircraft's ADS-B equipment processes this position information, along with other flight parameters, [such as identification, indication of climb or descent angle, velocity, next waypoint, and other data that is limited only by the equipment's capability] for a periodic broadcast transmission, typically once a second, to the ADS-B ground station. The information will be used for surveillance applications and Air Traffic Services Displays on automation systems such as Common Automated Radar Tracking System (CARTS), Standard Terminal Automation Replacement System (STARS), Microprocessor En Route Automated Radar Tracking System (MicroEARTS), En Route Automation Modernization (ERAM), HOST, and Advanced Technologies and Oceanic Procedures (ATOP).

In addition to the ground-based ADS-B receiver, nearby aircraft within range of the broadcast and equipped with ADS-B avionics may receive and process the surveillance information for display to the pilot using the aircraft's multi-function display. Pilots could use the aircraft's multi-function display to ensure adequate aircraft separation. Finally, ADS-B equipment may be placed on ground vehicles or obstacles to allow locating and identifying them.

TIS-B: TIS-B is a service that provides ADS-B equipped aircraft with surveillance data about both ADS-B and non-ADS-B equipped aircraft, providing a more complete "picture" of nearby air traffic. TIS-B uses surveillance information provided by one or more other surveillance sources, such as secondary or primary surveillance radar. The surveillance information is processed and converted for use by ADS-B equipped aircraft. TIS-B can also be used in ADS-B implementations involving multiple ADS-B data links to provide a cross-link or gateway between ADS-B equipped aircraft that could use it to ensure separation with a similarly equipped aircraft. This TIS-B sub-function is identified as Automatic Dependent Surveillance – Rebroadcast (ADS-R). Two communication link protocols have been approved for ADS-R use; Universal Access Transceiver (UAT), used mostly by general aviation aircraft, and the 1090 extended squitter, which broadcasts but does not receive signals, and is normally used by commercial transport aircraft.

FIS-B: Flight Information Services provide ground-to-air broadcast of non-air traffic control advisory information which provides users valuable, near real-time information to operate safely and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

The ADS-B acquisition has been structured as a multi-year, performance-based service contract under which the vendors will install, own, and maintain the equipment. The FAA will purchase services in the same way the agency purchases telecommunications services today. The FAA will define the services it requires and maintain ultimate control of the data that flows between the vendor's infrastructure, FAA facilities, and aircraft. The government will not own the ground infrastructure (which will be owned by the vendor) or the avionics (which will be owned by the aircraft owner).

Segment 1 of the program requires two In-Service Decisions. The first provided the authority to proceed with NAS-Wide deployment of Essential Services TIS-B/FIS-B. The second will provide the authority to proceed with NAS-Wide deployment of Critical Services (Surveillance). This includes integration, certification, and approval of 3 and 5-mile separation standards using ADS-B as a surveillance source. The areas that Segment 1 will focus on are: Gulf of Mexico (Communications, Weather, and Surveillance); Louisville, KY (Surveillance/TIS-B/FIS-B); Philadelphia, PA (Surveillance/TIS-B/FIS-B); Southeast Alaska, Juneau Area (Surveillance/TIS-B/FIS-B and Wide Area Multilateration); and Expansion of Broadcast Services – East Coast, Midwest to North Dakota, Western Arizona through California and Oregon, (TIS-B/FIS-B).

Segment 2 of the program is expected to begin in FY 2011 and the schedule for deployment of services for the remainder of the NAS has been developed jointly by the FAA and the service provider, ITT Corp, based on a roadmap that will provide for maximum operational benefit and the potential for early equipage along with select pocket of users that will optimize the user and government benefits.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 2 –** Increase reliability and on-time performance of scheduled carriers.
- **FAA Performance Target 1 –** Achieve a NAS on-time arrival rate of 88.00 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

Relationship to Performance Target

ADS-B is a technology that will allow implementation of new air traffic control procedures that will make better use of existing airspace. This, in effect, is an increase in capacity and will result in fewer delays and more optimal routing for aircraft.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.3 –** Deliver the NexGen/OEP commitments.

Program Plans FY 2010 – Performance Output Goals

- In-Service Decision for Critical (ADS-B) Services.
- Louisville Initial Operating Capability (IOC).
- Houston/Gulf of Mexico IOC.
- Philadelphia IOC.
- Juneau ADS-B IOC.
- Final ADS-B Out Rule Published in Federal Register.
- Continue Future Applications Development.

Program Plans FY 2011-2014 – Performance Output Goals

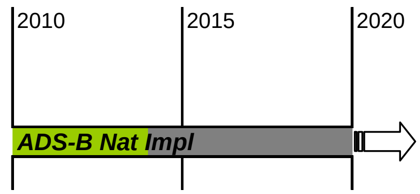
- Commission weather and communications at 25 airports in Alaska.
- Complete NAS-Wide deployment of ADS-B, TIS-B and FIS-B.
- Commission ASDE-X at 9 ASDE Sites.
- Commission upgrade of ASDE-X Multilateration to support ADS-B dual-link transmission technology.
- Continue Future Applications Development.
- Develop plan for removal of legacy surveillance systems.
- Achieve IOC for surface alerting.

System Implementation Schedule

Automatic Dependent Surveillance-Broadcast (ADS-B) National Airspace System (NAS) Wide Implementation

First site IOC: August 29, 2009 -- Last site IOC: 2013

Expected operational life: 21 years



2A16, Windshear Detection Services

FY 2010 Request $1.0M

- Windshear Detection Services, W05.03-01

Program Description

Windshear Detection Services is a program to determine how to modernize and improve current wind shear detection systems. One component will be to develop a business case analysis of whether to upgrade the Low Level Wind Shear Alerting System (LLWAS), which is a ground based wind shear detection system that the FAA first implemented in the 1970s timeframe. LLWAS uses pole-mounted sensors that are strategically placed around runways to measure wind speed and direction along airport arrival/departure corridors and their associated runways. LLWAS generates wind shear alerts and warnings so controllers can inform pilots of the risk for encountering wind shear as they approach or depart airports. A second component of the analysis will look at other technologies such as Laser Infrared Detection and Ranging (LIDAR) to add a new capability or supplement existing systems in detecting wind shear. The radars (Terminal Doppler Weather Radar (TDWR) and Airport Surveillance Radars with Weather Systems Processor (ASR-WSP)) that detect wind shear are being improved under separate CIP line items. The analysis will support an initial investment decision for Wind Shear Detection Services which is planned for FY 2010 under NextGen Decision 37 in the Weather Roadmap. When a final investment decision is approved, this program will implement the approved upgrades.

The analysis will examine how to improve system performance in a cost effective way. The LIDAR capability is currently being tested, and, if testing is successful, there are at least six airports that would benefit from its ability to detect wind shear in dry climates. It is being tested because the TDWR and ASR-WSP systems depend on moisture in the air to detect wind shear and are not sufficiently accurate in dry climates. LLWAS was the first system designed to detect wind shear and is both installed at lower activity airports that cannot qualify for the more expensive Terminal Doppler Weather radar (TDWR), and it also supplements TDWR at some major airports. The rationale for replacing existing systems is based on the age of the existing LLWAS and the multiple configurations purchased under the programs described below:

- LLWAS-Model 2 (II),
- LLWAS-Network Expansion (NE),
- LLWAS-Relocate/Sustain (R/S),
- LLWAS-Wind Measuring Equipment (WME), and
- Pole relocation and/or refurbishment to maintain performance.

In addition to replacing old systems and adding new capabilities for existing runways, FAA must also determine the number and type of systems needed to serve new runways that qualify for windshear detection service. This program must also analyze what is needed to fulfill NextGen requirements for wind shear detection. Success of NextGen efforts to increase capacity will depend on better information on the location and intensity of wind shear. Implementation of Trajectory Based Operations and other solution sets that are designed to maximize the use of runway capacity will require accurate and timely information on when weather restrictions begin and end for the runways that support NextGen operations.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

Windshear is a known cause of fatal aviation accidents. LLWAS generates windshear alerts and warnings during the most critical phase of flight under tower control. New Technology, SLEP or Tech Refresh will contribute to maintaining existing windshear detection services.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plan FY 2010 – Performance Output Goals

- Initiate business case alternatives and tech refresh activities.

Program Plan FY 2011-2014 – Performance Output Goals

- If funding becomes available tech refresh activities will be initiated.

2A17, WEATHER AND RADAR PROCESSOR (WARP)

FY 2010 Request $17.6M

- Weather and Radar Processor (WARP) – WARP Sustain, W04.03-01

Program Description

There is a critical need to provide accurate, reliable, tactical and forecast weather conditions to air route traffic control center (ARTCC) controllers, traffic management specialists, and center weather service unit meteorologists. This weather data will allow the FAA to provide timely weather advisories and accomplish its mission of safe and efficient air traffic control within the National Airspace System (NAS). The WARP Program provides accurate weather data to critical NAS programs such as En Route Automation Modernization (ERAM), Advanced Technologies and Oceanic Procedures (ATOP), and User Request Evaluation Tool (URET). The current WARP system provides the following:

- Integrates Weather radar data on air-traffic controllers' displays,
- Provides access to radar mosaics and other key weather information to Area Supervisors and Traffic Management Personnel,
- Interfaces with advanced weather sensors,
- Plots and processes forecasted upper air wind and temperature gridded data, and
- Provides weather data to other NAS systems.

Due to the WARP Program’s aging hardware and software infrastructure, (unsupported operating system and HW equipment obsolescence), the existing architecture must be sustained and maintained until it is replaced. This will ensure that the weather processing and distribution capabilities continue to provide data which supports en-route controllers, traffic management specialists, and center weather service unit meteorologists who support air traffic.

Original Contract Award was June 1996 and National Operational Readiness Decision (ORD) for the Continental United States ARTCCs (WARP weather data on Controller Display System Replacement (DSR) screens and operational) was achieved in December 2002 and ORD for the Anchorage, Alaska ARTCC was achieved in April 2003. The WARP Maintenance and Sustainment Services (WMSS) Contract Award was April 2005. The WARP system is operational at all 21 ARTCCs and at the Air Traffic Control Systems Command Center (ATCSCC). Also, there are two (2) WARP systems at the William J. Hughes Technical Center (WJHTC) and one (1) system at the vendor's facility (Harris Corporation), in Melbourne, FL.

Current WARP Benefits realized include: Delay (Passenger Value of Time and Airline Direct Operating Costs) and Safety. Benefits for the continuation of WARP sustain and technical refresh activities are realized in the form of incremental delay benefits (i.e., Foresee effect of deviations and assist pilot decision-making), incremental Safety benefits (i.e., Providing advisories and information that help aircraft without onboard radar to avoid accidents in convective weather) and a Cost Avoidance (i.e., not re-engineering of obsolete parts) and the elimination of commercial weather service.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The FAA goal of Greater Capacity requires collaboration among multiple disciplines to provide capacity in the United States airspace system that meets projected demand in an environmentally sound manner. WARP supports the goal's objective of making air traffic flow over land and sea more efficient. Specifically, WARP provides air-traffic controllers and traffic management unit (TMU) specialists with high-resolution, integrated real-time and strategic graphical weather information. WARP provides common situational awareness by providing data to other FAA systems such as Advanced Technologies and Oceanic Procedures (ATOP) and Dynamic Ocean Track System Plus (DOTS+), and is aligned with the NAS infrastructure.

The benefit of having better weather information presented in an integrated manner in the En route environment is in providing a comprehensive picture of where aircraft can safely fly resulting in a more efficient use of airspace. As a result of the integrated weather information made available through the WARP, air traffic controllers have an enhanced awareness of the weather and can better direct aircraft. Sustainment of WARP is required in order to meet the 0.9996 system availability as specified by the WARP Specification.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plans FY 2010 – Performance Output Goals

- Continue WARP Maintenance and Sustainment Service (WMSS) activities.
- Start National Airspace Data Interchange Network (NADIN) II interface(s) transition from NADIN II to FTI.
- Start data format adaptation activities.
- Start removal of Commercial Weather Service.
- Start selectable layer for improved stratification activities.
- Address hardware refresh for obsolete subsystems.

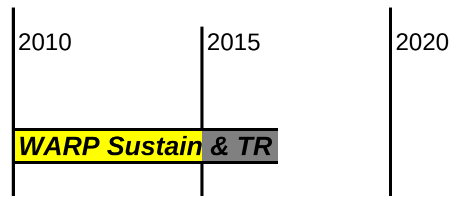
Program Plans FY 2011-2014 – Performance Output Goals

- Continue WARP Maintenance and Sustainment Service (WMSS) activities.
- Complete data format adaptation activities.
- Complete removal of Commercial Weather Service.
- Complete selectable layer for improved stratification activities.
- Complete NADIN II interface(s) transition from NADIN II to FTI.
- Complete development and Implementation for WINS development to satisfy the Next Generation Air Traffic System (NextGen) Network Enabled Weather (NNEW) 4-D Weather Data Cube strategy of providing weather information suitable for Decision Support Systems (DSS) Integration as a Single Authoritative Source using standardized formats and access methods.
- Integrate WARP Radar Acquisition and Mosaic Processor (RAMP) into the NextGen Weather Processor (NWP).
- WARP subsystems not subsumed by the NextGen Weather Portfolio will begin decommissioning.

System Implementation Schedule

WARP Sustain & Tech Refresh

First site ORD: Post 2009 EC/JRC -- Last site ORD: TBD



2A18, COLLABORATIVE AIR TRAFFIC MANAGEMENT TECHNOLOGIES (CATMT)

FY 2010 Request $18.1M

- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G5A.05-01
- X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G5A.05-02
- X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4, G5A.05-03

Program Write ups for CATMT WP2, WP3, and WP4 are combined with BLI 2A06 Air Traffic Management (ATM)

B. TERMINAL PROGRAMS

2B01, AIRPORT SURFACE DETECTION EQUIPMENT – MODEL X (ASDE-X)
FY 2010 Request $17.3M

- Airport Surface Detection Equipment – Model X (ASDE-X), S09.01-00
- X, ASDE-X – Tech Refresh & Disposition, S09-01-01

Program Description

ASDE-X is a surface surveillance system that provides seamless multi-sensor airport surveillance with identification and conflict alerting to air traffic controllers. The ASDE-X system integrates five technologies: transponder multilateration, surface movement radar, Automatic Dependent Surveillance-Broadcast (ADS-B), multi-sensor data fusion, and control tower display equipment. The integration of these sensors provide data with accuracy, update rate, and reliability suitable for improving airport safety and efficiency in all weather conditions. ASDE-X is particularly useful as a traffic control aid during hours of darkness and during other conditions of poor visibility.

The FAA plans to deploy ASDE-X systems to 35 airports. As of September 2008, ASDE-X systems are operational at 17 airports.

In FY 2011, the ASDE-X Team plans to begin a study to determine the equipment and/or software that needs to be included in the tech refresh. Tech refresh is scheduled to begin in 2012.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 3 –** Reduce the risk of runway incursions.
- **FAA Performance Target 1 –** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.450 per million operations, and maintain or improve through FY 2013.

Relationship to Performance Target

ASDE-X enables air traffic controllers to track surface movement of aircraft and vehicles. It was developed to aid in preventing surface collisions and in reducing critical Category A and B runway incursions. ASDE-X provides air traffic controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors. It improves the ability of controllers to maintain awareness of the operational environment and to anticipate contingencies potential runway incursions.

ASDE-X Safety Logic enhances the situational awareness for air traffic controllers. It uses surveillance information from ASDE-X to determine if the current and/or projected positions and movement characteristics of tracked aircraft/vehicles present a potential collision situation. Visual and audible alerts are provided to the air traffic controllers, which include critical information about the targets involved, such as ID and surface occupied.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- Deliver last 9 out of 35 (100%) ASDE-X systems.
- Achieve Initial Operating Capability (IOC) of 13 out of 35 (91%) ASDE-X systems.

Program Plans FY 2011-2014 – Performance Output Goals

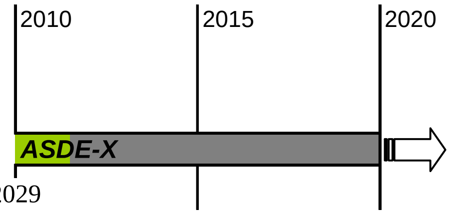
- Achieve IOC at the last 3 out of 35 (100%) ASDE-X systems.
- Begin study to determine the equipment and/or software that needs to be included in the tech refresh.
- Begin tech refresh in 2012.

System Implementation Schedule

Airport Surface Detection Equipment – Model X (ASDE-X)

First ORD October 2003 -- Last ORD: May 2011

First Site Decom: October 2028 -- Last Site Decom: September 2029



* The last three ASDE-X sites are dependent on or impacted by their planned new Airport Traffic Control Tower schedules.

2B02, Terminal Doppler Weather Radar (TDWR) – Provide

FY 2010 Request $9.9M

- Terminal Doppler Weather Radar – Service Life Extension Program (SLEP), W03.03-01

Program Description

The primary mission of the TDWR is to enhance the safety of air travel through timely detection, reporting, and display of hazardous weather conditions—wind-shear events, microburst and gust fronts, and thunderstorms—in and near an airport's terminal approach and departure zone. TDWRs are installed at higher-density airports with high occurrences of thunderstorms, and provide controllers current information on severe weather so that they can issue warnings to pilots. TDWRs are operational at 46 airports. TDWR weather data is also transmitted to FAA automation systems and to 34 National Weather Service weather forecast offices. In addition, the four Washington, DC, area TDWRs provide data to the Urban Shield wind dispersion project that is operated by the Pentagon Force Protection Agency.

The TDWRs were installed in the 1990s, and many components of the existing system require replacement to ensure these radars are available during severe weather conditions. The antenna drive systems need rebuilding; the computer processors are out of date; and several other components need to be upgraded and modernized. The planned upgrades in this first phase of the TDWR's service life extension program are scheduled to be completed in 2014. Via separate projects, subsequent phases of the program will address other areas of the TDWR that need refurbishment in order to keep the system reliable until it is replaced.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

The TDWR SLEP contributes to safety goals by continuing TDWR service, improving TDWR software architecture integration, and replacing old components with more reliable components, all of which will enable the TDWR to reliably operate until the planned end of service life goal (2025).

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Install TDWR Radar Data Acquisition (RDA) Retrofit Units at 12 operational sites.
- Install TDWR elevation gears (bearings) and lube stations at 6 operational sites.
- Buy TDWR brushless antenna drive motor modification kits.

Program Plans FY 2011-2014 – Performance Output Goals

- 2011 – Modify 12 more sites with production RDA mod kits; modify 7 more sites with new elevation bearings and lube stations; procure the last antenna drive systems and install 7 of them.
- 2012 – Modify 12 more sites with RDA production mod kits; modify 7 more sites with new elevation bearings and lube stations; install 15 more antenna drive systems.
- 2013 – Modify the last 6 sites with new elevation bearings and lube stations; install 15 more antenna drive systems; install the last 6 RDA production mod kits.
- 2014 –Install the last 10 production antenna drive systems.

System Implementation Schedule

- RDA Retrofit: Complete last modification in FY 2013.
- Elevation Drive Enhancement: Complete last modification in FY 2013.
- Brushless Drive Motors: Complete last modification in FY 2014.

2B03, STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS) (TAMR PHASE 1)

FY 2010 Request $28.0M

- Standard Terminal Automation Replacement System – Technical Refresh (TAMR Phase 1), A04.01-01
- Standard Terminal Automation Replacement System – Terminal Enhancements (TAMR Phase 1), A04.01-02

Program Description

The Standard Terminal Automation Replacement System (STARS) is a joint Department of Defense and Department of Transportation (FAA) program to modernize terminal air traffic control automation systems. The STARS is a digital processing and display system that replaces the aging air traffic control equipment at our Automated Radar Terminal System (ARTS) IIIA and other high activity Terminal Radar Approach Control (TRACON) facilities and airport traffic control towers. Air traffic controllers use the STARS automation and displays to ensure the safe separation of military and civilian aircraft, at several airports within the nation's airspace. This investment is part of a phased approach to modernizing our terminal air traffic control equipment. The program updates existing TRACONs and towers with state-of-the-art systems featuring large-screen, high-resolution, color displays, and is expandable to accommodate future air traffic growth and new hardware and software. STARS addresses technology, mobility, and security gaps with the existing systems.

As in any commercial-off-the-shelf (COTS) based system, an aggressive hardware "technology refreshment" program is absolutely essential. Planning for technology refreshment enables identification and qualification of affected components before they become inoperable due to obsolescence. For example, the processor currently used in STARS is no longer available from the manufacturer. The consequences of obsolescence have collateral implications in the areas of engineering, training, maintenance and many other disciplines.

On April 20, 2004, the FAA Joint Resources Council (JRC) directed a phased approach to terminal automation modernization. The JRC approved STARS as a replacement for 47 critical site systems within three years. Thus, the current scope of the STARS program is to deploy systems to the remaining designated sites, and sustain and enhance those systems at the 47 sites. By the end of FY 2008, 46 of the 47 STARS will be operational within the NAS. The final site deployment is still pending availability of a new facility.

Terminal Enhancements (TE) address issues identified by controllers and operating facilities personnel. This project funds mandatory security enhancements and corrective changes to enhance system performance. Enhancements include addressing evolving safety requirements (e.g. Minimum Safe Altitude Warning system (MSAW) and Conflict Alert (CA)) and upgrading interfaces with other systems (surveillance, centers, oceanic). Regular reviews of system performance identify and prioritize issues and schedule the work to be completed in any fiscal year. Software changes that are needed to address changes in hardware are done under this program to support the STARS Tech Refresh activities, and/or the upgrades needed for enhanced performance and capacity.

Terminal Enhancement work includes increasing tracker accuracy, adding system capacity, improving voice recognition techniques, increasing target capability, and addressing training needs. It also provides software and other support staff to enhance/refine all the STARS operational systems/sites.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

During FY 2008, STARS had an equipment availability of 99.99997% at all operational sites (Source: National Outage Database, through June 2008). STARS is fully operational at 18 OEP airports. In addition to high availability, STARS has an improved controller data display and data manipulation capabilities, enabling controllers to increase aircraft density without compromising safety.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Complete the system processor and peripheral equipment qualification and purchase.
- Complete qualification for a terminal controller workstation display monitor replacement, tower controller monitor replacement, and eliminate costly inter-dependency of the system processors and operating system.
- Complete qualification of newly discovered end of life hardware items.
- Develop STARS software enhancements to improve system performance, efficiency, ease of use, and support.

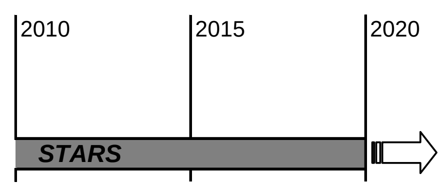
Program Plans FY 2011-2014 – Performance Output Goals

- Continue to sustain and enhance the operational STARS systems and implement technology refreshment as necessary.

System Implementation Schedule

Standard Terminal Automation Replacement System (STARS)

First site IOC: October 2002 -- Last site IOC: September 2007



2B04, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 3)

FY 2010 Request $3.0M

- Terminal Automation Modernization – Replacement (TAMR) – Phase 3, A04.07-01

Program Description

Terminal automation systems are essential for helping controllers manage the tempo of operations at our nation's busiest airports. The automation systems rely on information from radar and weather sensors, along with flight plan information for each aircraft to inform controllers of the aircraft's location and intended path of flight so they can safely and efficiently maintain aircraft separation at or near airports.

The Terminal Automation Modernization and Replacement program provides a phased approach to modernizing the automation systems at the FAA's Terminal Radar Approach Control (TRACON) facilities and their associated Airport Traffic Control Towers (ATCT) throughout the NAS.

TAMR Phase 3 begins planning for the modernization/replacement of automation systems at the remaining 106 TRACONS. Additionally, TAMR Phase 3 will evaluate opportunities for automation convergence and will include them appropriately. The FAA will continue to sustain the automation systems at these sites while monitoring system performance to identify any deterioration in service. Planning and business case development for TAMR Phase 3 will begin in 2009 with future activities pending a JRC decision.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1** – Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4** – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

By providing state-of-the-art equipment, outages are reduced, thereby reducing delays at the 99 remaining ARTS IIE sites and 7 ARTS IIIE sites not addressed in either TAMR Phase 1 or TAMR Phase 2.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Continue planning, investment analysis, and business case development activities for Phase 3 to address performance shortfalls at the remaining 106 ARTS sites as well as evaluating covering the current STARS/Common ARTS platforms into a single family of platforms.

Program Plans FY 2011-2014 – Performance Output Goals

- To be determined – pending JRC decision

2B05, TERMINAL AUTOMATION PROGRAM
FY 2010 Request $9.6M

- A, Flight Data Input/Output (FDIO) Replacement, A01.11-01
- B, Electronic Flight Strip System, A32.01-01
- C, Terminal Flight Data Management System, A33.01-01

A, Flight Data Input/Output (FDIO) Replacement, A01.11-01

Program Description

The FDIO system provides standardized flight plan data, safety related data, and other information to air traffic controllers at more than 500 TRACON, ATCT, and ARTCC facilities. The FDIO system prints flight data information on paper strips to assist controllers in tracking aircraft and anticipating the arrival of aircraft in the sector under their control.

The FDIO Replacement program replaces the end-of–life/obsolete FDIO equipment with fully compatible (form/fit/function) commercial off-the-shelf (COTS) equipment.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The FDIO program replaces end-of–life, obsolete FDIO equipment with modern COTS equipment, thereby reducing potential outages and delays.

Strategic Management Process (SMP) Pathway and Objective

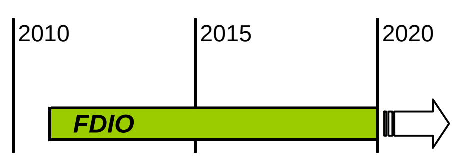
SMP Pathway #1 – Achieve Operational Excellence.
SMP Objective #1.6 – Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
- Complete an operational analysis to identify/validate hardware and software technical refresh requirements.
- Develop solutions for replacement/modernization of end-of-life/obsolete components.
- Begin the procurement of replacement equipment necessary for continued FDIO operation.

Program Plans FY 2011-2014 – Performance Output Goals
- Continue procurement of replacement equipment.
- Deploy solutions to replace/modernize end of-life/obsolete components.

System Implementation Schedule

Flight Data Input/Output (FDIO)
First site IOC: February 2011 -- Last site IOC: September 2025



B, Electronic Flight Strip System, A32.01-01

Program Description

The FAA currently relies on paper flight strips to provide air traffic controllers with a physical representation of the aircraft they are controlling. The strips are used to coordinate and plan operations regarding individual flights, including arrivals, departures, and surface movement of aircraft. As flights are processed, the corresponding flight strips are passed from one controller to the next – each of whom is concerned with a specific segment of the overall sequence to be completed. This process is inefficient and restrictive since information hand-written on the flight strips during the progress of a flight is not easily shared with other personnel or facilities.

This program will automate the flight strips, providing controllers with electronic tools and functions to better manage air traffic operations, facilitating a safer and more efficient Air Traffic Control (ATC) operational environment. This system will facilitate the efficient distribution and management of electronic flight plan operations as well as the sharing of flight plan data and system information.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011and maintain through FY 2013.

Relationship to Performance Target

Modernizing the processing, update, and transfer of flight strips using electronic means will improve Air Traffic Control (ATC) operational efficiency increasing capacity and reducing delays at the airports addressed by this investment

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective # 1.3 –** Ensure safety and aircraft separation.

Program Plan FY 2010 – Performance Output Goals
- Obtain Final Investment Decision.
- Award contract to prime vendor and begin design/development.

Program Plan FY 2011-2014 – Performance Output Goals
- Goals will be defined during Investment Analysis.

C, Terminal Flight Data Management System, A33.01-01

Program Description

The NAS currently relies on several flight data management systems in Air Traffic Control Towers (ATCTs) to provide flight object data and traffic management tools in the terminal environment. These systems include, but are not limited to, Airport Resource Management Tool (ARMT), Flight Data Input Output (FDIO), Tower Data Link Services (TDLS), Integrated Display System (IDS), Electronic Flight Strip Transfer System (EFSTS), and Advanced Electronic Flight Strip (AEFS). In order to achieve the modernization of the NAS envisioned by NextGen, it is necessary to develop an integrated Terminal Flight Data Management (TFDM) platform that provides all of the functionality currently available to controllers as well as emerging capabilities anticipated in the modernization of the NAS such as Electronic Flight Strip (EFS) and Terminal Data Display System (TDDS). This phase of TFDM intends to integrate the functionality of the existing terminal flight data systems and decision support tools in order to reduce operating costs and facilitate increased capacity in the terminal environment through the consolidation of these systems.

The TFDM program is an integrated approach to maximize the efficient collection, distribution, and update of the data and improve access to the information necessary for the safe and efficient control of air traffic. The system will collect and portray terminal flight object (flight and flow) data as well as provide traffic management tools on an integrated display; and, interface to information and decision support tools.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The integration of existing terminal flight data systems and decision support tools, such as ARMT, FDIO, and TDLS, will facilitate increased capacity in the terminal environment by providing a more efficient and effective means of collecting, distributing, accessing, and updating flight object data in the Terminal environment.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #3 –** Increase Capacity Where Needed.
- **SMP Objective #3.3** – Implement airspace and airport capacity enhancements safely.

Program Plan FY 2010 – Performance Output Goals

- Complete requirements development and identify viable alternatives.
- Seek an Investment Analysis Readiness Decision.

Program Plan FY 2011-2014 – Performance Output Goals

- Complete Investment Analysis and obtain investment decisions (initial and final).
- Additional Goals will be defined during Investment Analysis.

2B06, Terminal Air Traffic Control Facilities – Replace

FY 2010 Request $176.0M

- ATCT/TRACON Replacement, F01.02-00

Program Description

The FAA provides air traffic control services from more than 500 Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities and must continually replace these buildings to ensure an acceptable level of air traffic control services and to meet current and future operational requirements. The average age of control towers is 27 years, and some are 60 years old. As the volume and complexity of terminal air traffic control increases, so does the need to have additional positions in the ATCT/TRACON facilities (i.e., helicopter positions, Visual Flight Rule traffic advisories, runway monitors, etc.). Control towers built more than 20 years ago often do not meet today’s operational requirements. In addition, some terminal facilities must be upgraded to conform to current building codes and design standards.

ATCT/TRACON facilities that cannot meet present-day operational requirements are being replaced. New facilities will accommodate future growth, current building codes, and design standards. The FAA will fund terminal facility replacement programs in six phases to provide sound financial management of these projects. Phase 0 includes investment analysis and requirements development; phase I includes site selection and advanced engineering; phase II incorporates facility equipment design and procurement, environmental studies, and site adaptation; phase III is facility construction; phase IV continues funding for equipment installation and utilities installation; and phase V funds demolition of the old tower or TRACON being replaced and restoration of the old site.

Relationship of Program to FAA Strategic Goal, Objective and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The Terminal Air Traffic Control Facilities program contributes to the FAA greater capacity goal by replacing ATCTs and TRACONs to meet current and future operational requirements. Some replacements are required to accommodate growth in air traffic; others are needed to provide added space for new equipment; and, in some cases, the tower must be replaced to ensure that controllers have an unobstructed view of the runways and taxiways. The average control tower is 27 years old, and as volume and complexity of terminal air traffic control increases, so does the requirement for additional positions in ATCT/TRACON facilities.

New and replacement facilities support the FAA capacity goal: to provide a system that meets or exceeds air traffic demand. Strategic location, adequate height, and cab size of an airport traffic control tower will provide an efficient working environment, enable controllers to achieve an unobstructed view of the airport, and enable them to see aircraft at the outer aircraft movement areas.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Design starts at one site (Phase I/II).
- Start construction at four sites (Phase III).
- Equipment installation at thirteen sites and commissioning at three sites (Phase IV/V).

Program Plans FY 2011-2014 – Performance Output Goals

- Continue siting studies, design, site work, construction, electronic design, electronic installation, and decommission and restoration.
- Provide Other Transactional Agreement support. [In cases where an airport sponsor constructs a usable facility with Federal funds, FAA provides these funds through the Other Transactions Agreements (OTA) process. The OTA process allows the FAA to turn over the project management – and the funds appropriated for the project – to the airport sponsor for construction of the proposed facility.]

2B07, ATCT/TERMINAL RADAR APPROACH CONTROL (TRACON) FACILITIES – IMPROVE
FY 2010 Request $38.9M

- ATCT/TRACON Modernization, F01.01-00

Program Description

The FAA must continually upgrade and improve terminal facilities and equipment to provide an acceptable level of service and to meet current and future operational requirements. Improvements include replacing facility components that are deteriorating such as: roofs, air conditioners, tower cab consoles; undersized generators and environmental equipment. In addition to the renovation projects, modernization includes facility upgrades such as adding operating positions for controllers and training space, rehabilitating administrative and equipment space to accommodate facility expansion, and expanding base-buildings to support current and future demand.

ATCT/TRACON facilities have also had to be modernized to address additional operational and safety requirements, including upgraded visibility of the entire airport surface, accessibility improvements, removal of hazardous materials, upgrading to met seismic and security standards that didn't exist when they were constructed. Facility improvements must be completed with minimal impact on existing operations. An initial evaluation by the U.S. Army Corps of Engineers found that a number of FAA ATCT/TRACON facilities do not meet current seismic code criteria. This program has initiated building improvements to bring the facilities up to a level to withstand a seismic event by complying with Executive Order 12941 that mandates compliance with the Interagency Committee on Seismic Safety in Construction seismic standards and the "DOT Policy for Seismic Safety of New and Existing DOT Owned or Leased Buildings".

Relationship of Program to FAA Strategic Goal, Objective and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ATCT/TRACON Modernization program upgrades and improves facilities to support the NAS. This program will enable facilities to meet current operational, environmental, and safety needs economically instead of replacing or relocating the entire facility. This effort will result in a smooth and orderly transition of new equipment into FAA terminal facilities, minimizing disruption of the operating system. This program will also improve the operational efficiency and environmental systems of obsolete and deteriorated ATCT/TRACON facilities. The improvements to facility infrastructure such as electrical distribution systems, heating and air-conditioning, and structural problems will extend the service life of facilities and minimize outages that would delay air traffic.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Conduct planning projects (e.g., Life Cycle Assessments, Conditions Assessments, etc.) to determine requirements.
- Initiate an average of 84 new projects to improve, repair, and sustain infrastructure at ATCT/TRACON facilities.
- Conduct analysis on the longer-term plans for facilities.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue facility sustainment, repair, and modernization work within available funding.
- Initiate an average of 84 modernization related projects per year.

2B08, Terminal Voice Switch Replacement (TVSR)

FY 2010 Request $10.5M

- Voice Switches – Terminal Voice Switch Replacement (TVSR) II, C05.02-00

Program Description

The ongoing TVSR program involves replacing the aging, obsolete voice switches in the Air Traffic Control Towers and Terminal Radar Approach Control facilities. Voice switches enable air traffic controllers to communicate with aircraft as well as other air traffic control facilities. The TVSR program ensures that controllers continue to have reliable voice communications in the terminal environment. The program consists of several multiyear equipment contracts for voice switches, including; Small Tower Voice Switches, Enhanced Terminal Voice Switches, Rapid Deployment Voice Switches model IIA, Voice Switch Bypass Systems, and Interim Voice Switch Replacement. It also includes the Conference Control Center at the Air Traffic Control System Command Center (ATCSCC). To date, this program has replaced 388 of 421 terminal switches throughout the NAS. The program also provides the contract vehicles for the FAA to procure voice switch equipment for new and modernized terminal facilities.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The TVSR program supports the greater capacity goal by improving system reliability of terminal voice communications by replacing aging electronic switches with modern digital equipment. This reduces outages and prevents delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Deliver 10 terminal voice switches to various FAA facilities including additional systems to support ATO-T Tower replacement program

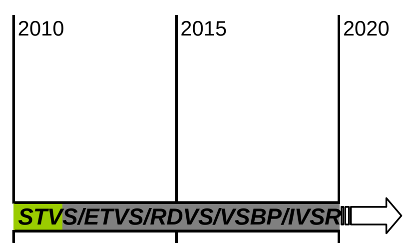
Program Plans FY 2011-2014 – Performance Output Goals

- Deliver terminal voice switches to various FAA facilities that were not included in the original statement of the program (approximately 50) but will be, or are, at the end of their lifecycle.

System Implementation Schedule

Small-Tower Voice Switches (STVS), Enhanced Terminal Voice Switches (ETVS), Rapid Deployment Voice Switches (RDVS) model IIA, Voice Switch Bypass Systems (VSBP), and Interim Voice Switch Replacement (IVSR)

First site IOC: 1994 (2006) -- Last site IOC: 2011



2B09, NAS FACILITIES OSHA AND ENVIRONMENTAL STANDARDS COMPLIANCE
FY 2010 Request $26.0M

- NAS Facilities OSHA & Environmental Standards Compliance – NAS Facilities OSHA, F13.03-00
- Environmental and Occupational Safety and Health Compliance and Fire/Life Safety for Airport Traffic Control Towers, F13.03-00

Program Description

NAS Facilities Occupational Safety and Health Administration (OSHA) & Environmental Standards Compliance provides comprehensive ATO-wide environmental, occupational safety and health management to meet Federal, state, and local legal requirements in addition to negotiated agreements. ATO-W's Environmental Occupational Safety & Health (EOSH) Services is the lead organization within ATO charged with the protection of employee well being and the environment. Through the development of guidance, technical assistance, employee training, compliance monitoring, and corrective actions, EOSH Services designs and implements compliance programs that integrate risk management into each level of the ATO infrastructure lifecycle: from system and facility design, through infrastructure management, and to decommissioning.

To achieve its mission, EOSH Services oversees the implementation of numerous programs covering a wide range of disciplines, from fire life safety to pollution prevention.

The Fire Life Safety program implements fire life safety upgrades at Airport Traffic Control Towers. Additionally, it develops fire prevention plans and trains tower occupants, resident engineers, maintenance technicians, and employees on maintenance requirements for new systems.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 1** – Implement human resource management practices to attract and retain a highly skilled, diverse workforce and provide employees a safe, positive work environment.
- **FAA Performance Target 2 –** Reduce the total workplace injury and illness case rate to no more than 2.44 per 100 employees by the end of FY 2011 and maintain through FY 2013.

Relationship to Performance Target

In support of the workplace injury and illness performance target, ATO will meet the following activity targets:
- Will ensure that ATO employees complete web-based OSH awareness training by July 27, 2010.
- Will conduct EOSH program management evaluations in each service area to evaluate program effectiveness no later than July 27, 2010.
- Will work with product teams to incorporate EOSH requirements into at five (5) new emerging systems by July 31, 2010.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #5 –** Promote Organizational Learning and Growth.
- **SMP Objective #5.5 –** Foster a safety and performance-based culture.

Program Plans FY 2010 – Performance Output Goals
- Continue fire life safety upgrades to 20 ATCTs initiated in FY 2009.
- Initiate fire life safety upgrades for 20 ATCTs.
- Work with product teams to incorporate EOSH requirements into at least five (5) NAS new systems.
- Work with ATO-T to incorporate EOSH requirements into all new ATCT and TRACON designs.
- Initiate five new ATO EOSH guidance/documents/directives.

- Complete FAA acceptance process for 100% of mold remediation projects identified through the Agency identification process and planned for completion in 2010.
- Maintain environmental compliance performance level at or better than the FY 2009 baseline level as established by the ATO environmental management system (EMS).
- Use EOSH program dashboard performance measures to establish program performance baselines.
- Finalize existing EOSH training standards into uniform course titles.

Program Plans FY 2011-2014 – Performance Output Goals

- Initiate fire life safety upgrades for 80 ATCTs.
- Perform system hazard analysis on at least five (5) new NAS system per year.
- Support acquisition management organizations by providing OSH and environmental technical assistance on five (5) systems per year.
- Work with ATO-T to incorporate EOSH requirements into all new ATCT and TRACON designs.
- Prepare course materials for at least one EOSH course with a uniform course title per year.
- Establish consistent annual environmental inspection information for selected NAS facilities.
- Conduct at least one field review for hearing conservation program per year.
- Develop standardized training course for confined space.
- Continue implementing electrical safety and Lockout/Tagout safety programs
- Perform review on the status of fall protection personal protective equipment in the service areas.
- Conduct at least one indoor air quality program field review per year.
- Conduct at least one environmental compliance program field review per year.
- Continue to perform safety hazard analyses on NAS in-service equipment.
- Continue implementing written safety programs.
- Conduct quality assurance/quality control evaluation of EOSH Program implementation in at least one Service Area per year.
- Finalize implementation of ATO EMS.

2B10, AIRPORT SURVEILLANCE RADAR (ASR-9)

FY 2010 Request $3.5M

- ASR-9 / Mode S SLEP, Phase 1B – Transmitter Modification, S03.01-05
- ASR-9 / Mode S SLEP, Phase 2, S03.01-06

Program Description

The Airport Surveillance Radar Model 9 (ASR-9) and Mode Select (Mode S) provide aircraft target and weather information to air traffic controllers, which help reduce delays and improve safety at high activity airports. The ASR-9 and Mode S surveillance systems were designed and fielded in the 80's/90's and have experienced an increase in failures. Studies conducted in 2000 – 2003 revealed that continued investment is required to sustain the current level of surveillance services provided by these systems; without modification, it is expected the number of unscheduled outages would increase, as well as the mean time to restore service. Furthermore, without modification, the ability to implement Internet Protocol (IP) and All Purpose Structured Eurocontrol Surveillance Information Exchange (ASTERIX) data format for interface with the System Wide Information Management (SWIM) (reference NAS Architecture 6, Decision Point #102) and associated support for NextGen would be compromised.

The results of an investment analysis conducted in November 2003 indicated that a Service Life Extension Program (SLEP) for both systems was the preferred solution. The FAA developed a multi-phased strategy that addresses critical, near-term sustainment issues, identified as those elements that represent immediate, serious risk to this service (Phase 1) and identifies the next highest set of major impact risks and develops affordable long-term solutions to ensure continued surveillance services at ASR-9/Mode-S sites (Phase 2).

The first phase was further separated into two segments: Phase 1, Segment A; and Phase 1, Segment B. A final investment decision was approved for Phase 1, Segment A in September 2004, which implemented modifications to the ASR-9 antenna at selected sites to mitigate the risk of structural collapse, while addressing Occupational Safety and Health Administration (OSHA) issues and replacing the obsolete control and monitoring equipment at all sites. A final investment decision was approved for Phase 1, Segment B in June 2005, which implements modifications to the ASR-9 transmitter at 135 systems through FY 2010 to improve the reliability and maintainability of these systems.

Phase 2, currently in investment analysis, consists of implementing additional modifications to the ASR-9 radar systems to sustain primary surveillance in terminal airspace through 2025. The sustainment of the ASR-9 aligns with the National Airspace System Architecture 6, and the Surveillance and Broadcast Services (SBS) Automatic Dependent Surveillance - Broadcast (ADS-B) strategy.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ASR program contributes to the goal of greater capacity by maintaining existing airport capacity and meeting future air traffic demands. The ASR-9 serves airports with high activity levels and will not be replaced by the ASR-11. The SLEP projects being performed will address the most critical performance issues in order to improve system reliability and thereby reduce unscheduled outages.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6** – Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

Phase 1B

- Continue installation of the ASR-9 transmitter modification at operational sites.

Phase 2

- Complete investment analysis.

Program Plans FY 2011-2014 – Performance Output Goals

Phase 1B

- Complete installation of the ASR-9 transmitter modification at operational sites.

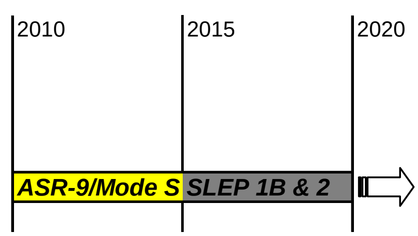
Phase 2

- Initiate implementation of system modifications.

System Implementation Schedule

Airport Surveillance Radar-Model 9 (ASR-9)/Mode Select (Mode S) Service Life Extension Program (SLEP) Phase 1B and 2

Phase 1B: First site ORD: March 2008 -- Last site ORD: February 2011
Phase 2: JRC planned for 2009



2B11, TERMINAL DIGITAL RADAR (ASR-11)
FY 2010 Request $12.6M

- A, ASR-11 – ASR-7/ASR-8 Replacement, DoD Takeover, New Establishments, S03.02-01
- B, ASR-11 – Tech Refresh – Segment 1, S03.02-04 and Segment 2, S03.02-05

A, ASR-11 – ASR-7/ASR-8 Replacement, DoD Takeover, New Establishments, S03.02-01

Program Description

The Airport Surveillance Radar - Model 11 (ASR-11) system replaces ASR-7s, a portion of the ASR-8s and Air Traffic Control Beacon Interrogator (ATCBI) - Model 4/5 radars with a single, integrated digital primary and secondary radar system. The ASR-11 is compatible with legacy analog automation systems, as well as digital automation systems. There are approximately 90 Terminal Automation Systems with analog displays which require analog input.

The ASR-11 systems also provide six-level National Weather Service calibrated weather capability. This six-level weather data, which is presented on air traffic control displays, results in significant improvement for both controllers and pilots for interpreting and identifying the location of weather in the proximity of the airport. This enhanced weather capability is not available with the existing ASR-7/8 systems.

The ASR-11 program replaces the aging terminal radar infrastructure with new support equipment and buildings, including advanced grounding/bonding and lightning protection systems, digital or fiber optic telecommunications, emergency backup power supplies, and enhanced physical security.

The FAA has procured 68 systems. There are 39 ASR-8's that remain in the NAS.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ASR-11 system provides improved reliability and maintainability compared to the ASR-7/8 systems being replaced. The ASR-11 system reduced the mean time to repair and increased the mean time between outages that were applicable to the existing ASR-7/8 and ATCBI-4/5 systems. The resulting improvement in operational availability, due to the reduced number of occurrences and duration of outages, reduces aircraft delays that result from these outages.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
- Complete Initial Operating Capability of systems at 4 sites.
- Procure 10 demolitions/restorations.
- Start demolition/restorations at 10 legacy ASR-7/8 system sites.

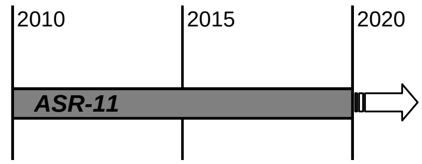
Program Plans FY 2011-2014 – Performance Output Goals
- Start demolition/restorations at1 legacy ASR-7/8 system sites.

System Implementation Schedule

Airport Surveillance Radar - Model 11 (ASR-11)

First site ORD: December 2003 -- Last site ORD: September 2009

First Site Decom: December 2023 -- Last Site Decom: September 2029



B, ASR-11 – Tech Refresh – SEGMENT 1, S03.02-04 and Segment 2, S03.02-05

Program Description

The ASR-11 Technology Refresh program replaces and upgrades obsolete ASR-11 commercial off-the-self (COTS) hardware and software to ensure the continued reliable operation of the radar system through its designated lifecycle. Segment 1 Tech Refresh (FY 2008 – FY 2015) is included in this program description and Segment 2 CIP S03.02-05 (Beyond FY 2013) is being defined.

Segment 1: The Low Overhead Array Processors, which are used in the signal processor cabinet, are 1980's technology and are no longer in production. Current processor and memory utilization of these processor cards run at 80-90%. There is no possibility for expanding these cards. The vendor, DoD, and the FAA participated in early development discussions to investigate other possible mitigations and improvements to ensure that the ASR-11 systems would support future capabilities. The first change to the baseline based upon these discussions is the Advanced Signal Data Processor (ASDP) that replaces the existing signal data processor (SDP). The ASDP will be implemented by the vendor in the production systems that are available in FY 2009 and beyond and retrofitting deployed systems will also provide major benefits. The Tech Refresh, including ASDP modification allows increased functionality through software modifications and it closes four in-service decision open action items. The ASR-11 Technology Refresh Program includes development of three incremental software builds to address in-service decision action items, with the software development completing in 2012.

The funding planned for FY 2008 through FY 2015 for Tech Refresh will be used to retrofit 68 systems in the FAA inventory with the ASDP modification kits.

The major objectives of the ASDP are:

1) Install production ready, form-fit function replacement kits for the SDP, including elimination of the Low Overhead Array Processors.
2) Use scalable hardware and software architecture to permit easy future growth with minimal cost and effort.
3) Address In-service Decision open action items including increasing memory and processing capacity.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4** – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ASDP design reduces the total number of Line Replaceable Units (LRU's) required in the system. It will eliminate the need for four LRUs: pulse compressor, synchronizer Low Overhead Array Processors, and beam/ Sensitivity Time Constant (STC) cards. The ASDP design also reduces the total number of supported cards for the ASR-11 system from 14 to 3, and the new architecture eliminates the proprietary custom backplane that constrained connectivity to the system. By reducing the number of LRUs, future O&M cost are reduced. Additionally, the entire architecture is scalable and it will accommodate any future software modifications.

This change will increase operational availability in all previously deployed and commissioned ASR-11 systems in the NAS and reduce service outages.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

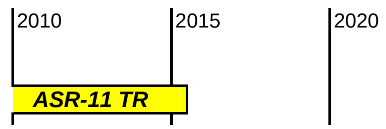
- Procure 17 out of 68 ASDPs.
- Deliver 22 out of 68 ASDPs.
- Install 12 out of 68 ASDPs.

Program Plans FY 2011-2014 – Performance Output Goals

- Procure 27 out of 68 ASDPs.
- Deliver 38 out of 68 ASDPs.
- Install 48 out of 68 ASDPs.

System Implementation Schedule

Airport Surveillance Radar - Model 11 (ASR-11) Tech Refresh
First site Delivery: September 2009 -- Last site Delivery: April 2015



2B12, RUNWAY STATUS LIGHTS (RWSL)

FY 2010 Request $117.3M

- Runway Status Lights (RWSL) – Segment 1, S11.01-02
- X, Runway Status Lights (RWSL) – Segment 2, S11.01-03

Program Description

The RWSL System integrates a light warning system with approach and surface surveillance systems to provide a visual signal indicating to pilots and vehicle operators that it is unsafe to enter, cross or begin takeoff on a runway. The RWSL system is driven automatically using computer processing of integrated Airport Surface Detection Equipment – Model X and terminal surveillance information. The RWSL system software detects the presence and motion of aircraft and surface vehicles on or near the runways, illuminates red runway-entrance lights (RELs) if the runway is unsafe for entry or crossing, and illuminates red takeoff-hold lights (THLs) if the runway is unsafe for departure. The system extinguishes the lights automatically as appropriate when the runway is no longer unsafe. The RWSL program received approval from the JRC for 22 operational and 3 support sites.

Relationship of Program to FAA Strategic Goal, Objective, and Performance

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 3 –** Reduce the risk of runway incursions.
- **FAA Performance Target 1 –** By FY 2010, limit Category A and B (most serious) runway incursions to a rate of no more than 0.450 per million operations, and maintain or improve through FY 2013.

Relationship to Performance Target

The overall year to date trend for runway incursion rate suggests an increasing rather than decreasing rate and while the numbers are not statistically conclusive their initial trend suggests that additional effort is required to ensure that the Flight Plan performance target is achieved. The establishment of additional installations of RWSL will contribute toward the accomplishment of the Flight Plan performance target.

Strategic Management Process (SMP) Pathway and Objective

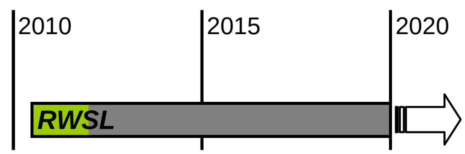
- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- .Start construction at 10 of 22 sites.
- Complete Factory Acceptance Test for First Article.
- Complete Site Acceptance Test (SAT) for First Article at key site.
- Complete remainder of site survey's for a total of 22.
- Procure systems for deployment to 4 out of 22 operational sites.
- First ORD in FY 2010.

Program Plan FY 2011-2014 – Performance Output Goals
- Start construction at 12 of 22 sites.
- Procure systems for deployment to 18 out of 22 operational sites.
- Finish construction at 22 of 22 sites.
- Complete installation of 21 of 22 operational sites.
- Complete ORD of 21 of 22 operational sites.

System Implementation Schedule

Runway Status Lights (RWSL)
First site IOC: August 2010 -- Last site IOC: September 2011



2B13, NATIONAL AIRSPACE SYSTEM VOICE SWITCH (NVS)
FY 2010 Request $26.6M

- Networked Facility NAS Voice Switch, G3C.01-01

Program Description

The NAS Voice Switch (NVS) will be a real-time, critical part of the ATC infrastructure that provides the connectivity for efficient communications among air traffic controllers, pilots, and ground personnel. It connects incoming and out-going communication lines via a switching matrix to the controller’s workstation. The controller via a panel on his workstation selects the lines needed to communicate with pilots, other controllers and other facilities. The NVS will replace the service that is currently provided by 17 different voice switch system configurations. The focus will be on designing a replacement switch with standardized components that will reduce maintenance and parts inventory costs.

The current switch technology deployed in the NAS will not support the expected future NextGen concept of operations for either: networked facilities, or such concepts as dynamic re-sectorization and off-loading during non-peak operations. These capabilities require that lines connected to a controller’s workstation panel can be changed to add or eliminate lines as the geographical boundaries of the sector change. The NVS will support current and future ATC operations as envisioned by both government and industry forecasters.

Relationship of Program to FAA Strategic Goal, Objective, and Performance

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The NVS program supports the greater capacity goal by improving the system reliability of voice communications for both current and future operations by replacing and upgrading the obsolete, non-supportable hardware and software. The NVS program will also be capable of being flexible to support reduction of the number of facilities and the resulting work load adjustments.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure viable future.
- **SMP Objective #4.2** – Deliver a future air traffic system that meets customer's operational needs.

Program Plans FY 2010 – Performance Output Goals
- Achieve initial Joint Resources Counsel (JRC) decision to proceed with program.
- Release Screening Information Request (SIR) package.

Program Plans FY 2011-2014 – Performance Output Goals
- Achieve final JRC decision to proceed with program.
- Award Production contract.
- Install at Key site.
- Achieve Initial Operating Capability (IOC) of Systems.

2B14, VOICE RECORDER REPLACEMENT PROGRAM (VRRP)
FY 2010 Request $11.9M

- Voice Recorder Replacement Program – Next Generation Recorders (VRRP), C23.01-00

Program Description

The NAS System Requirements Document (NAS-SR-1000) requires that both air-to-ground (A/G) and ground-to-ground (G/G) communications be recorded and stored for later retrieval. This applies to all ATC domains, including Air Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, Air Route Traffic Control Centers (ARTCC), Automated Flight Service Stations (AFSS), and the FAA's Air Traffic Control System Command Center. FAA Order 7210.3T *Facility Operation and Administration* requires that ATC facilities "record operational communications to the maximum extent practicable."

The voice recorder provides the legally accepted recording capability for conversations between air traffic controllers, pilots, and ground-based air traffic facilities in all ATC domains and is used in the investigation of accidents and incidents and routine evaluation of ATC operations.

As the voice recorder technology has continued to evolve, early digital voice recorders have experienced obsolescence and supportability issues. These digital recording systems are reaching the end of their service life and they use obsolete operating systems and parts that are no longer manufactured.

The Next Generation Voice Recorder Replacement Program (NGVRRP) will replace the obsolete digital voice recorders and any remaining analog recorders and provide digital voice recording functionality at new facilities. The replacement of aging voice recorders will reduce operational costs.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The NGVRRP voice recording system will support the goal of sustaining operational availability by replacing aging and obsolete equipment currently in the field. System outages and downtime for repair will be significantly reduced due to the higher availability and improved operational technology of the next generation of voice recorders.

Strategic Management Process (SMP) Pathway and Objective

SMP Pathway #1 – Achieve Operational Excellence.
SMP Objective #1.6 – Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Deliver and install 121 voice recorders.

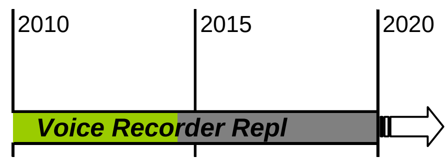
Program Plans FY 2011-2014 – Performance Output Goals

- Deliver and install 121 voice recorders.

System implementation schedule

Voice Recorder Replacement

First site IOC: 2007 -- Last site IOC: 2014



2B15, INTEGRATED DISPLAY SYSTEM (IDS)

FY 2010 Request $7.0M

- Integrated Display System (IDS) – Technical Refresh and Sustainment, A03.05-01

Program Description

The Integrated Display System (IDS4) is a local and wide area network information dissemination and display system. IDS4 consolidates information from several operational NAS weather subsystems and other operational sources onto a single display, and distributes the data to air traffic controllers and airspace managers at TRACON, ATCT, and ARTCC facilities. The FAA began regional procurements in 1990 and currently has 2,230 IDS4 workstations located at approximately 390 FAA facilities nationwide. Recent obsolescence issues and loss of proprietary software support make it necessary to replace this system to sustain its functionality.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The IDS provides important information to air traffic controllers necessary for the safe and efficient management of air traffic. This program replaces the existing IDS-4 with upgraded hardware and software to improve its reliability and reduce potential outages.

Strategic Management Process (SMP) Pathway and Objective

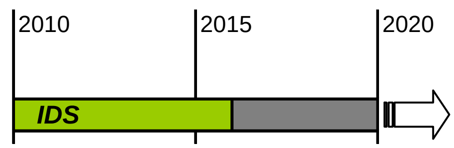
- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
- First Article Acceptance
- Begin production and system deployment
- Attain initial operational capability at the first site

Program Plans FY 2011-2014 – Performance Output Goals
- Complete production
- Continue system deployment

System Implementation Schedule

Integrated Display System (IDS)
First site IOC: February 2010 -- Last site IOC: September 2015



2B16, INTEGRATED TERMINAL WEATHER SYSTEM (ITWS)
FY 2010 Request $1.9M

- ITWS – Development/Procurement/Pre-Planned Product Improvement (P3I) – Segments 1,2,3, W07.01-00

Program Description

The Integrated Terminal Weather System (ITWS) is an air traffic management tool that provides air traffic manager's graphic, full-color displays of essential weather information at major U.S. airports. ITWS was developed to fill the need of air traffic managers, controllers, and airlines for a tool that integrated weather data from a number of sources and provided customers a single, easily used and understood display of support products. ITWS depicts current and short-term predictions of terminal weather through the integration of data from FAA and National Weather Service sensors and systems, as well as from aircraft in flight. ITWS weather information is immediately useable by air traffic controllers and managers without further meteorological interpretation.

The ITWS program includes development, installation, testing, training, maintenance, and lifecycle operational support. The FAA has completed development, deployment, and commissioning of 22 operational ITWS. In November 2007 the JRC approved the procurement of 11 of the 12 deferred sites and additional system components to provide ITWS Situation Displays (SDs) for 16 secondary/reliever airports. The program also includes technical planning support for the transition of terminal weather capabilities to System-Wide Information Management (SWIM) and NextGen Network Enabled Weather (NNEW).

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1** – Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Traffic managers can use ITWS to plan traffic flow reconfiguration and to coordinate with personnel in the TRACONs, ATCTs, ARTCCs, and the ATCSCC to minimize cancellations and delays and sustain average daily capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plans FY 2010 – Performance Output Goals

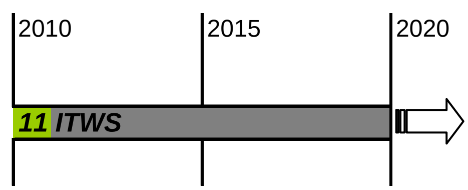
- Complete delivery and installation of ITWS at remaining 2 out of 33 operational (100%) sites.
- Achieve IOC at remaining 4 ITWS sites out of 33 operational (100%): Wichita, Louisville, Tulsa, San Juan,
- Commission ITWS at remaining 6 sites out of 33 operational (100%): Raleigh-Durham, Oklahoma City, Wichita, Louisville, Tulsa, San Juan.
- Complete installation of displays at 7 additional (1 previously completed) ITWS secondary/reliever airports out of 16 sites (50%).
- Initiate activities to evolve ITWS telecommunications to SWIM.
- Initiate activities to evolve ITWS service to transition to NNEW.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete installation of displays at remaining 8 ITWS secondary/reliever airports out of 16 sites (100%).
- Demonstrate SWIM and NextGen-compatible ITWS capabilities.

System Implementation Schedule

Integrated Terminal Weather System (ITWS)
First ORD: April 2003 -- Last ORD: 2010 (33rd Unit)



2B17, REMOTE MAINTENANCE MONITORING
FY 2010 Request $1.0M

- Remote Maintenance and Monitoring System (RMMS) Technology Refreshment, M07.04-01

Program Description

The existing Remote Maintenance Monitoring System (RMMS) is the primary tool used by the FAA to maintain the operation of NAS systems and facilities. RMMS consists of two main functions: (1) monitor and control of selected remote NAS systems and facilities; and (2) maintenance management of all NAS systems and facilities. The RMMS hardware platforms and software applications have been operating since the 1980's and are in need of replacement. Existing hardware platforms are obsolete and maintaining them is becoming very costly. The Remote Monitoring and Logging System (RMLS) will retain the same functionality as the current RMMS but provide updated hardware and software in two phases. Phase I, is the RMLS National Logging Network (NLN) which improves reliability of the RMMS maintenance management function. Phase II is the RMLS National Remote

Maintenance Monitoring (RMM) Network (NRN) which updates the monitor and control function of RMMS. RMLS NRN will replace the Maintenance Processor Subsystem (MPS) hardware platform and the Maintenance Automation System Software (MASS). In FY 2007 and FY 2008 the Remote Maintenance System Engineering Team (RMSET) successfully developed a prototype design for RMLS NRN. The prototype design for RMLS NRN will be implemented and deployed starting in FY 2010.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

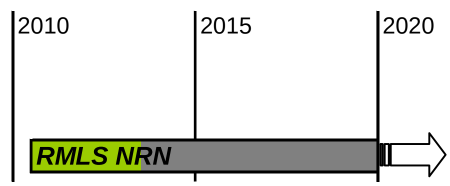
The RMMS supports the FAA performance target by capturing, quantifying, analyzing, measuring, and reporting maintenance information to determine operational availability as well as error levels, responsiveness, and utilization of NAS components, systems, services, and the NAS as a whole. The RMMS maintenance information is used by the FAA to analyze trends and improve performance; make investment decisions and support budget requests for replacement, relocation, or modification of existing equipment; detect supportability problems; evaluate the efficiency and effectiveness of the overall maintenance program; and provide reports to Congress and FAA management.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway # 1** – Achieve operational excellence.
- **SMP Objective #1.6** – Optimize service availability.

System Implementation Schedule

Remote Monitoring Logging System - National RMM Network (RMLS NRN)
First site IOC: Septemer 2010 -- Last site IOC: March 2013



2B18X, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 2)
FY 2010 Request $0.0M

- Terminal Automation Modernization – Replacement (TAMR) – Phase 2 Tech Refresh, A04.05-02

Program Description

Terminal automation systems are essential for supporting the fast tempo of operations at our nation's busiest airports. The automation systems rely on information from radar and weather sensors, along with flight plan information for each aircraft to help controllers safely and efficiently maintain aircraft separation at or near airports.

The Terminal Automation Modernization/Replacement program (TAMR) provides a phased approach to modernizing the automation systems at the FAA's Terminal Radar Approach Control (TRACON) facilities and their associated Air Traffic Control Towers (ATCT) throughout the NAS. Phase 2 of the TAMR Program addresses the operational shortfalls at nine (9) sites. In 2006 through 2008, the FAA replaced the Automated Radar Terminal System (ARTS) IIE systems with STARS at 3 sites - Anchorage, AK; Corpus Christi, TX; and, Wichita, KS; and, modernized the ARTS IIIE systems at 4 sites - Chicago, IL; Denver, CO; Minneapolis/St. Paul, MN; and, St. Louis, MO. The replaced/modernized systems provide state-of-the-art digital radar and flight data processing as well as color display systems that provide additional functionality and support the projected growth in air traffic capacity demands. Color displays provide a significant improvement for air traffic controllers in determining weather intensity.

As with any Commercial-off-the-Shelf (COTS) based system, an aggressive hardware "technology refreshment" program is absolutely essential. Planning for technology refreshment enables identification and qualification of affected components before they become inoperable due to obsolescence. In order to ensure that automation services are available and reliable through 2025, the FAA will pursue a cyclical technology refreshment approach at these nine sites.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4** – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

By providing state-of-the-art equipment, outages are reduced, thereby reducing delays at the nine (9) major airports supported by this investment.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Program to start in FY 2011.

Program Plans FY 2011-2014 – Performance Output Goals

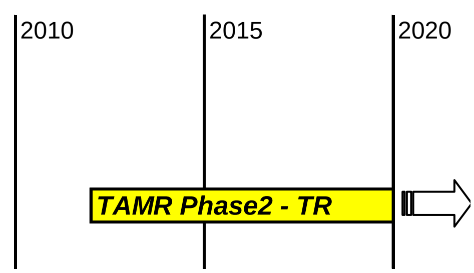
- Initiate and complete contractual activities to design/develop solutions for accomplishing a technology refreshment of the terminal system hardware and software.
- Complete design/development of technology refreshment solutions and deploy to all nine sites.
- Technology refreshment will be accomplished in several five (5) year cycles as components reach the end of their useful life or become unavailable.

System Implementation Schedule

Terminal Automation Modernization/Replacement (TAMR Phase 2) - Tech Refresh

First site IOC: 2012 -- Last site IOC: 2024*

*Note: Tech Refresh will be cyclical



C. Flight Service Programs

2C01, Automated Surface Observing System (ASOS)
FY 2010 Request $5.5M

- Automated Surface Weather Observation Network (ASWON) – ASOS – Pre-Planned Product Improvements (P3I), W01.02-02

Program Description

ASWON is an umbrella program that consists of the following surface weather sensor systems: the Automated Surface Observing System (ASOS), Automated Weather Observation System (AWOS), Automated Weather Sensor Systems (AWSS), Stand Alone Weather Sensors (SAWS), Digital Altimeter Setting Indicator (DASI), F-420 Wind Sensor, and AWOS Data Acquisition System (ADAS). The only ASWON program currently receiving F&E funding is ASOS Pre-Planned Product Improvements (P3I). All other ASWON systems are In Service.

These systems are located at airports and measure and report weather conditions such as temperature, barometric pressure, visibility, precipitation type and amount, cloud height and coverage, and wind speed and direction. The ASOS P3I program consists of five upgrades/enhancements to the ASOS – three efforts are complete (Processor Upgrade, Dewpoint Sensor Replacement, and Ice-Free Wind Sensor) and two are active (Ceilometer Replacement and Enhanced Precipitation Identification (EPI) sensor). The ASOS P3I program will upgrade/sustain the performance of 571 ASOS with EPI sensors and the Ceilometer Replacement. The EPI sensors will expand precipitation measurement capabilities from the current ASOS ability to identify rain or snow to also include the identification of drizzle, hail, and ice pellet occurrence. The Ceilometer Replacement will replace an obsolete sensor to measure the height and amount of cloud coverage.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4** – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The ASWON program supports the FAA greater capacity goal by supplying automated surface weather observations at over nine hundred locations (based on AWOS, ASOS, SAWS and AWSS) to meet the needs of pilots, operators, air traffic personnel, downstream automation systems, and terminal forecasters.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5 –** Minimize impacts of weather on the operation.

Program Plans FY 2010 – Performance Output Goals

- Ceilometer: Continue deployment; deploy 250 ceilometers.
- EPI sensor: Continue EPI sensor development and testing.

Program Plans FY 2011-2014 – Performance Output Goals

FY 2011:

Ceilometer:

- Continue deployment (deploy 250 ceilometers).

EPI sensor:

- Complete EPI sensor development and testing.
- Begin procurement (procure 350 EPI sensors).
- Begin deployment (deploy 50 EPI sensors).

FY 2012:

Ceilometer:

- Complete deployment (deploy final 30 ceilometers).

EPI sensor:

- Complete EPI sensor procurement (procure 221 EPI sensors).
- Continue deployment (deploy 300 EPI sensors).

FY 2013:

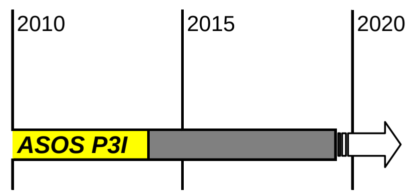
EPI sensor:

- Complete deployment (deploy final 221 EPI sensors).

System Implementation Schedule

Automated Surface Observing System (ASOS) - Pre Planned Product Improvement (P3I)

First site ORD: 2005 -- Last site ORD: 2013



2C02, FLIGHT SERVICE STATION (FSS) MODERNIZATION

FY 2010 Request $20.1M

- Alaska Flight Services Modernization, F05.04-01

Program Description

The Alaskan Flight Service Modernization (AFSM) system will provide up to the minute, pilot briefing data by integrating weather graphics with text based weather and aeronautical information. Automated weather, aeronautical and flight planning updates will be integrated with notice to airmen (NOTAM) and flight planning databases. A web portal will make data available to both FAA personnel and pilots, and will increase access to flight service information in even the most remote locations. A new voice switch will increase operational flexibility by allowing frequencies to be shifted to other flight service facilities to meet productivity demands. Additionally, flight service buildings will be updated to meet Occupational Safety and Health Administration (OSHA) and Americans with Disabilities Act requirements. Building power, electrical, and safety systems will be updated to ensure the new equipment will meet our standards for reliability in the facilities.

The overall AFSM program will address the shortfalls of: automation, voice switch, facilities, and business continuity. The Operational and Supportability Implementation System (OASIS) is used as the operational automation system because the unique Alaskan flight service systems were experiencing security and data integrity issues. The period of performance for the OASIS contract may only be continued under the present contract through February 2010. The AFSM program has been segmented into two parts. Segment 1 is Automation and Segment 2 is Voice Switch, Facilities, and Flight Service Delivery. Business continuity will be addressed during both Segment 1 and Segment 2 through elimination of single-points-of-failure. Segment 1 Automation will have a core set of requirements that must be in place on day 1 of operation with contract options to develop and implement valid requirements that are not available when the replacement systems is first operational (i.e., web-based services, self-service remote briefing stations, remote airport advisories, etc.).

Segment 2: Facilities and Flight Service Delivery will study the current locations of facilities, where the demand for service is originating, conditions of current facilities and quality of life issues, and identify the most cost effective and efficient means of flight service delivery that maintains or improves safety. Alternatives to be studied include: 1) keep the 17 current facilities, 2) ensure the right mix of facilities are located in the best locations to provide service to customers, and 3) rely on a centralized architecture (need at least 2 facilities to maintain business continuity). Upon completion of Segment 1 (currently scheduled for February 2010), Segment 2 will begin Investment Analysis activities.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 2 –** By the end of FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from the 2000-2002 average of 130 accidents per year to no more than 99 accidents per year. This measure will be converted from a number to a rate at the beginning of FY 2010.

Relationship to Performance Target

The AFSM program system will directly contribute to the FAA's increased safety goal by increasing the availability and capabilities of the current flight service systems. There are operational limitations and inherent vulnerabilities with the present system, and the AFSM system and facilities upgrade will provide timely and accurate weather and aeronautical information. It will also provide automated monitoring and alerting of in-flight deviations and warnings of weather encounters. The AFSM program will provide web based (self-briefing) services and a series of remote briefing terminals throughout the state. This will increase pilot aeronautical information awareness by giving them access to the same products used by the flight service specialists.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals

- Continue integration and test efforts for Automation.
- Continue facility upgrades and installation
- Complete site automation system acceptance tests.
- Continue implementation and deployment of new equipment
- Complete Security Certification and Authorization Process for Automation system.
- Continue facility sustainment activities.
- Begin acquisition efforts for the voice switch.
- Initiate surveys to determine where service efficiency may be improved (i.e. traffic studies, demand for service, quality of life, effectiveness and efficiencies to be gained, etc.).

Program Plans FY 2011-2014– Performance Output Goals

- Begin source selection activities for the Voice Switch.
- Complete voice switch source selection technical evaluation.
- Award the voice switch contract.
- Begin integration and test efforts for the Voice Switch.
- Perform pre-installation site surveys to determine specific facility upgrade needs.
- Complete site acceptance and voice switch system acceptance tests.
- Complete voice switch development, implementation and deployment.
- Complete NAS integration activities for voice switch.

- Complete Security Certification and Authorization Process for voice switch.
- Recommend facility reconstruction, rehabilitation, and adaptation as dictated by survey findings and operational requirements.
- Prepare source selection requirements and initial screening information request documents for facilities and flight service delivery.
- Begin awarding contract(s) for the facilities and flight service delivery.

2C03, Weather Camera Program
FY 2010 Request $3.8M

- Weather Camera Program – Segment 1, M08.31-01
- X, Weather Camera Program – Future segments, M08.31-02

Program Description

A disproportionate number of all U.S. aircraft crashes occur in Alaska. Between 1990 and 2006, there were 1497 commuter and air taxi crashes in the United States of which 520 of those accidents occurred in Alaska. Alaska accounts for 35% of all commuter and air taxi crashes.

Limited weather information in Alaska contributes to a higher risk of accidents and flight inefficiencies. Without weather information about their destination airport and route of flight, pilots cannot make informed decisions on whether it is safe to fly or continue their flight. This leads to accidents and unnecessary fuel costs. The National Transportation Safety Board (NTSB) Safety Study: Aviation Safety in Alaska, November 1995, recommended that the FAA assist the National Weather Service (NWS) with an evaluation of the technical feasibility and aviation safety benefits of remote color video weather observing systems in Alaska. The evaluation identified a need for pictorial views of current weather conditions, which would be accessible to the aviation community.

The mission of the Weather Camera Program is to improve safety and efficiency by providing weather visibility information in the form of near real-time camera images to aviation users. Weather images from airports and strategic en route locations are provided to pilots and flight service station specialists for enhanced situational awareness, preflight planning and en route weather briefings. Images are updated every ten minutes and stored for six hours. These images are made available through a user-friendly, web-enabled application.

The program funds procurement and installation of weather camera sites.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 2 –** By FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from the 2000-2002 average of 130 accidents per year to no more than 99 accidents per year. This measure will be converted from a number to a rate at the beginning of FY 2010.

Relationship to Performance Target

One of the Flight Plan strategies for reducing accidents in Alaska is to expand and accelerate implementing safety and air navigation improvement programs. The FAA will continue to enhance aviation safety throughout the state of Alaska by supplying visual meteorological information to pilots and expanding the use of weather cameras. Specific metrics for this initiative are: 1) reduce weather camera preventable accidents by 29%, and 2) Improve operator efficiency by reducing unnecessary flight time by 46%.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.1** – Ensure airspace system is safe, efficient, and secure.

Program Plans FY 2010 – Performance Output Goals
- 23 new weather camera facilities operational.

Program Plans FY 2011-2014 – Performance Output Goals
- Install additional weather camera facilities.

D. LANDING AND NAVIGATIONAL AIDS PROGRAMS

2D01, VHF OMNIDIRECTIONAL RANGE (VOR) WITH DISTANCE MEASURING EQUIPMENT (DME)

FY 2010 Request $5.0M

- Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC), N06.00-00

Program Description

This program replaces, relocates, or converts VOR and VORTAC facilities to improve NAS efficiency and capacity. VOR, Tactical Air Navigation (TACAN), and VORTAC (combination VOR and TACAN) systems provide navigational guidance for civilian and military aircraft in both the en route and terminal areas. The FAA navigation roadmap indicates the decisions will be made in the future regarding whether VOR or TACANS systems will remain in service or be shut down. If they are retained, they will continue to provide satellite navigation backup and define VOR routes and procedures for legacy users. VORTAC supports the transition to both Area Navigation (RNAV) and the Next Generation Air Transportation System (NextGen) by maintaining the present level of en route and terminal navigation service. Until that transition is complete, VORTACs must remain in service and they must be relocated, technologically refreshed, or replaced. Currently 60% of the VORTAC systems are beyond their estimated service life. It is projected that within 10-15 years all existing VORTAC systems will be beyond their estimated service life.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

Replacing, relocating, or converting VOR and VORTAC facilities increases NAS system efficiency. These facilities are experiencing signal deterioration due to various environmental factors and parts obsolescence, and they must be sustained to avoid deterioration in operational availability.

Strategic Management Process (SMP) Pathway and Objective

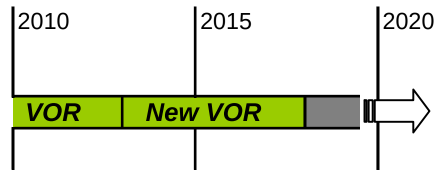
- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
- Procure approximately (4) Doppler Kits
- Service Available (Convert) for (1) VOR systems to Doppler VOR.
- Service Available (Relocate) for (1) VOR Antenna System.

Program Plans FY 2011-2014 – Performance Output Goals
- Procure approximately (16) Doppler Kits
- Service Available (Convert) for approximately (8) VOR systems to Doppler VOR.
- Service Available (Relocate) for approximately (4) VOR Antenna Systems.

System Implementation Schedules

New VHF Omnidirectional Range (VOR)
First site IOC: December 2013 -- Last site IOC: January 2018



2D02, INSTRUMENT LANDING SYSTEMS (ILS) – ESTABLISH
FY 2010 Request $8.6M

- Instrument Landing Systems (ILS), N03.01-00

Program Description

The ILS program buys and installs partial and full Category I, II, and III instrument landing systems and associated precision approach equipment at qualified airports. These systems enable aircraft to land in weather conditions where visibility is very limited. The ILS provides vertical and horizontal guidance information to the pilot to allow safe landings through touchdown and rollout. Approach lighting provides visual cues for the pilot to see the runway, once the ILS minimum altitude (normally 200 feet above the runway for a Category I approach and lower for Category II and III) is reached.

An ILS system has several components (a localizer for horizontal guidance, a glide slope for vertical guidance, and markers to determine horizontal distance from the runway) and supporting equipment (distance measuring equipment, approach lighting systems, runway visual range indicators to measure visibility along the runway, and other systems to provide visual cues for finding the runway) to provide approach guidance when visibility is obscured by low clouds or fog.

The ILS along with required Approach Lighting Systems (i.e., Approach Lighting System with Sequenced Flashing Lights Model 2 (ALSF-2) and Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)), improve both system safety and capacity at equipped runways by providing precision approach capability in the U.S. and world wide for aircraft landing in adverse weather conditions.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Establishing ILS precision approach capability allows lower visual minimums for landings and helps to maximize NAS use. Lowering visual minimums allows operations in poor weather conditions, which, in effect, is the same as an increase in airport capacity.

Strategic Management Process (SMP) Pathway and Objective

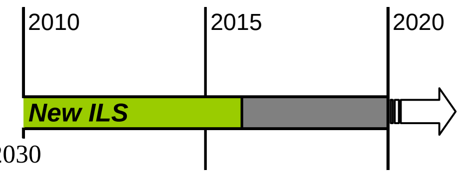
- **SMP Pathway #3 –** Increase Capacity Where Needed.
- **SMP Objective #3.3 –** Implement airspace and airport capacity enhancements safely.

Program Plans FY 2010 – Performance Output Goals
- Procure approximately five (5) ILS Systems.
- Service Available (Establish) for approximately (3) ILS locations
- Service Available (Upgrade) for approximately (4) ILS locations

Program Plans FY 2011-2014 – Performance Output Goals
- Procure approximately (20) ILS Systems.
- Service Available (Establish) for approximately (15) ILS locations
- Service Available (Upgrade) for approximately (10) ILS locations

System Implementation Schedules:

New Instrument Landing Systems (ILS)
First site IOC: June 2008 -- Last site IOC: December 2015
First Site Decom: January 2023 -- Last Site Decom: December 2030



2D03, WIDE AREA AUGMENTATION SYSTEM (WAAS) FOR GPS
FY 2010 Request $97.4M

- A, Wide Area Augmentation System (WAAS) – LPV Segment, N12.01-00
- B, Wide Area Augmentation System (WAAS) – Surveys and Procedures, N12.01-06

A, Wide Area Augmentation System (WAAS) – LPV Segment, N12.01-00

Program Description

The WAAS is an extremely accurate navigation system for aviation, providing precise navigation and landing guidance to equipped aircraft in any weather. WAAS provides coverage to the entire U.S., overcoming limitations to ground-based systems, such as navigation signal blockage by mountainous terrain. WAAS results in safety and capacity improvements in the national airspace and will reduce FAA operations costs by enabling the removal of some of the legacy ground-based navigation infrastructure.

WAAS became operational July 10, 2003. Following commissioning, WAAS began the Full Localizer Performance with Vertical guidance (LPV) segment, which is a mixed life cycle of development, modernization, and enhancement in conjunction with operations and maintenance scheduled to be completed in 2008.

In 2009, WAAS will have two remaining segments: 1) Phase III – Technical refresh/Operations and Maintenance from 2009 – 2013 and 2) Phase IV – Dual Frequency Operations (formerly known as the GLS upgrade) 2014 – 2028 to leverage the improvements the Department of Defense will make as part of its GPS modernization program.

WAAS uses a network of precisely located ground reference stations across the U.S., Canada, and Mexico to monitor Global Positioning System (GPS) satellite signals. This information is processed and sent to user receivers via leased navigation transponders on geostationary (GEO) satellites. The WAAS-provided messages improve the accuracy, availability, and safety of GPS-derived position information. WAAS addresses the following performance gaps: Lack of precise navigation capabilities that can handle continued air traffic growth; Lack of stable vertical guidance for approaches to airports in all weather conditions; Aging navigation systems that are expensive to maintain.

WAAS is a critical enabling technology for NextGen in the Air Traffic Operations Domain in support of the following solution sets: Initiate Trajectory Based Operations, Increase Arrivals/Departures at High Density Airports, and Increase Flexibility in the Terminal Environment.

The WAAS program is developing 500 LPV/LP procedures per year enabling more efficient aircraft trajectories. WAAS will be used in the redesign of airspace with RNAV T and Q routes that will increase efficiency and capacity, which supports the solution sets of Initiate Trajectory Based Operations, Increase Flexibility in the Terminal Environment and Increase Arrivals and Departures at High Density Airports.

In Alaska, WAAS enables users to operate under Instrument Flight Rules (IFR) on routes currently classified as uncontrolled airspace. The WAAS enabled routes improve operator efficiency, access and safety, while incrementally reducing dependency on Ground Based navigation, which supports the solution sets of Initiate Trajectory Based Operations and Increase Flexibility in the Terminal Environment.

WAAS will support the Teterboro near-term demonstration with vertical flight aircraft and business jets with airspace redesign and WAAS LPV approaches. This project is engaged through NextGen for the implementation of WAAS navigation and landing services. The business jet portion of the project will be to develop RNAV/RNP routes from an en route environment using minimal fuel descent profiles, Optimized Profile Descents (OPDs), and avoiding environmentally sensitive areas to WAAS LPV final approach segments. The second phase of this project will be to develop clear air departures and provide for air space separation between the Teterboro and Newark Airports to facilitate independent operations and reduce congestion in the departure and arrival corridors. The vertical flight portion of the project will be used to separate the helicopter traffic from the commercial jet traffic and provide the IFR precision approaches to heliport/helipad locations. These approaches will be tied to an urban area vertical flight only infrastructure providing for greater safety of flight operations between fixed wing operations and vertical flight, increased training of instrument operations, increased use of WAAS technology, and minimize the reliance on ground based infrastructures. The two operations will begin to separate the airspace control issues between airports that are very closely spaced and traffic operations currently negatively affect each other. This project will support the following solution sets of Initiate Trajectory Based Operations, Increase Flexibility in the Terminal Environment, and Increase Arrivals and Departures at High Density Airports.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 1 –** Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018).

Relationship to Performance Target

The WAAS provides customers with an enhanced satellite navigation signal enabling operations in all meteorological conditions during all phases of flight. WAAS provides any WAAS equipped aircraft with a highly accurate navigation capability at all locations and altitudes within the NAS. The WAAS navigation signal allows pilots to fly with reduced position uncertainty regardless of location within the NAS providing enhanced safety. In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an 8 fold reduction in approach accident rates (53 per million for non-precision approaches vs. 7 per million for precision approaches) when non-precision vs. precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year period and save over 250 lives when using WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. WAAS provides vertical and horizontal guidance with an aviation safety component enabling pilots to make stable, vertically guided approaches to all qualified runway ends in the continental United States and most of Alaska. Presently precision vertically guided approaches using ILS are only available at 870 of the nations 19,000 public and private use airports.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure aircraft safety and separation.

Program Plans FY 2010 – Performance Output Goals

- Expand accuracy and availability of WAAS LPV-200 service.
- Add 500 LPVs or Localizer Performance (LP) approach procedures to runways.
- Start integration of new GEO in WAAS to increase continuity and availability.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year.
- Add additional countries cooperating with the United States on the use of GNSS.
- Provide WAAS service at 400 runway ends currently not served by ILS.
- Integrate an additional geostationary satellite into the WAAS software.
- Complete integration of new GEO Operational in WAAS to provide increased continuity and availability.

System Implementation Schedule

Implementation schedule for Hardware and Software upgrades:

- FY09 Hardware Upgrade #1 - WRS Upgrade Kits
- FY10 Hardware Upgrade #2 - Comm. Architecture Upgrade
- FY11 Hardware Upgrade #3 - Obsolescence Upgrade I

- FY09 Software Upgrade #1 - Availability and Continuity Enhancement I;
- FY10 Software Upgrade #2 - Availability and Continuity Enhancement II;
- FY11 Software Upgrade #3 - GEO Interface and Iono Robustness

- FY12 Hardware Upgrade #4 - Safety Computer
- FY13 Hardware Upgrade #5 - Obsolescence Upgrade II

- FY12 Software Upgrade #4 - Compiler OS Upgrade
- FY13 Software Upgrade #5 - Availability and Continuity Enhancement III

- FY14 Hardware/Software Upgrades.

Implementation schedule for new GEO:

- Test and integrate GAP filler GEO (FY10)
- Initiate new GEO Services (FY10-14)
- Install Ground Uplink Station (GUS) (FY10-14)
- Develop Satellite Payload (FY10-14)
- GEO System Integration & Test (FY10-14)
- GEO Operational FY15

Wide Area Augmentation System (WAAS)

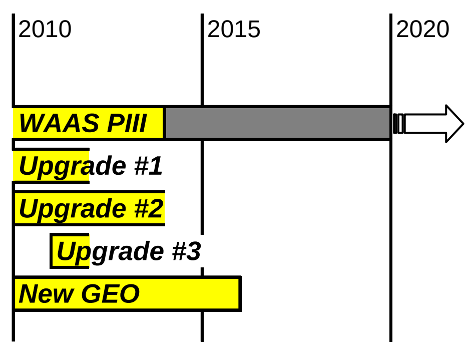
Commissioned July 2003 -- Full Precision: 2013

Upgrade #1 -- Start FY 2009 -- End FY 2012

Upgrade #2 -- Start FY 2010 -- End FY 2013

Upgrade #3 -- Start FY 2011 -- End FY 2011

Integrate New GEO -- Start FY 2010 -- End FY 2015



B, Wide Area Augmentation System (WAAS) – Surveys and Procedures, N12.01-06

Program Description

Developing a Localizer Performance with Vertical guidance (LPV) Instrument approach procedure requires an accurate airport obstruction survey. This survey is specific to the approach and provides detailed obstacle information used to ensure safe aircraft separation from the obstructions, and it establishes minimum altitudes allowed for specific segments while flying that LPV approach. The survey information can also be used for other purposes such as development of other instrument approach procedures (Required Navigation Performance (RNP), Lateral Navigation/Vertical Navigation (LNAV/VNAV), Lateral Navigation (LNAV), as well as Localizer Performance (LP), etc.).

Survey data is essential in ensuring information about the existing obstructions surrounding an airport is fully reflected in the published approach. Historical data suggests the number of surveys will be larger than the number of approach procedures published because 20-30% of surveyed airport approaches will not meet the required separation from obstructions to qualify for supporting an LPV. It is likely this percentage will be higher in future years because the airports most likely to support a LPV approach are selected first, and the remaining airports are likely to have more issues. Airport runway ends that do not qualify for an LPV procedure due to obstacles or terrain may qualify for an LP (Localizer Performance) approach procedure, which provides horizontal guidance to the pilot. LP approaches will utilize WAAS, and they will benefit the user by offering potentially lower minimums than other non-precision approaches.

Developing LPV procedures is a necessary step toward realizing the benefits from WAAS. The FAA Flight Plan goal calls for development of 500 new procedures in FY 2010 and FY 2011. Based on historical data, it is estimated that 650-700 approach surveys will be required each year to support this number of usable procedures. LPV and LP procedures developed in a current fiscal year require surveys conducted the prior year. Hence, surveys completed in FY 2010 will be used to support procedure development in FY 2011.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 1 –** Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018).

Relationship to Performance Target

In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an 8 fold reduction in approach accident rates (53 per million for non-precision approaches versus 7 per million for precision approaches) when precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year period and save over 250 lives if we develop procedures that use WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. WAAS provides vertical and horizontal guidance which improves safety by enabling pilots to make stable, vertically guided approaches to all qualifying runway ends in the continental United States and most of Alaska that have a published approach procedure. Presently precision vertically guided approaches using ILS are only available at 870 of the nations 19,000 public and private use airports.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure aircraft safety and separation.

Program Plans FY 2010 – Performance Output Goals

- Complete sufficient quantity of airport obstruction surveys to develop 500 LPV/LP procedures.
- Additional cost of procuring surveys under the new AC-150/5300 standard to support accelerated procedure development at additional runway ends.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete sufficient quantity of airport obstruction surveys to develop 500 LPV/LP procedures for each of the subsequent years.
- Additional cost of procuring surveys under the new AC-150/5300 standard to support accelerated procedure development at additional runway ends.
- Increase the number of precision approach procedures developed and published at selected airports to further facilitate increased user acceptance of WAAS.

2D04, RUNWAY VISUAL RANGE (RVR)

FY 2010 Request $5.0M

- Runway Visual Range (RVR) – Replacement/Establishment – N08.02-00

Program Description

The Runway Visual Range (RVR) provides pilots and air traffic controllers with a measured value for the horizontal visibility at key points along a runway. That data is used to decide whether it is safe to take off or land during limited visibility conditions. The new-generation RVR and PC-based RVR are also safer because the equipment is mounted on frangible, low-impact-resistant structures that break away if hit by aircraft during takeoff or landing. Replacement decisions are prioritized based on the level of activity at the airport, where they are located, equipment age and life-cycle issues, such as: Reliability, Availability and Maintainability. This project also provides the equipment for new sites, including new runways and existing runways that have recently qualified for either a new Instrument Landing System (ILS) installation or a higher category ILS than the one currently installed.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The RVR decreases diversions and delays at an airport by providing an accurate measure of the runway visibility. During reduced visibility weather conditions, RVR system products are used by Air Traffic to establish airport operating categories; thus, properly equipped aircraft with a trained crew may continue operations under reduced visibility Category I and Category II/III conditions. The RVR information affects airline scheduling decisions and air traffic management decisions regarding whether flight plans should be approved for an aircraft to fly to or take off from an airport with low visibility.

Older RVR systems are maintenance intensive, resulting in excessive downtime, which negatively affects airport traffic flow capacity and reduces adjusted operational availability. The replacement or upgraded equipment requires less maintenance and repair time, which reduces system downtime, consequently improves traffic flow capacity, and improves adjusted operational availability.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.5** – Minimize impacts of weather on the operation.

Program Plans FY 2010 – Performance Output Goals
- Procure seven (7) RVR systems.
- Complete on-going RVR installation projects.
- Start the implementation of nine (9) new RVR installation projects.

Program Plans FY 2011-2014 – Performance Output Goals
- Procure 21 RVR systems.
- Complete 31 RVR projects.
- Start the implementation of 29 RVR projects.

2D05, APPROACH LIGHTING SYSTEM IMPROVEMENT PROGRAM (ALSIP)
FY 2010 Request $8.7M

- Visual Navaids – ALSIP Continuation, N04.03-00

Program Description
The Approach Lighting System Improvement Program (ALSIP) improves approach lighting systems, built before 1975. It upgrades the equipment to current standards and reduces the severity of take-off and landing accidents by replacing rigid structures with lightweight and low-impact resistant structures that collapse or break apart upon impact. The High Intensity Approach Lighting System with Sequenced Flashing Lights Model 2 (ALSF-2) provides visual information on runway alignment, height perception, roll guidance, and horizontal reference for Category II and III Precision Approaches. The Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) provides visual information on runway alignment, height perception, roll guidance, and horizontal references for Category I Precision Approaches.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target
- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target
The ALSIP replaces rigid approach lighting structures with lightweight and low-impact resistant structures that collapse or break apart upon impact. This reduces damage to aircraft that may strike these structures during departure or landing, which directly affects the goal of reducing aircraft fatal accidents.

Strategic Management Process (SMP) Pathway and Objective
- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3 –** Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- Complete the implementation one (1) ALSF-2 project.
- Start the implementation of three (3) new MALSR replacement projects.
- Procure approximately 20 MALSR Systems.

Program Plans FY 2011-2014 – Performance Output Goals
- Start the implementation of three (3) MALSR systems.
- Commission or Return to Service one (1) ALSF-2 Systems.
- Commission or Return to Service six (6) MALSR Systems.

2D06, DISTANCE MEASURING EQUIPMENT (DME)
FY 2010 Request $6.0M

- Sustain Distance Measuring Equipment (DME), N09.00-00

Program Description

DMEs are radionavigation aids that are used by pilots to determine the aircraft's distance from the DME. The DME program replaces obsolete, first generation DME technology with modern technology electronics that will improve operations and facility performance. Replacement equipment reduces maintenance expense and repair downtime required for DME systems. Low Power DMEs (LPDME) are replacing ILS marker beacons at existing and newly established Category I ILS locations.

To support the Commercial Aviation Safety Team (CAST) recommendations, the DME program is procuring and installing DME systems at recommended sites. These systems will support the reduction of controlled-flight-into-terrain (CFIT) accidents at the most vulnerable locations in the NAS. There are 451 identified CAST DME sites. However, the FAA recommends installing DME at 177 locations. This number would cover 80 percent of all operations. For safety reasons, the industry wants to discontinue using step-down or "dive-and-drive" non-precision approach procedures, in which the pilot descends to the minimum allowable altitude to try to see the runway. Using DME minimizes the need for these types of approaches.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 1 –** Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The new DME can provide distance information to more than 200 aircraft simultaneously, compared to less than 50 aircraft for the existing older systems, thus increasing the number of aircraft that can simultaneously use the DME. Availability of the new DME is greater than 99.95%.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

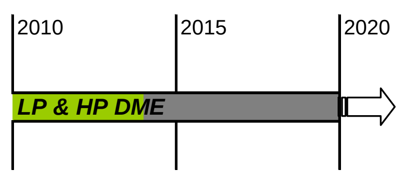
Program Plans FY 2010 – Performance Output Goals
- Procure approximately (12) LPDME Systems.
- Service Available (Establish) for approximately eight (8) LPDME locations.
- Service Available (Sustain) for approximately (4) LPDME locations.

Program Plans FY 2011-2014 – Performance Output Goals
- Procure approximately (45) High and Low Power DME Systems.
- Service Available (Establish) for approximately (23) DME locations.
- Service Available (Sustain) for approximately (23) DME locations.

System Implementation Schedules:

Low and High Power Distance Measuring Equipment (DME)
First site IOC: June 2009 -- Last site IOC: September 2013

First Site Decom: December 2029 -- Last Site Decom: January 2033



2D07, VISUAL NAVAIDS – ESTABLISH/EXPAND
FY 2010 Request $3.7M

- Visual Navaids – Visual Navaids for New Qualifiers, N04.01-00

Program Description

This program supports the procurement, installation, and commissioning of Precision Approach Path Indicator (PAPI) systems and Runway End Identification Light (REIL) systems. A PAPI provides visual approach glide slope information to pilots and enables them to make a stabilized descent with a safe margin of approach clearance over obstructions. The PAPI consists of four (4) lamp housing assemblies arranged perpendicular to the edge of the runway. The PAPI projects a pattern of red and white lights along the desired glide slope so a pilot can tell whether they are on the glide slope or when they are either above or below it so they can correct their rate of descent. A REIL is a non-precision visual aid that provides rapid and positive identification of the approach end of a runway to the pilot. The REIL system consists of two simultaneously flashing white lights, one on each side of the runway landing threshold.

The implementation of PAPI systems satisfies Commercial Aviation Safety Team (CAST) and Land and Hold Short Operations (LAHSO) requirements.
- The FAA plans to implement the 170 highest priority CAST PAPI installations. This number would cover 80% of commercial airline operations.
- LAHSO is an air traffic control tool used to increase airport capacity by allowing simultaneous approaches on intersecting runways. PAPI systems are required at airports to be approved for LAHSO.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increase safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1** – Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

Installing PAPI lights at both CAST and non-CAST locations will enhance system safety by reducing the probability of landing short of the runway or landing too far down the runway to stop before reaching the end of the runway. Installing the REIL system will reduce accidents because the system clearly identifies to the pilot the correct end of the runway for landing.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3** – Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- Procure nine (9) PAPI systems.
- Complete on-going CAST PAPI projects.
- Start the implementation of nine (9) CAST PAPI projects.

Program Plans FY 2011-2014 – Performance Output Goals
- Procure 35 PAPI systems.
- Complete the implementation of 44 PAPI projects.
- Start the implementation of 35 PAPI projects.

2D08, INSTRUMENT FLIGHT PROCEDURES AUTOMATION (IFPA)
FY 2010 Request $7.9M

- Instrument Flight Procedures Automation (IFPA), A14.02-01
- X, Instrument Flight Procedures Automation (IFPA) – Tech Refresh, A14.02-02

Program Description

FAA's Aviation System Standards (AVN) directorate maintains more than 18,000 instrument flight procedures in use at over 4,000 paved airport runways, accommodating requirements for both precision and non-precision approaches and departures. Maximizing implementation and use of Instrument Landing Systems (ILS), Microwave Landing System, Global Positioning System Area Navigation (GPS/RNAV), Wide Area Augmentation System (WAAS), and RNP/RNAV will increase the capacity of the NAS and requires development of new and revised instrument flight procedures.

The existing Instrumental Approach Procedures Automation (IAPA) system, which provides the basis for instrument flight procedure development and maintenance, has been heavily modified since being developed in the early 1970s and does not meet all of today's functional or integration requirements. The current IAPA system is barely able to support the existing inventory of 18,000 instrument flight procedures. A modern integrated system is needed to accommodate the expected growth of the NAS. Aviation System Standards has identified technological opportunities to replace IAPA and consequently increase functional capabilities, which raises the organization's ability to meet current and expected future demand for instrument flight procedures within the NAS. Instrument Flight Procedures Automation (IFPA) will be more efficient and encompassing to support instrument flight procedures development. It will include functionality for developing approaches, missed approaches, circling, Standard Terminal Arrival Routes (STAR), airways, and departures. In addition, IFPA will contain an integrated obstacle evaluation application, replacing a mostly manual process. Along with development of the new IFPA tools, integration across three Aviation System Standards organizations will be accomplished—the National Flight Procedures Office, Flight Inspections Operations Office, and the National Aeronautical Charting Office—eliminating manual effort and duplication of data. New commercial off-the shelf (COTS) standard desktop workstations and COTS server upgrades are also included in the CIP funding.

IFPA is a suite of Information Technology tools, consisting of the Instrument Procedure Development System (IPDS), Instrument Flight Procedures database (IFP), Airports and Navigations Aids database (AirNav), and AVN Process Tracking System (APTS). The IPDS tool is being developed in modules, with the first module providing space-based navigation (RNAV and RNP) procedure design capability. With IPDS module two, ground-based NAVAID procedure design capability will be provided and the legacy IAPA tool will then be replaced and decommissioned. IPDS Module deployments begin in early FY 2010 and continue through FY 2012, with IAPA replacement scheduled for mid-FY 2011.

As a requirement for the IPDS software tool, high-end COTS workstations were deployed in early FY 2008 to all procedure developers. According to guidance, every four years these workstations are eligible for Tech Refresh, and AVN will be requesting necessary funding for the Tech Refresh to occur in FY 2012.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing,

Relationship to Performance Target

The IFPA system ensures continued progress toward increasing instrument flight procedures development and maintenance productivity by 32%, and improving quality of products through process re-engineering and elimination of manual processes. Upgrading automation systems allows for efficiency and cost savings in development of instrument procedures for approaching and departing an airport.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway 2 –** Enhance Financial Discipline.
- **SMP Objective 2.4 –** Reduce Unit Cost of Operations.

Program Plans FY 2010 – Performance Output Goals

- Reduce Instrument Flight Procedure (IFP) production cycle time by 25 days when compared to FY 2008 baseline – Cycle time reduced from 174 to 149 days.
- Reduce new IFP development time by 28 hours when compared to FY 2008 baseline – Task time reduced from 132 to 104 hours.
- Reduce IFP amendment time by 19 hours when compared to FY 2008 baseline – Task time reduced from 46 to 27 hours.
- Reduce obstacle evaluation time by 1/8 hour when compared to FY 2008 baseline – Task time reduced from 30 to 22.5 minutes.

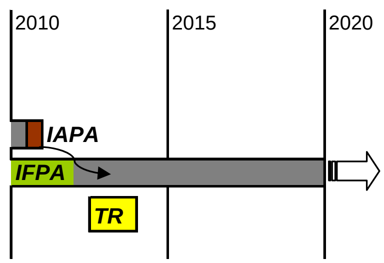
Program Plans FY 2011-2014 – Performance Output Goals

- Achieve final IFP production cycle time of 149 days.
- Achieve final task efficiencies across all measured tasks.
- Begin IFPA-IPDS workstation tech refresh in 2012, first site installation by September 2012 (150 machines), last site installation by September 2013 (150 machines).
- Begin IFPA server's tech refresh in 2013, first site installation by September 2013 (MMAC), last site installation by September 2014 (WJHTC).

System Implementation Schedules

Instrument Flight Procedures Automation (IFPA)
Last site Decom: November 2011
First site IOC: June 2007 -- Last site IOC: September 2011

Instrument Flight Procedures Automation (IFPA) - Tech Refresh
First site: September 2013 -- Last site: September 2014



2D09, NAVIGATION AND LANDING AIDS – SERVICE LIFE EXTENSION PROGRAM (SLEP)
FY 2010 Request $6.0M

- Navaids – Sustain, Replace, Relocate, N04.04-00

Program Description

This program supports NAVAIDS sustain and replace efforts at sites where primary precision approach capability gaps are imminent due to emerging life-cycle issues (i.e., Reliability Availability and Maintainability {RAM}). NAVAIDS include:

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) at Category I approaches.
- High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) at Category II/III approaches.

- Runway End Identifier Lights (REIL).

This program also supports Instrument Landing Systems (ILS) sustain and replace efforts at non-OEP sites where primary precision approach capability gaps are imminent due to emerging life-cycle issues (i.e., Reliability Availability and Maintainability {RAM}). ILS components include electronic devices (i.e., localizers, glide slopes, distance measuring equipment, etc). ILS's (Mark 1F) removed from OEP airports are reinstalled at low level airports to replace existing Mark 1D and Mark 1E IL's.

This program also supports various other efforts that are related to the replacement of navigation equipment, such as: replace guide wires for light station, replace cable between light stations, replace aluminum light towers, replace DME antenna pedestal, convert antenna arrays, recabling localizer antenna, equipment relocate, replace glideslope wooden tower, replace localizer antenna platform, and repair pier with navigation equipment; undertake new technology initiatives, and provide engineering and technical services support.

This program also supports the service life extension of Godrey and Airflow ALSF-2 (CAT II/III systems) by replacing the constant current regulations and installing a monitoring system and the replacement of electrical cables at some locations.

This program supports product improvements, modifications and technological upgrades to visual NAVAIDS. Ongoing efforts include:

- Improve approach lighting system semi-flush fixture

Replace existing MALSR green threshold and white steadying burning lights with LED lights.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The older electronic guidance systems and NAVAIDS are maintenance intensive, resulting in excessive downtime, which negatively impacts airport traffic flow capacity. The replacement or upgraded equipment will require less maintenance and repair time, which reduces system downtime and consequently improves traffic flow capacity.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Fund installation/engineering of twenty (20) REILS.
- Fund installation/engineering of one (1) Lead In Lights (LDIN's).
- Extend the service life of five (5) ALSF-2 at OEP airports by replacing the constant current regulators and installing a monitor for category II/III approaches.
- Install two (2) MALSRs.
- Relocate four (4) navigation systems.
- Replace one (1) glidesclope tower.
- Replace two (2) light station wires.
- Replace four (4) localizer antenna platforms.
- Relocate four (4) Navigation systems.
- Leap-frog four (4) ILS.

Program Plans FY 2011-2014 – Performance Output Goals

- Install eight (8) MALSRs.
- Extend the service life of 14 ALSF-2 at OEP airports by replacing the constant current regulators and installing a monitor for category II/III approaches.
- Procure and/or install 144 REILS.
- Fund installation/engineering of one (1) LDIN's.
- Leap-frog seven (7) ILSs.
- Re-cable NAVAID.

2D10, VASI REPLACEMENT – REPLACE WITH PRECISION APPROACH PATH INDICATOR

FY 2010 Request $4.0M

- Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI), N04.02-00

Program Description

The International Civil Aviation Organization (ICAO) has recommended that all International airports replace the Visual Approach Slope Indicator (VASI) lights with Precision Approach Path Indicators (PAPI) lights. This standardizes the equipment used to allow pilots to determine visually that they are on the proper glideslope for landing. The program supports the procurement, installation, and commissioning of PAPI systems in order to comply with this ICAO recommendation.

At the inception of this program, there were approximately 1,387 older (pre-1970's) VASIs at international and other validated locations requiring replacement. The first phase of the program addresses replacement of VASI systems at approximately 329 ICAO runway ends. The remaining VASI systems in the NAS will be replaced during the second phase of the program.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 2 –** Increase reliability and on-time performance of scheduled carriers.
- **FAA Performance Target 1 –** Achieve a NAS on-time arrival rate of 88.0 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

Relationship to Performance Target

Replacing VASI with PAPI improves on-time performance by improving availability of the visual approach slope guidance systems used to help pilots touch down at the appropriate location on the runway. When these older VASI approach slope indicators fail, air traffic controllers cannot use certain procedures such as Land and Hold Short to increase airport capacity and prevent aircraft delays.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Procure 10 PAPIs for replacement projects.
- Complete on-going replace VASI with PAPI projects.
- Start the implementation of 11 new replace VASI with PAPI projects.

Program Plans FY 2011-2014 – Performance Output Goals
- Procure 83 PAPI systems.
- Complete the implementation of 74 PAPI projects.
- Start the implementation of 83 PAPI projects.

2D11, GPS CIVIL REQUIREMENTS
FY 2010 Request $43.4M

- GPS Civil Requirements, N12.03-01

Program Description

The Global Positioning System (GPS) is a satellite-based system that provides Position, Navigation, and Timing (PNT) service to multiple civil and government users with no direct user charges. GPS provides two PNT services; the Precise Positioning Service (PPS), using the dual L1-C/A signal (L band signal - Coarse Acquisition) and L2 signals P(Y)-code (precise encrypted), and the Standard Positioning Service (SPS), using the single L1-C/A signal. Only SPS is available for worldwide use by the civil community. Currently, GPS consists of second-generation satellites (GPS-II) and the Operational Control Segment (OCS). As the satellites reach the end of their useful life, the GPS program will transition from GPS-II to the third generation (GPS-III) and the modernized Operational Control Segment (OCX). Modernization adds three new civil signals (L1C, L2C, and L5), and signal monitoring for all civil signals. The L1-C/A, L2C, and L5 signals are considered part of the baseline civil GPS capability funded by the DoD. Modernization starts with the remaining GPS-II satellites (Block IIRM and IIF) awaiting launch and continues on the new GPS-III (Block A, B, and C) satellites and OCX.

The National Space-based PNT policy (NSPD-39) requires civil agencies to fund new and unique civil GPS capabilities, specifically, the L1C signal and civil signal monitoring with DOT serving as the lead civil department. DOT directed FAA to include the funding to implement L1C and civil signal monitoring starting in the FY 2009 budget request and FAA will serve as the implementing agency for the civil funded capabilities.

Implementation of the L1C signal requires system design and development activities that will be performed by the GPS-III and OCX prime contractors, managed by the U.S. Air Force GPS Wing. The GPS Signal Monitoring system will consist of a worldwide network of 18-21 GPS monitor stations connected to two processing facilities. The monitor stations must be installed at geographically dispersed locations worldwide such that every GPS satellite can be continuously monitored from at least two stations. The monitor stations will collect real-time measurements of the GPS signals (L1C, L1-C/A, L2C, and L5) and forward this information to the processing facilities where a suite of software algorithms will monitor the accuracy, integrity, continuity, and availability performance to verify that modernized GPS system is performing properly.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2** – **Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion**.**
- **FAA Performance Target 1** – Achieve an average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

The GPS signal monitors support the implementation of NextGen capabilities by ensuring that aircraft navigation systems have continuous information on the accuracy and integrity of GPS satellites. Using GPS is a central element of using ADS-B for surveillance.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.5 –** Optimize NextGen/OEP Portfolio.

Program Plans FY 2010 – Performance Output Goals
(To be negotiated with DoD prior to executing an Interagency Agreement with the USAF GPS Wing.)

- Complete L1C detailed design.
- Complete Monitor Station civil element design.
- Complete requirements for availability, accuracy, Navigation Advisories to NAVSTAR Users (NANU), and navigation message algorithms.
- Complete design and prototype GIII receiver.

Program Plans FY 2011-2014 – Performance Output Goals
(To be negotiated with DoD prior to executing an Interagency Agreement with the USAF GPS Wing.)

- Develop reference station hardware and software (2011).
- Complete FAA development of the GIII receiver.
- Install 50% of reference sites (2012).
- Complete and validate algorithm requirements.
- Establish joint operational capability.
- Establish agreement with DoD to design terrestrial network and control segment updates (2012).
- Implement terrestrial network (2012).
- Install remainder of reference sites (2013).
- Establish external distribution of monitor data and results (2013).
- Initiate performance assessment capability (2012).
- Extend capability to monitor Integrity Monitoring (2014).
- Define Operations and Maintenance responsibilities and define procedures (2012 – 2014).
- Complete L1C development (2012).
- Begin procurement of L1C (2013).
- First launch of L1C payload (2014).

E. OTHER ATC FACILITIES PROGRAMS

2E01, FUEL STORAGE TANK REPLACEMENT AND MONITORING
FY 2010 Request $6.2M

- Fuel Storage Tanks, F13.01-00

Program Description

The FAA Fuel Storage Tank (FST) program designs, fields, and sustains fuel storage systems that support critical FAA operations across the NAS. The FST systems include the storage tank (both above ground and underground tanks containing a variety of liquids: gasoline, diesel, propane, oils, glycol, etc.); the flow control devices (pipe, hoses, pumps, valves, etc.); electronic leak detection and inventory control devices; and electronic/electrical system operation devices (control boards, technician operations stations, switched relays, etc.). The FST program active inventory includes over 3,000 FST systems and historical data is retained on over 1,400 previously closed/removed systems.

The majority of FAA storage tanks are used for emergency electrical generator operations. The emergency generators provide NAS facilities with an alternative power supply during periods of commercial power company outages. A loss of integrity on any FST component will affect the operational capacity of the emergency generator systems and may ultimately result in a total facility failure.

Storage tanks have historically contained materials that could cause an adverse environmental impact or result in personal injury if accidentally released. In response to the risk of accidental release, the federal government, the various State legislatures, local county governments and city jurisdictions have all passed statutes specifying the minimum requirements for the construction, installation, removal, and operations of storage tank systems. Additional regulations affecting storage tank system operations have been established under the jurisdiction of state and local building codes, fire protection codes, airport operating authority requirements, and occupational safety and health acts.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 4 – Environmental Stewardship.**
- **DOT Outcome 1 –** Reduction in pollution and other adverse effects from transportation and transportation facilities.
- **DOT Strategy –** Adopt transportation policies and promote technologies that reduce or eliminate environmental degradation.

Relationship to Performance Target

The FST Replacement and Monitoring project supports the Environmental Stewardship goal by developing, promoting, and executing FST environmental compliance strategies and designing/fielding system components and methods of system operation that reduce the risk of leaking FST systems, enhance operational readiness, and minimize adverse impacts to personal and environmental safety.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1** – Achieve Operational Excellence.
- **SMP Objective #1.6** – Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Continue ARTCC FST Upgrade initiative.
- Remedy integrity failures as identified.
- Respond to regulatory enforcement actions.
- Continue systems replacement in accordance with life-cycle management goals.

Program Plans FY 2011-2014 – Performance Output Goals

- Continue ARTCC FST Upgrade initiative.
- Remedy integrity failures as identified.
- Respond to regulatory enforcement actions.
- Continue systems replacement in accordance with life-cycle management goals.

2E02 Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)

FY 2010 Request $18.2M

- FAA Buildings and Equipment Sustain Support – Unstaffed Infrastructure Sustainment, F12.00-00

Program Description

The Unstaffed Infrastructure Sustainment (UIS) Program proactively sustains infrastructure supporting the NAS to enable the delivery of NAS systems required availability. Proactive NAS sustainment includes major repairs to and replacement of real property and structures which are normally not staffed. Sustainment of the unstaffed infrastructure includes:

- Major repair and replacement of FAA property including: access roads, grounds, fencing, storm water controls, parking lots, security lighting, and walkways,
- Replacement or modernization of FAA facilities and infrastructure including : buildings, shelters, roofs, sheds, fuel tanks (heating only), plumbing, heating, ventilating and air conditioning (HVAC) equipment, alarms and lighting, and
- Replacement or renovation of NAS antenna and equipment towers.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The FAA Unstaffed Infrastructure Sustainment Program supports the FAA's greater capacity goal by providing renovation or replacement of existing FAA-owned unstaffed facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance, navigation, communication, and weather equipment. In addition the infrastructure protects the electronic equipment from weather hazards, radio interference, and unauthorized entry. Failure of the infrastructure will result in NAS equipment failures directly reducing capacity of the NAS.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Prioritize sustainment to the infrastructure using a passenger focused impact model.
- Establish national contracts for HVAC and Tower major repair and replacement.
- Develop Service Level Agreements with Navaids, Comm. and other offices for sustainment.
- Establish data and models to support life cycle costing methodology of proactive sustainment.

Program Plans FY 2011-2014 – Performance Output Goals

- Deliver maximum value by completing prioritized high impact projects.
- Expand the use of top down prioritized project commitments
- Establish at least two further national contracts for proactive sustainment.
- Implement life cycle planning and sustainment driven by data and priority.
- Seek synergistic alliances with all NAS stakeholders.

2E03, AIRCRAFT RELATED EQUIPMENT PROGRAM
FY 2010 Request $10.0M

- A, Aircraft Related Equipment Program, M12.00-00
- B, Aircraft and Related Equipment Program – Boeing Simulator Replacement, M12.01-01
- X, Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technical Refresh, M12.01-03

A, AIRCRAFT RELATED EQUIPMENT PROGRAM, M12.00-00

Program Description

The FAA operates a fleet of specially equipped flight inspection (FI) aircraft to check navigation and landing aids and certify flight procedures before publishing them for public use. FI aircraft conduct airborne evaluations of electronic signals used to guide aircraft departures, determine en-route position, and ensure safe arrival flight procedures. In order to certify that these procedures and the navigational aids (NAVAIDS) are safe to use, FI aircraft must be equipped with an independent onboard truth system to precisely determine the aircraft's actual location in order to verify the accuracy of the NAVAID or procedure.

The FI fleet and its on-board technology continue to age and become more costly and labor intensive to maintain. Existing navigation and avionics systems are rapidly becoming obsolete. These systems must be upgraded and sustained to provide adequately equipped FI aircraft that are capable of satellite-based navigation and sustaining the safety of both the existing ground-based and the emerging satellite-based NAVAIDS in the NAS.

ARE includes several individual projects that have been combined into an Evolution Plan, which is a systematic program for upgrades to the FI aircraft and related systems, the operational and technical support infrastructure, and the mission specific equipment.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

The FAA improves air safety by ensuring that flight inspection aircraft and systems are equipped and modified to validate and certify the accuracy of navigational aid electronic signals, as well as validate and certify the safety of approach/departure flight procedures and terminal routes at all airports within the NAS and at military facilities world wide.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Continue Beech 300 FI aircraft enhancement with the installation of Pro Line 21 navigation flight management systems.
- Begin Installation of Next Generation Flight Inspection System (NAFIS) on the Challenger 605 aircraft.
- Install and test Data Link system on the FI Aircraft.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete Beech 300 enhancement and installation of Pro Line 21 navigation flight management systems.
- Start installation and testing of NAFIS in FI aircraft.
- Begin Challenger 601 enhancement (avionics and interior).
- Begin Next Generation Air Traffic System Surveillance and Broadcast Services equipage.
- Begin Challenger 604/605 Enhanced Vision System installation and integration.

B, AIRCRAFT RELATED EQUIPMENT PROGRAM – BOEING SIMULATOR REPLACEMENT, M12.01-01

Program Description

In previous years, the Boeing Simulator Replacement Program procured a new, advanced Boeing 737 (B737-800) Next Generation (NG) 6-axis full flight aircraft simulator. .The simulator enables the FAA to perform critical evaluations and analysis of multiple Research, Engineering, and Development (RE&D) projects. The simulator can be used for realistic, high fidelity operational evaluations of current and advanced aviation technologies, equipment, and procedures using flight simulation rather than costly (both in dollars and risk) actual flight hours. Moreover, simulation offers the opportunities to expand the research regime beyond the normal flight envelope, thus exploring certain hazardous events (e.g., wake encounters and upset recovery) that are too risky to perform in an actual aircraft. Data gathered from flight simulation activities are used to support safety investigations as well as to develop regulations and flight procedures. Some of the simulator's components require technology refresh to ensure the simulator performance and simulation tests represent the level of technology needed for NextGen operational research.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 –Increased Safety.**
- **FAA Objective 1** – Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by FY 2025.

Relationship to Performance Target

The B737-800 NG simulator improves air safety by providing the FAA with the capability to conduct NextGen operational evaluation programs on new technologies and advanced systems integration within the NAS. On-going and future RE&D projects will provide regulators with guidance and analysis data to ensure safe implementation of new technologies while increasing capacity within the NAS and international arena. Regulatory guidance plus findings from accident investigation simulations, will also contribute to the reduction of the fatal accident rate for air carriers. The simulator realism and high fidelity capability will provide an enhanced analysis of aircraft and Human-in-the-Loop data across all areas of safety.

Program Plans FY 2010 – Performance Output Goals

- Update the B737-800 NG simulator autopilot to digital Collins system currently used in the industry.
- Install technology on the Electronic Flight Bag (EFB) for runway incursion research.
- Install advanced wake turbulence model in the simulator control system to closely replicate realistic wake encounter scenarios in a terminal environment.
- Install Cockpit Display of Traffic Information (CDTI) and Automatic Dependent Surveillance-Broadcast (ADS-B) symbology on the Pilot Flight Director (PFD), Navigation Display (ND), EFB, and Instructor Operating Station (IOS).
- Develop software modeling to simulate self-separation technology.
- Enhance stall/upset models to be used for high and low altitude stall recovery research.

Program Plans FY 2011-2014 – Performance Output Goals

- Replace the Heads-Up-Display (HUD) with advanced digital HUD for both seats.
- Replace the hydraulic motion system with an electric motion system.
- Install cockpit technology to include data link technology that shows weather on the cockpit displays.
- Install advanced ADS-B out and in technologies.
- Install Synthetic Vision System (SVS) technology integrated with Enhanced Flight Vision System (EFVS) to display a fully integrated Enhanced Vision System (EVS).

X, AIRBUS SIMULATOR PURCHASE – ADVANCED FLY-BY-WIRE SIMULATOR – TECHNICAL REFRESH, M12.01-03

Program Description

The FAA Flight Technologies and Procedures Division (AFS-400) acquired an Airbus 330/340 (A330/340) convertible 6-axis full flight aircraft simulator that will replicate the performance and handling characteristics of a wide-body, two jet engines (A330) or four jet engines (A340) commercial transport aircraft with fly-by-wire (FBW) flight control technologies. AFS-400 is responsible for the development, analysis, and introduction into the NAS of new concepts and technologies for aircraft navigation and instrument flight operations. AFS-400 establishes and governs policies, criteria, and standards by which terminal and en route flight procedures are established and maintained. The Division also is responsible for approving special instrument approach procedures and requests for waivers of standards. Technical Refresh funding for this simulator is being requested in FY 2012.

The new A330/340 simulator with side-stick control will complement the narrow-body Boeing 737-800 Next Generation (NG) simulator during vital RE&D projects and realistic high fidelity operational evaluation activities. Such activities include Closely Spaced Parallel Operations (CSPO), Required Navigational Performance (RNP), and Human-in-the-Loop (HITL) pilot/controller/aircraft terminal operations performance during introduction of new NextGen initiatives such as Automatic Dependent Surveillance-Broadcast (ADS-B) and weather in the cockpit. This simulator supports NAS NextGen modernization and development initiatives as well as future FAA and National Transportation Safety Board (NTSB) safety initiatives.

The FAA's access to industry simulator facilities with the necessary research configurations and data collection will not be sufficient to meet the anticipated regulatory guidance initiatives from the introduction of new technology supporting NextGen. In FY 2012, AFS-400 will begin a technical refresh of the A330/340 simulator that will take two to three years to complete and will include the purchase and installation of peripheral/software updates, computer system upgrades, visual system's image generators, imaging software, and projectors. Aircraft Avionics (hardware and software) and cockpit display systems will be brought to the current revision levels. In addition, A350 and A380 simulator aerodynamic models will be installed to further explore operational impacts on the NAS from these aircraft types.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1** – Reduce commercial air carrier fatalities.
- **FAA Performance Target 1** – Cut the rate of fatalities per 100 million persons on board in half by FY 2025.

Relationship to Performance Target

The A330/340 simulator improves air safety by providing the FAA with the capability to conduct NextGen operational evaluation programs on the impact of introducing new technologies and advanced systems integration within the NAS. On-going and future RE&D projects will provide regulators with guidance and analysis data to ensure safe implementation of new technologies while increasing capacity within the NAS and international arena. Regulatory guidance, plus findings from accident investigation simulations, will also contribute to the reduction of the fatal accident rate for air carriers. The simulator realism and high fidelity capability will provide an enhanced analysis of aircraft and Human-in-the-Loop data across all areas of safety.

Program Plans FY 2010 – Performance Output Goals
- None.

Program Plans FY 2012-2014 – Performance Output Goals
- Replace the Heads-Up-Display (HUD) with advanced digital HUD for both seats.
- Install weather in the cockpit technology to include data link technology on the cockpit displays.
- Install advanced ADS-B out and in technologies.
- Install Synthetic Vision System (SVS) technology integrated with Enhanced Flight Vision System (EFVS) to display a fully integrated Enhanced Vision System (EVS).
- Install A350 and A380 simulator aerodynamic models.

2E04, AIRPORT CABLE LOOP SYSTEMS – SUSTAINED SUPPORT
FY 2010 Request $6.0M

- Airport Cable Loop Systems – Sustained Support, F10.00-00

Program Description

This program will replace existing on-airport, copper-based, signal/control cable lines that have deteriorated. The primary focus will be on projects at airports with high traffic counts and enplanements. The obsolete underground telecommunications cable infrastructure systems are vulnerable to failure and could cause flight delays related to outages. These lines feed airport surveillance radar, air/ground communications, and landing systems data and information to the tower, and operational and maintenance information to FAA-staffed facilities. Where cost-effective, the program will install fiber-optic cable in a ring formation to provide redundancy and communications diversity. The ring configuration allows information to flow from either side if there is a break in the cable. The airport cable loop program takes advantage of opportunities to save cost by coordinating projects with major construction projects (e.g. tower relocations, and runway projects).

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

The Airport Cable Loop Systems Sustained Support Program will reduce potential failures, delays, and outages by replacing obsolete underground cable infrastructure systems. The program improves signaling and communications primarily at large airports with high traffic counts and enplanements.

Strategic Management Plan (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals
- Complete system cutover at La Guardia, Seattle, and Charlotte Douglas International Airports.
- Complete equipment installation at Boston-Logan (Phase II) and Denver International Airport.
- Complete development of engineering packages for Ronald Reagan Washington National Airport and Houston (I-90) TRACON.
- Begin Planning and Design Phase for Ontario, Oakland, Newark, Austin, Dallas-Ft. Worth, Cleveland, Honolulu, and Ft Lauderdale, Los Angeles, and Cleveland International Airports.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete installations at Houston, Ronald Reagan Washington National, Newark, Austin, Dallas-Ft. Worth, Denver, and Portland International Airport.
- Complete development of engineering packages Baltimore/Washington International Airport.
- Begin fiber-optic system upgrade planning at San Francisco International Airport.
- Begin Planning and Design Phase for Anchorage, Andrews Air Force Base, San Diego, Philadelphia, Honolulu, and Pittsburgh International Airport.

2E05, ALASKAN NAS INTERFACILITY COMMUNICATIONS SYSTEM (ANICS)

FY 2010 Request $9.0M

- Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network - ANICS Modernization - Alaskan Satellite Telecommunication Infrastructure (ASTI), C17.02-01

Program Description

The ANICS Phase 1 project (renamed ASTI) was implemented to achieve system-wide NAS interfacility telecommunication throughout Alaska. ASTI provides circuit connectivity for the following NAS services:

- Remote Control Air Ground (RCAG) and Remote Communications Outlets for voice communication with pilots,
- En route & Flight Service Station Radio Voice Communications,
- En route and Terminal Radar Surveillance Data; Digitized Radar Data and Digitized Beacon Data,
- AFSS and Flight Service Station (FSS) Flight Service Data Processing System and the Digital Aviation Weather Network,
- Weather Advisories, Briefings, and Products; e.g., Automatic Surface Observation System (ASOS), Automated Weather Observation System (AWOS), AWOS Data Acquisition System (ADAS), Airport Weather Information System, etc.
- Remote Maintenance Monitoring,
- WAAS Reference Station (WRS), and
- Automatic Dependent Surveillance-Broadcast (ADS-B).

ASTI also provides Alaska with 90% of the inter-facility communications for critical, essential, and routine air traffic control services. Over the past several years, system availability has fallen below 0.9999 and continues to decline. Many system components have either reached the end of their useful life or are no longer supportable. Several antennas and their protective covers have been destroyed by high winds, and other antennas are fast eroding due to their coastal location. In recent years, aggressive system technical service efforts have been required to maintain overall system availability and reliability. The communication system has experienced a loss of performance capability, increased maintenance, and higher costs.

The ASTI project will replace and/or upgrade system components to raise system availability to required levels (0.9999), reduce the frequency of system alarms and outages, and reduce the level of FAA maintenance. The ASTI program will replace the following major components:

- Antennas,
- Radomes,
- Satellite modems,
- Multiplexing equipment,
- Radio Frequency equipment, and
- Network Management hardware and software.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety**
- **FAA Objective 2 –** Reduce general aviation fatalities.
- **FAA Performance Target 2 –** By the end of FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from the 2000-2002 average of 130 accidents per year to no more than 99 accidents per year. This measure will be converted from a number to a rate at the beginning of FY 2010.

Relationship to Performance Target

ASTI supports FAA's strategic goal of increased safety and the objective of reducing accidents rates in Alaska by improving communications availability. Availability has fallen below 0.999, and it is declining. Air safety is improved by minimizing outages for critical and essential communications links between pilots and air traffic controllers. These links between FAA facilities and pilots are essential to ensure the flow of accurate and reliable information on air traffic movement, weather, and radar data.

Strategic Management Process (SMP) Pathway and Objective

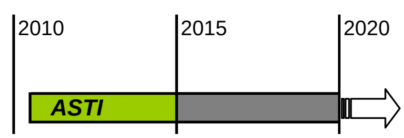
- **SMP Pathway #1** – Achieve Operational Excellence.
- **SMP Objective #1.1** – Ensure Airspace System is safe, efficient, and secure.

Program Plans FY 2010 – Performance Output Goals
- Achieve JRC investment decision.
- Establish acquisition program baseline.
- Upgrade satellite communications equipment at the training and test facility.

Program Plans FY 2011-2014 – Performance Output Goals
- Install network monitoring and control system.
- Upgrade satellite communications equipment at 64 facilities.

System Implementation Schedule
- Estimated contract award date is 1st quarter of FY 2010

Alaskan Satellite Telecommunications Infrastructure (ASTI)
First site ORD: September 2010 -- Last site ORD: September 2014



2E06, FACILITIES DECOMMISSIONING
FY 2010 Request $5.0M

- Decommissioning, F26.01-01

Program Description

In recent years the FAA has decommissioned many redundant or underutilized facilities. In addition, the FAA is making plans to decommission entire classes of facilities such as Non-Directional Beacons and Remote Communications Facilities.

This program funds disposition activities including:
- Termination Environmental Due Diligence Audits (EDDAs);
- Testing for environmental clean-up/hazmat abatement, and disposal;
- Non-hazmat real property site restoration, demolition, and disposal;
- Lease termination liabilities;
- Equipment and infrastructure (personal property) removal, reuse, and disposal;
- Removing telecommunications systems, services, and circuits;

- Frequency spectrum reallocation;
- Modification of the National Airspace System Resources (NASR) database, aeronautical charts, and terminal procedures publications; and
- Addressing cultural and historic preservation and natural resource protection issues.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

Eliminates costs to maintain personal property and real property no longer required by the FAA.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce Unit Cost of Operations.

2E07, ELECTRICAL POWER SYSTEMS – SUSTAIN/SUPPORT
FY 2010 Request $101.0M

- Power Systems Sustained Support, F11.01-01

Program Description

The Electrical Power Systems Sustain Support (Power) program is an infrastructure sustain and renewal program. Other NAS ATC programs fund the initial purchase and installation of components for backup power systems and power regulation and protection equipment. Electrical power systems are necessary to allow continued operation of air traffic control facilities when there is an interruption in commercial power sources. These power systems also protect sensitive electronic equipment from commercial power surges and fluctuations. After replacement equipment/facilities have been commissioned, the Power program replaces, refurbishes and renews components of the existing power system and cable infrastructure when necessary to maintain and improve the overall electrical power quality, reliability, and availability.

Program elements include replacing, refurbishing, or sustaining: the large battery systems used for critical power and power-conditioning systems; uninterruptible power systems; engine generators; airport power cable; and lightning protection and grounding systems. Projects are prioritized using NAS metrics of capacity, demand, and passenger value, and specific expert information.

The Power program is critical to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS electrical power equipment. These actions avoid power disruptions to NAS equipment that result in costly delays. Without reliable NAS power systems, air traffic control electronics cannot deliver their required availability and commercial power disruption results in flights being kept on the ground, placed in airborne holding patterns, or re-routing to other airports. The Power program also prevents expensive damage to critical air traffic control electronic equipment, and avoids the resulting outages of NAS equipment that would produce costly delays.

Modern complex hardware and associated software are experiencing extended service disruptions when exposed to small power fluctuations. These factors result in the need for power systems with better reliability, and availability, particularly for the planned NextGen system.

The Power program will develop more proactive programs to sustain and support NAS power systems, such as:

- Improve management of NAS power systems inventory by better utilization of NAS databases.
- Prioritize program effort by location identifiers, importance of the NAS facility supported and by ranked economic value.
- Highlight "pop up" activities and develop incidence reduction strategies.
- Expand the needs assessment process to provide guidance to other program offices.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

All NAS facilities are dependant on the availability, reliability, and quality of NAS power. Planned electrical power equipment replacement and improvement activities minimize disruption of air traffic, and maximize availability and reliability of NAS systems. Power systems sustain airport capacity by providing power that reduces the incidence of NAS delays caused by equipment outages that would otherwise have occurred during commercial power disturbances.

Strategic Management Process (SMP) Pathway and Objective

SMP Pathway #1 – Achieve Operational Excellence.
SMP Objective #1.6 – Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Sustain existing NAS power systems by completing about 150 projects (Actual may vary based upon validation and priority for year):
  - Replace 65 failed batteries.
  - Replace 5 obsolescent Uninterruptible Power System units.
  - Install 10 cost efficient Direct Current power distribution systems as replacement for power backup.
  - Replace 70 worn out engine generators.
  - Replace 2 deteriorated and "at risk" airport power cables.
  - Refurbish 2 ineffective lightning protection and grounding systems.
  - Sustain the reliability of ARTCC power distribution equipment.
  - Continue ARTCC reliability upgrades to address identified issues.
  - Complete Power Systems Operational Support Center.

Program Plans FY 2011-2014 – Performance Output Goals

- Sustain existing NAS power systems by completing about 150 projects per year (Actual may vary based upon validation and priority for year):
  - Replace between 200 to 260 failed batteries.
  - Replace between 20 to 23 obsolescent Uninterruptible Power System units.
  - Install between 40 to 60 cost efficient Direct Current power distribution bus systems as replacement for power backup.
  - Replace between 200 to 240 worn out engine generators.
  - Replace between 8 to 12 deteriorated and "at risk" power cables.
  - Refurbish between 8 to 16 ineffective lightning protection and grounding systems.
  - Sustain the reliability of ARTCC power distribution equipment.
  - Continue ARTCC reliability upgrades to address identified issues.

2E08, AIRCRAFT FLEET MODERNIZATION

FY 2010 Request $6.0M

- Flight Standards Inspector Aircraft Replacement – Phase 1, M11.02-00
- X, Flight Standards Inspector Aircraft Replacement – Phase 2, M11.02-01

Program Description

The FAA's Office of Aviation Safety (AVS) is responsible for regulating and overseeing the civil aviation industry. AVS requires a fleet of aircraft for currency and proficiency flying by nationally based Aviation Safety Inspectors (ASI) and also for pilots in the Initial and Recurrent Turboprop program. There are 640 ASI's that need proficiency flying once a quarter. These proficiency flights are necessary to ensure that the ASI's can accurately assess operator skill levels while accomplishing their regulatory checks. The ASI also needs sufficient proficiency to recover the aircraft should the pilot being tested get into an unsafe situation.

Proficiency depends on flying modern aircraft that are configured like the current commercial fleet, so that ASIs have current experience in the types of aircraft operations they are checking. Inspectors must practice proper management of aircraft in highly congested airspace including operations in poor weather conditions. To obtain that experience, they must fly an aircraft rather than use a simulator.

This investment will be for six (6) aircraft configured to modernize the current fleet of aircraft. Procurement of four (4) aircraft is anticipated in FY 2009. This will be accomplished using both FY 2008 and FY 2009 funds. It is anticipated that the remaining two (2) aircraft will be purchased in FY 2010. Operational data will be collected and evaluated using the 6 aircraft and a determination made whether to request the purchase of additional aircraft.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

To provide the necessary level of performance and proficiency flying required to meet ASI's needs in regulatory requirements, new aircraft must be purchased to ensure ASIs are fully qualified to check flight operations of commercial operators. Currency of ASIs will sustain the high level of safety for general aviation and air carrier operators reduce fatal accidents.

Program Plans FY 2010 – Performance Output Goals

- Accept delivery of two aircraft for service.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete the collection and evaluation of operational data. Determine if additional aircraft will be needed and, if necessary, return to the JRC to seek approval of aircraft.

ACTIVITY 3. NON-AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. SUPPORT EQUIPMENT

3A01, HAZARDOUS MATERIALS MANAGEMENT
FY 2010 Request $20.0M

- Environmental Cleanup/HAZMAT, F13.02-00

Program Description

The FAA has identified more than 700 contaminated sites at over 200 distinct locations nationwide that require investigation, remediation, and closure activities. Environmental Cleanup site investigations have indicated that toxic contamination resulted from a variety of hazardous substances: cleaning solvents, fuels, pesticides, asbestos, polychlorinated biphenyls (PCBs), and heavy metals. FAA organizations, including the Mike Monroney Aeronautical Center and the William J. Hughes Technical Center, have mandatory remediation and monitoring schedules in place as part of negotiated agreements with regulatory agencies. These agreements require the FAA to remediate contaminated soil and groundwater. Extensive contamination at the FAA Technical Center prompted the Environmental Protection Agency (EPA) to place the site on the EPA National Priorities List, indicating its status as one of the Nation's most environmentally dangerous sites (i.e. Superfund site). In addition, contaminated sites and past noncompliance with requirements of the Hazardous Materials Management (HAZMAT) program account for a large portion of the unfunded environmental liabilities documented in the FAA's Financial Statement.

To clean up these contaminated sites and comply with applicable environmental regulations, the FAA developed the HAZMAT program. The FAA must continue mandated program activities to achieve compliance with all Federal, State and local environmental cleanup regulations, including the Resource Conservation and Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, and the Superfund Amendment and Reauthorization Act (SARA) of 1986. FAA program activities include: conducting site investigations; managing hazardous materials; including hazardous waste accumulation, handling and disposal; installing groundwater monitoring wells; remediating site contamination; and operating air pollution controls. The FAA performs assessment, remediation and closure activities as aggressively and proactively as funding will allow. Future planned efforts include conducting contaminant investigations, implementing site remediation projects and completing required regulatory closures. Additionally, during FY 2008, the FAA attained 94 percent "No Further Remedial Action Planned (NFRAP)" closure documentation for FAA sites listed on EPA's Federal Hazardous Waste Compliance Docket.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 4 – Environmental Stewardship.**
- **DOT Outcome 1** – Reduction in pollution and other adverse environmental effects from transportation and transportation facilities.
- **DOT Strategy** – Adopt transportation policies and promote technologies that reduce or eliminate environmental degradation.

Relationship to Performance Target

The HAZMAT program supports the environmental stewardship goal by conducting required cleanup activities for contaminated sites within existing NAS land and structures. The program achieves this objective through assessment, remediation, and closure activities for contaminated sites. These activities result in a safe and environmentally sound workplace, and protection of the natural resources of surrounding communities. The program works to ensure continuing compliance with the Hazardous Materials Management program. Further, the program ensures that the FAA maintains compliance with the Department of Transportation's Strategic Plan (2006-2011) performance goal of achieving NFRAP status for 94 percent of all FAA sites listed on the EPA's Federal Hazardous Waste Compliance Docket.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce Unit Cost of Operations.

Program Plans FY 2010 – Performance Output Goals

- Maintain 94 percent NFRAP for all sites listed on the EPA's Federal Hazardous Waste Compliance Docket.
- Remove five-percent (5%) of the total sites listed in the 2009 Environmental Site Cleanup Report.
- Complete remediation activities for PCB and fuel contamination at the Bimini, Bahamas Very High Frequency Omnidirectional Radio (VOR) Maintenance Facility (MF) and the Non-Directional Beacon (NDB).
- Provide report to the EPA on the Ronald Reagan Washington National Airport (DCA) South Investigation Site Supplemental Site Investigation. Initiate steps to obtain NFRAP status for the site.
- Continue to conduct investigation and closure activities at the FAA Technical Center near Atlantic City, New Jersey.
- Continue to support the Decommissioning Program (F26.01-01) with technical assistance and funding for remediation of environmental contamination found at these sites.
- Achieve regulatory closure of the Cape Yakataga (CYT) landfill and ensure the landfill is in post-operational monitoring.
- Achieve regulatory closure of the Skwentna, Alaska (SKW) landfill, and ensure the landfill is in post-operational monitoring.
- Attain the Closure-Long Term Monitoring phase for the Chlorinated Groundwater Plume at the Mike Monroney Center (AMC).

Program Plans FY 2011-2014 – Performance Output Goals

- Attain regulatory closure and NFRAP for DCA and begin the process of delisting the site from the Federal Hazardous Waste Compliance Docket
- Attain NFRAP status for the Kirksville, MO Air Route Surveillance Radar site.
- In FY 2011 through FY 2014, attain 94% NFRAP status for all sites listed on the EPA's Federal Hazardous Waste Compliance Docket.

3A02, AVIATION SAFETY ANALYSIS SYSTEM (ASAS) – REGULATION AND CERTIFICATION INFRASTRUCTURE FOR SYSTEM SAFETY (RCISS)

FY 2010 Request $10.5M

- Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 1, A17.01-01
- X, Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 2, A17.01-02

Program Description

RCISS provides the automation hardware, software, and communication infrastructure to support Aviation Safety (AVS) information databases and access to them by the increasingly mobile FAA safety work force. RCISS is the next generation infrastructure, which will build upon the ASAS legacy infrastructure to better support fact based decision-making. Whether through providing enhanced access to data by inspectors and engineers while in the field or through the development of new systems which provide data to the work force and the safety applications, RCISS will continue to provide the workforce with the systems to support the certification and regulation of aircrews, airlines, and other licensed companies in aviation. Having information readily available improves the ability of safety personnel to develop safety regulations and oversee the civil aviation industry. With the consolidation of IT infrastructures within the FAA and AVS it is critical that RCISS address disaster recovery requirements, improve management of the infrastructure and application systems through advancements in IT technologies and provide enterprise wide solutions for economical development of future software applications.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

Inspection and review of airline safety programs and practices are integral to the FAA safety program. The RCISS program provides the infrastructure to support the workforce's need for information on the safety record of an airline and the actions required to meet regulations and directives. This new infrastructure will dramatically enhance the capability of the workforce to complete assignments while conducting work in the field. Having this information allows the safety inspectors to determine if the airline is complying with good safety practices, which is essential to FAA's role in preventing accidents.

Program Plans FY 2010 – Performance Output Goals

- Complete the deployment and support of mobile devices with enhanced telecommunications services to 25% of the AVS safety workforce.
- Continue the transition to centralized data storage and processing environment.
- Continue the development of a disaster recovery facility, co-located within an existing FAA Data Center, to support critical AVS safety data and systems.
- Continue technology refreshment of legacy AVS infrastructure components in support of AVS national safety applications.

Program Plans FY 2011-2014 – Performance Output Goals

- Complete first technology refreshment cycle of mobile devices to the AVS safety workforce; ends FY 2011.
- Begin second technology refreshment cycle of mobile devices to the AVS safety workforce; starts FY 2012.
- Complete the transition to centralized data storage and processing environment; ends FY 2011.
- Begin first technology refreshment of centralized data storage and processing environment; starts FY 2012.
- Complete development of a disaster recovery facility, co-located within an existing FAA Data Center, to support critical and non-critical AVS safety data and systems; ends FY 2011.
- Begin first technology refreshment of disaster recovery facility; starts FY 2012.
- Complete technology refreshment of legacy AVS infrastructure components in support of AVS national safety applications; ends FY 2011.

3A03, LOGISTICS SUPPORT SYSTEMS AND FACILITIES (LSSF)
FY 2010 Request $9.3M

- Logistics Center Support System (LCSS), M21.04-01

Program Description

The FAA Logistics Center (FAALC) manages the central NAS inventory warehouses and distribution facilities for the FAA. It provides routine and emergency logistics products and services to 8,000 FAA customers at 41,000 facilities and 28,000 sites, as well as, to the Department of Defense (Air Force, Navy, and Army), state agencies, and foreign countries. It provides logistics support for 80,000 parts and services. It supplies, tracks, and accounts for Capital and Ops funded parts totaling $1B.

Examples of NAS support that FAALC provides include:

- Annually issues over $300M in assets to ATO-W technical operations specialists, and
- Satisfied over 110,000 NAS requirement transactions

The Logistics Center provides inventory management of stock levels, demand forecasting, contract management, customer assistance, and special project support for NAS installation and repair. They are an ISO 9001:2000 certified distribution, warehousing, and repair facility, and they are certified for the design, implementation, and maintenance of software systems in support of the NAS.

LCSS will replace the Logistics and Inventory System (LIS) and be a fully integrated National logistics (supply support) system that will reduce cost and provide increased visibility of NAS assets. LCSS will provide for improved supply support as the Agency transitions to NextGen.

LCSS will be a web-based system that uses state-of-the-art tools to extend and leverage the existing agency investment in LIS. The new tools will be based on object-driven open architecture and will allow interfaces to be integrated. LCSS will incorporate the use of COTS applications and enhancements to improve asset visibility, provide serial number tracking, warranty information, shop floor control and spares modeling. These functions will provide a more complete picture of the financial position of logistics within the agency.

LIS is a 20-year-old customized mainframe system with an obsolete system design that is technically difficult and expensive to maintain. It is unable to incorporate technology and business changes to meet the accelerating growth in requirements of the National Airspace System.

The replacement system will improve the tracking of parts failures to better manage spare parts inventory; automate the tracking of repairable parts as they are processed through the shops; upgrade the ability to identify parts that have high failure rates so they can be replaced or improved; and maintain an inventory of obsolete parts, so decisions can be made about repairing or replacing them.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The LCSS program supports the flight plan Organization Excellence goal with enhanced cost-control measures and improved decision-making by:

1) Providing the right part, at the right time, to the right place. Metric: Issue Effectiveness: Target goal is 85% effectiveness, where issue effectiveness is the shipment of an item in stock within 24 hours of the order or, in the case of a direct ship item, completed processing of the order with the vendor within 24 hours.
2) Providing NAS components and parts that are not defective. Metric: Confirm defective products: Target goal is no more than 11.5 defects per 1,000 issues.
3) Providing services that meet or exceed customer expectations. Metric: Customer satisfaction surveys: Target goal is 86% customer satisfaction.

4) Delivering parts and services on time and defect-free reduces potential air traffic system outages and avoids the cost of duplicate shipping and handling.

Program Plans FY 2010 – Performance Output Goals

- Develop logistics business process blueprint and assemble LCSS software solution prototype.

Program Plans FY 2011-2014 – Performance Output Goals

- Design, configure, test, and deploy a complete LCSS software solution.
- Monitor LCSS implementation and continue COTS software upgrades/maintenance.

3A04, National Airspace System (NAS) Recovery Communications (RCOM)

FY 2010 Request $10.2M

- Command and Control Communications (C3), C18.00-00

Program Description

The RCOM program gives the FAA the C3 capability to directly manage and operate the NAS during local, regional and national emergencies, when normal common-carrier communications are interrupted. The NAS C3 provides and enhances a variety of fixed-position, portable, and transportable C3 systems to support emergency operations. Such C3 systems include the automatic digital network/defense messaging system; secure telephone unit third generation/secure telephone equipment; secure facsimile; very high frequency (VHF)/Frequency Modulated (FM); high-frequency single-side band radios; satellite telephone network; wireless notification system; secure conferencing system; Emergency Operations Network (EON); and communications in emergency situations. These C3 systems enable the FAA and other Federal agencies to exchange classified and unclassified communications to promote national security. The RCOM program also supports the Washington Operations Center Complex and modernizes several FAA "continuity of operations" sites, which ensures FAA executives have command and communications during times of crisis.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 5 – Security, Preparedness and Response.**
- **DOT Outcome 1 –** Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector.
- **DOT Strategy –** Continued to enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters

Relationship to Performance Target

The RCOM program contributes to the National Security goal by ensuring that the FAA's C3 structure can provide classified and unclassified, time-critical, public and NAS information for the FAA Administrator during emergencies. The FAA Administrator shares this information with staff members, key regional managers, the Secretary of Transportation, and other national-level executive personnel.

Program Plans FY 2010 – Performance Output Goals

- Procure and install VHF/FM equipment for Hawaii-Pacific System Maintenance Office (SMO), Chicago SMO, Pacific Northwest Mountain SMO, and Atlanta SMO.
- Continue to improve the Emergency Operations Network's basic platform and implement new versions and updates as necessary.
- Engineer system requirements for VHF/FM Chicago SMO, Pittsburgh SMO, and Southern New England SMO.
- Support Communication Support Team missions as required.
- Continue modernizing classified facilities as required.
- Continue modernization of Regional Operations Centers nationwide.

- Continue work on various interagency classified projects.
- Continue to implement NCS3-10 equipment.
- Upgrade and enhance satellite telephone network system.

Program Plans FY 2011-2014 – Performance Output Goals

- Procure and install additional secure facsimile units and secure conferencing systems.
- Procure and install VHF/FM equipment for the Pittsburgh SMO, Southern New England SMO, Chicago SMO, Salt Lake City SMO, Lone Star SMO, Ohio SMO, Rocky Mountain SMO, Red River SMO, Rio Grande SMO, Superior SMO, Dakota-Minnesota SMO, and Great Plains SMO.
- Engineer system requirements for VHF/FM Salt Lake City SMO, Lone Star SMO, Ohio SMO, Rocky Mountain SMO, Rio Grande SMO, Superior SMO, Dakota-Minnesota SMO, and Great Plains SMO.
- Continue modernizing classified facilities as required.
- Support Communication Support Team missions as required.
- Deliver additional secure conferencing systems as required.
- Upgrade and enhance satellite telephone network system.
- Continue to implement NCS3-10 equipment.
- Continue modernizing Regional Operations Centers nationwide.
- Continue efforts on various interagency classified projects.

3A05, Facility Security Risk Management

FY 2010 Request $18.0M

- Facility Security Risk Management (FSRM), F24.00-00

Program Description

The Facility Security Risk Management (FSRM) Program was established in response to Presidential Decision Directive 63, Critical Infrastructure Protection (later superceded by Homeland Security Presidential Directive (HSPD) 7, Critical Infrastructure Identification, Prioritization and Protection), which required all Federal agencies to assess the risks to their critical infrastructure and take steps to mitigate that risk. The program provides risk mitigation at all FAA staffed facilities. The program provides an integrated security system that includes access control, surveillance, x-ray machines, metal detection, and intrusion detection. Other upgrades include adding guardhouses, visitor parking, fencing, perimeter hardening, window blast protection, and lighting.

FSRM Phase 2 includes integrating the individual facilities into a Physical Access Control System (PACS) and adding access control at security level 1 facilities, such as Federal Contract Towers and Manufacturer Certification Offices.

The FSRM Program also supports the FAA's response to HSPD-12, *Policy for a Common Identification Standard for Federal Employees and Contractors*; HSPD-16, *Aviation Security* and the Airport Security Improvement Act of 2000.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 5 – Security, Preparedness and Response.**
- **DOT Outcome 1 –** Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector.
- **DOT Strategy –** Continued to enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters.

Relationship to Performance Target

The FSRM Program provides the infrastructure enhancements needed to reduce risks to facilities critical to the NAS. These enhancements reduce the risk of unauthorized access and provide early identification of potential security problems.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.7 –** Support national aviation security needs.

Program Plans FY 2010 – Performance Output Goals

- Upgrade 25 facilities so they can be accredited as meeting Federal security standards.

Program Plans FY 2011-2014 – Performance Output Goals

- Upgrade 75 percent of the remaining facilities that need to be accredited.

3A06, INFORMATION SECURITY

FY 2010 Request $12.3M

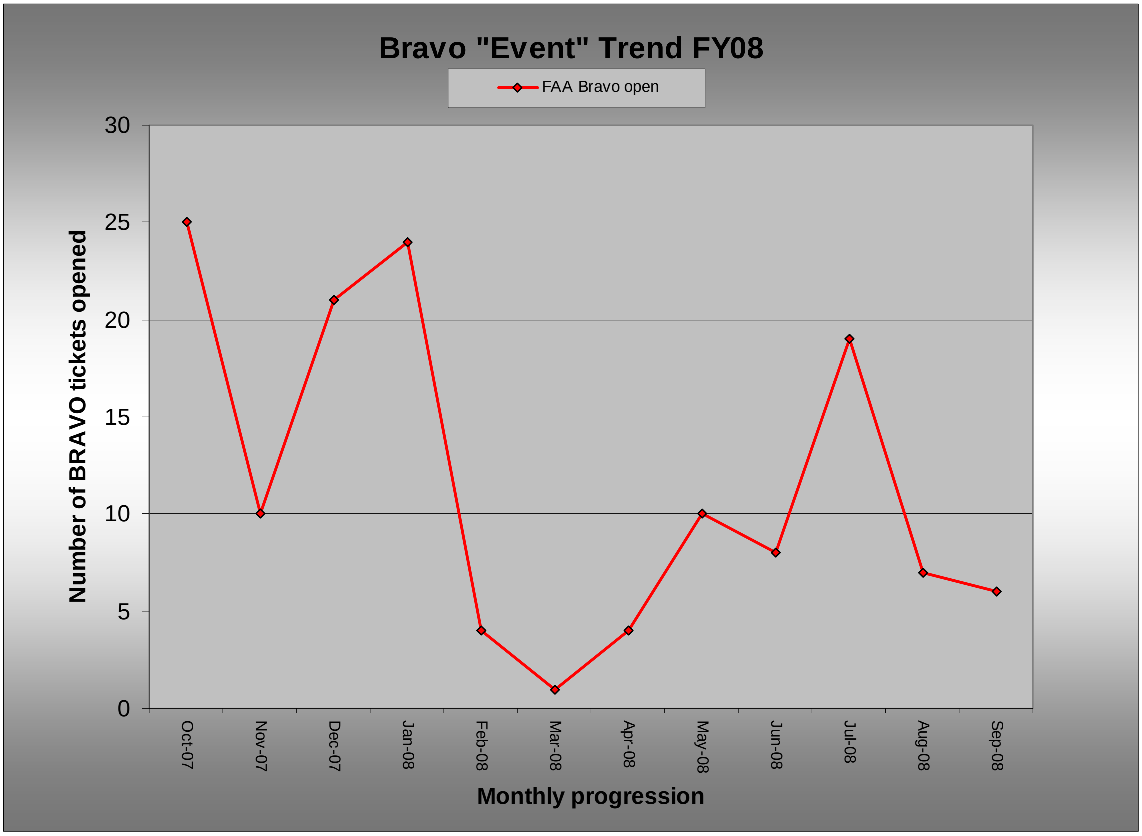
- NAS Information Security – Information Systems Security, M31.00-00

Program Description

The FAA must ensure the integrity and availability of all its critical information systems, networks, and administrative systems under conditions of increased cyber terrorism and malicious activities by hackers and other unauthorized personnel. In the Homeland Security Presidential Directive/HSPD 7, FAA was directed to protect and ensure the integrity, confidentiality, and availability of all National Airspace Information Systems as well as federal information. Under the Federal Information Security Management Act (FISMA) of 2002, FAA must ensure that all information systems identify and provide information security protection equal to the risk and magnitude of the harm resulting from unauthorized access, use, disclosure, disruption, modification, or destruction of information that support the agency, aviation safety and security, and the NAS.

The FAA Cyber Security program is a partnership between the FAA Chief Information Officer (CIO) organization and FAA lines of business and staff offices (LOBs/SOs) with a focus on protecting our information technology (IT) infrastructure. The program is comprised of the following areas: Cyber Security Management Center (CSMC); IT and Information Systems Security (ISS) awareness and training; IT research and development (R&D); policy, standards, and requirements; program evaluations; and system certification and compliance. This comprehensive Cyber Security effort offers information security awareness training of the agency's key ISS personnel, development and evaluation of policies and standards, formulation of system requirements, certification of systems and ensures their compliance with federal regulations, protection of FAA's computer enterprise, and response to computer security incidents.

Bravo events are targeted attacks on federal government systems, which pose a serious and imminent threat to those systems. These are events specific in nature, objective and patterned. They, by design, reflect hostile intent. Understanding all aspects of these events dictates that they be detected and prevented to the maximum extent to which the FAA is capable. The development of the term "Bravo" was initiated as an indirect route to allow the communication of these events and the identification and mitigation of systems that have been compromised or affected by these sophisticated attacks. The chart below shows the monthly Bravo event trend for October 2007 thru September 2008.



The office of the Chief Information Officer (AIO's) work continues with a strategy, which is a comprehensive, proactive approach to preventing and isolating intrusions in the agency's computer networks. This cyber defense strategy involves hardening of the individual system and network elements, isolating those elements and backing up those elements to avoid services disruptions.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 5 – Security, Preparedness and Response.**
- **DOT Outcome 1 –** Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector.
- **DOT Strategy –** Continued to enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters.

Relationship to Performance Target

The FAA supports and implements security strategies and plans by: (1) ensuring effective preparedness, detection, response, and recovery regarding cyber attacks; (2) integrating information security efforts into all acquisition and operation phases to protect FAA people, buildings, and information; and (3) supporting the nation's efforts to safeguard homeland security, in particular the aviation infrastructure and industry.

Program Plans FY 2010 – Performance Output Goals

- Correct NAS vulnerabilities discovered through the certification and authorization process.
- Provide CSMC enhancements to support NAS and the NAS Security Information Group.
- Enhance the NAS Enterprise Architecture regarding cyber security protection by developing cyber security requirements and reviewing certification and authorization work.
- Conduct initiatives to improve the reliability, availability, and integrity of NAS systems during various forms of cyber attack.
- Develop plans and provide management support to integrate the network connections from LOBs/SOs into the FAA Internet Protocol Version 6 compliant backbone.

Program Plans FY 2011-2014 – Performance Output Goals

- Correct NAS vulnerabilities discovered through the certification and authorization process.
- Certify and authorize spiral releases of complex systems and newly designed systems.
- Provide CSMC enhancements to support NAS and the NAS Security Information Group.
- Enhance the NAS Enterprise Architecture regarding cyber security protection by developing cyber security requirements and reviewing certification and authorization work.
- Conduct initiatives to improve the reliability, availability, and integrity of NAS systems during various forms of cyber attack.
- Complete concept of operation and implement strategy for automated recovery, which involves isolating those systems that have been affected by a virus, instituting the fix, and making sure that affected systems get back online as soon as possible.
- Develop architecture and engineering efforts for alternative solutions to secure new NAS systems.
- Monitor and take all actions necessary to ensure that the NAS information technology systems are not interrupted and are available at all times.
- Address vulnerabilities discovered through certifications and authorizations completed in prior years.
- Evaluate and acquire enhanced tools used by the CSMC to address complex and rapidly changing cyber threats and vulnerabilities.

3A07, SYSTEM APPROACH FOR SAFETY OVERSIGHT (SASO)

FY 2010 Request $20.0M

- System Approach for Safety Oversight (SASO) – Phase II Alpha, A25.02-01
- X, System Approach for Safety Oversight (SASO) – Phase II Beta, A25.02-02

Program Description

SASO Phase II is the second phase of the SASO Program. Phase II A is the first segment of SASO Phase II covering the years FY 2010 thru FY 2013. Phase II A will develop the AFS Safety Assurance System (SAS), one of four components of the AVS Safety Management System (AVSSMS). SASO Phase II B is an overlapping segment covering the years FY 2011 thru FY 2016 during which the remaining three components of the AVSSMS will be implemented (safety risk management, safety policy, and safety promotion).

The AVSSMS is FAA's response to a mandate from the International Civil Aviation Organization that requires its member states to institute regulations that require aviation entities under their purview to implement safety management systems.

The implementation of safety management systems by aviation entities will require AVS to implement a complimentary safety program that provides oversight of those aviation entity safety management systems. The first step in the development of the AVSSMS is the development of the Flight Standards Service (AFS) Safety Assurance System (AFS SAS)

The safety management system concept is recognized as the most effective and efficient way of preventing accidents. The AFS SAS will develop and implement a new proactive systems safety approach that will significantly improve the FAA's ability to identify and address hazards and safety risks before they result in accidents.

Existing information systems and tools will be examined to determine their ability to support systems safety oriented oversight. Redundant applications will be consolidated. Obsolete and unsuitable systems will be removed and replaced with an integrated suite of databases and analysis tools that coincide with the new systems-based, risk management-oriented processes. The new systems and analysis/decision support tools will consistently provide accurate, critical information needed to make timely safety decisions, and the newly engineered oversight processes will emphasize the use of this data by the FAA when making critical decisions. Finally, the program will exchange information from these systems with national and international government and industry organizations throughout the aviation community to increase awareness of systemic safety risks and maximize levels of safety.

The AFS SAS will consolidate 56 independent AFS safety systems into four enterprise systems. This will provide easier access to safety information for employees that monitor industry safety. Information will also be shared with industry professional, both within and outside the U.S., who are working to improve aviation safety.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

During SASO Phase II Alpha, SASO will contribute to a reduction in accident rates over the period FY 2003 through FY 2022. SASO proposes to achieve these results by automating one of the four components of safety management system functions.

SASO Phase II A FY 2010 – Performance Output Goals

- Refine AFS SAS system requirements.
- Initiate AFS SAS system design.
- Develop AFS SAS job task instructions, handbooks, and job aids.
- Initiate an AFS SAS outreach program to promote AFS SAS and prepare for change.
- Complete development and fielding of 5 Standard Reference Tables (SRT) for AFS applications.

SASO Phase II A FY 2011 – 2013 Performance Output Goals

- Complete AFS SAS system design development, and testing.
- Develop AFS SAS training curriculum and training materials.
- Complete AFS SAS key site implementation.
- Assess lessons learned from AFS SAS key site implementation.
- Complete AFS SAS implementation for CFR Parts 121, 135, 145.
- Complete AFS SAS outreach program to promote AFS SAS and prepare for change.

SASO Phase II B FY2011 – 2016 – Performance Output Goals

- Reengineer oversight business processes of all AVS Services/Offices to accommodate SMS.
- Design, develop, test, and implement remaining three components of the AVSSMS.
- Integrate the four components of the AVSSMS into the AVS enterprise architecture.
- Develop AVSSMS training curriculum and training materials.
- Complete training for AVSSMS key site implementation.
- Complete AVSSMS implementation throughout AVS.

3A08, AVIATION SAFETY KNOWLEDGE MANAGEMENT ENVIRONMENT (ASKME)
FY 2010 Request $8.1M

- Aviation Safety Knowledge Management Environment, A26.01-00
- X, Aviation Safety Knowledge Management Environment – Phase 2, A26.01-01

Program Description

The Aviation Safety Knowledge Management Environment (ASKME) is a suite of information technology (IT) tools designed to support and enable the FAA Aircraft Certification Service (AIR) to more efficiently certify new aircraft and modifications to existing aircraft. The program was established to provide a comprehensive automation environment for critical safety business processes for the Office of Aviation Safety through deployment of 18 integrated business solutions (18 projects) between Fiscal Year 2008 and Fiscal Year 2016. Phase 1 covers fiscal years FY08-FY12 and Phase 2 covers fiscal years FY13-FY17. ASKME, phase 1, obtained its baseline decision (FY08-FY12) on June 20, 2007 from the FAA Joint Resources Council.

The environment created by integration of ASKME deliverables will provide for the electronic storage and retrieval of FAA technical documentation, and lessons learned from previous certifications that involved aircraft design and manufacturing safety issues, so that they can be accessed and shared more easily. This technical data includes the rationale for design and production certification decisions, interpretations of rules and policies, and audits of aircraft industry manufacturers. In addition, ASKME will provide tools to improve the ability to identify potential unsafe conditions by analyzing this documentation along with safety information such as Service Difficulty Reports, National Transportation Safety Board safety recommendations and reports, accident reports, and Maintenance Difficulty Reports. Finally, ASKME will provide electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/ manufacturing certification, airworthiness certification, designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

Phase 1 IT Application Deliverables Include:
- Electronic File Service (EFS)
- Work Tracking Software – Risk Based Resource Targeting (WTS-RBRT)
- Monitor Safety Related Data (3 related applications)
  - Monitor Safety Analyze Data (MSRD-MSAD)
  - Oversee System Performance – Internal (MSRD-OSPi)
  - Oversee System Performance – External (MSRD-OSPe)
- Designee Supervision / Past Performance (DS/PP)
- Assimilate Lessons Learned (ALL)
- Work Tracking Software – Work Activity Tracking (WTS-WAT)
- Engineering Design Approval (EDA)
- DDS Technical Evaluations (DTE)

Phase 2 IT Application Deliverables Include:
- Work Tracking Software – Budget Management (WTS-BMgmt)
- Airworthiness Directives Development (ADD)
- Airworthiness Certifications (4 related applications)
  - Standard Airworthiness Certifications (StdAC)
  - Special Airworthiness Certifications (SpclAC)
  - Special Flight Authorizations (SFA)
  - Certification of Imported/Exported Products (CI/EP)
- Compliance and Enforcement Actions (CEA)

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1– Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

The Aircraft Certification Service (AIR) is responsible for ensuring that civil aircraft are designed and manufactured to operate safely within the NAS. ASKME will provide the automated systems to conduct safety data analysis and data gathering, as well as the collection of lessons learned as it applies to AIR's safety-related responsibilities (e.g. aircraft certification and certificate management, regulatory development, designee supervision and oversight, and operational safety). ASKME will provide AIR with a comprehensive mechanism aimed at: 1) the early identification and resolution of accident precursors; 2) the promotion of systematic and structured risk assessment/risk management practices; and 3) the proactive management of safety issues throughout the lifecycle of an aircraft and its components. The projected savings over the life of the program is estimated at 174 avoided fatalities and a total savings of $494.96M (then year dollars at 80% high confidence level).

Program Plans FY 2010 – Performance Output Goals

- Electronic Filing Service (EFS) – Historical scanning activities - first year.
- Work Tracking Software-Risk Based Resource Targeting (WTS-RBRT) – Completion of development; Deployment of solution for the RBRT Sub-Function.
- Monitor Safety Related Data - Oversee System Performance - Internal & External - MSRD-OSPi and OSPe - Complete documentation of detailed system requirements; Begin Design and Development activities for the OSPi Sub-Function.
- Assimilate Lessons Learned - ALL – Complete development activities and deploy solution for the ALL Sub-Function based on requirements gathered.
- Designee Supervision / Past Performance Sub-Function - DS/PP – Complete development activities and deploy solution for the DS/PP Sub-Function.
- Work Tracking Software - Work Activity Tracking - WTS-WAT – Document detailed system requirements.

Program Plans FY 2011-2014 – Performance Output Goals

- Finalize Documented detailed System Specification Requirements phase (first phase for application development lifecycle) for the following ASKME deliverables:
  - EDA (Engineering Design Approval) – FY11
  - DTE (DDS Technical Evaluations) – FY11
  - WTS-Budget Management – FY13
  - ADD (Airworthiness Directives Development) – FY13
  - AC-StdAC (Airworthiness Certification – Standard ACs) – FY14
- Scan historical safety-related documentation for population in the Electronic File Service repository. – FY10-FY12.
- Complete Design, Development, Test, and Deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
  - MSRD-OSPi (Internal Oversee Safety Performance) – Starts FY10, Ends FY11
  - MSRD-OSPe (External Oversee Safety Performance) – Starts FY10, Ends FY11
  - WTS-WAT (Work Activity Tracking) – Starts FY11, Ends FY13
  - EDA (Engineering Design Approval) – Starts FY12, Ends FY13
  - DTE (DDS Technical Evaluations) – Starts FY12, Ends FY13
  - WTS-BMgmt (Budget Management) – Starts FY13, Ends FY14
- Begin Design and Development phase activities for the for the following ASKME deliverables:
  - AC-StdAC (Airworthiness Certification – Standard ACs) – Starts FY13, Ends FY15

3A09X, LOGICAL ACCESS CONTROL
FY 2010 Request $0.0M

- X, Logical Access & Authorization Control Svc (LAACS), M31.02-01

Program Description

Homeland Security Presidential Directive (HSPD) 12 sets the policy for a Common Identification Standard and mandated government-wide implementation of secure and reliable forms of both physical and logical identification to gain access to buildings and information and communications systems. This directive followed multiple orders over several years, including National Institute of Standards and Technology (NIST) SP800-53, and E-Authentication and E-Gov from 1997 through 2003. The latter directs departments and agencies to increase the security of government logical resources including Information Systems (IS), Information Technology (IT) and data. Since HSPD-12, there have been additional orders and directives for increasing the security surrounding government logical resources, including FIPS-200 in 2006 which mandates compliance with NIST SP 800-53.

The LAACS program is the planning, acquisition, and implementation of the first integrated, enterprise identity management system (IDMS) with an associated service to help application and IT resource owners increase the security protecting their resources. A full-suite IDMS COTS product will integrate multi-level authentication, with multi-role authorization and multi-level asset audit security controls to the internal and external access of data and systems. This provides multi-level criterion to ensure a standardized level of identity security is applied to each application for its required level of assurance. LAACS controls who accesses what data with what forms of identity, at what times, from what locations, and with what methods. Audit logs provide near real-time threat assessments, as well as the capability for post-threat forensics. Additionally, LAACS provides automated workflow provisioning to manage account setup, modification, and de-activation to improve the efficiency and effectiveness of security controls. The latter is especially important in managing emerging threats and the single most compelling reason to implement an enterprise IDMS. With a single action, an individual's access to all logical assets is eliminated or reduced, i.e., de-provisioned or role modified.

LAACS will provide an enterprise security infrastructure to allow and promote secure electronic commerce between government, citizens, and industry - nationally and internationally. LAACS will support the Public Key Infrastructure trust model used globally, as well as other trust models which protect privacy for electronic access of publicly available data. A critical part of this plan is to ensure authentication of each internal user’s identity (100,000 employees and contractors) and their privilege level before granting access to government logical resources. Other trust models will be supported to provide for the private and secure access of the public or industry to government logical resources.

Finally, in conjunction with LAACS, the FAA must develop and set standards and policies for logical access control, including the maintenance and use of encryption keys.

Relationship of Program to DOT Strategic Goal, Objective, & Performance Target

- **DOT Strategic Goal 5 – Security, Preparedness and Response.**
- **DOT Outcome 1 –** Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector.
- **DOT Strategy –** Continued to enhance our ability to respond to crises rapidly and effectively, including security-related threats and natural disasters.

Relationship to Performance Target

The implementation of LAACS will enable the agency to protect the Department of Transportation and FAA NAS or Non-NAS logical resources against cyber terrorism and malicious activities by hackers and other unauthorized personnel. The implementation of LAACS will enable the agency to reduce identity fraud, protect personal privacy, keep sensitive information secure, support business continuity planning, respond rapidly and consistently to internal and external security threats, and improve the accountability and oversight of agency information and information systems. This effort will substantially increase the assurance of reliability, availability, and integrity of department and agency IS, IT, and data.

Program Plans FY 2010 – Performance Goals

- None.

Program Plans FY 2010-2014 Performance Output Goals

- Fiscal Year 2010—Complete initial component of the LAACS Enterprise Solution Development and Implementation with at least 10% of the identified 220 Non NAS systems and applications.
- Fiscal Year 2011—Complete second component of the LAACS Enterprise Solution Development and Implementation with at least 15% of the identified 220 Non NAS system and applications.
- Fiscal Year 2012—Complete third component of the LAACS Enterprise Solution Development and Implementation with at least 15% of the identified 220 Non NAS system and applications.
- Fiscal Year 2013—Complete forth component of the LAACS Enterprise Solution Development and Implementation with at least 15% of the identified 220 Non NAS system and applications.
- Fiscal Year 2014—Complete fifth component of the LAACS Enterprise Solution Development and Implementation with at least 15% of the identified 220 Non NAS system and applications.

B. TRAINING, EQUIPMENT, AND FACILITIES

3B01, AERONAUTICAL CENTER INFRASTRUCTURE MODERNIZATION
FY 2010 Request $13.8M

- Aeronautical Center Infrastructure Modernization, F18.00-00

Program Description

The Aeronautical Center Infrastructure Modernization program funds renovation and restoration of critical leased and owned facilities to enable, sustain, and ensure they remain viable for the mission of present and future FAA employees, students, and contractors. Funding from this program allows renovation of facility space used by Air Operations, Engineering Training (Radar/Navaids), NAS Logistics, airmen/aircraft registration, safety, and Business Services. FY 2010 funding will be used for facility renovation and building system replacement, storm sewer replacement, and telecommunications infrastructure upgrade. This CIP replaces major building systems not provided for by any other funding sources or lease agreement.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1** – Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The Aeronautical Center Infrastructure Modernization program sustains a cost effective workplace for Air Operations, Engineering, and Training that contribute to the FAA's 99.7% NAS system availability goal. This program reduces the cost of Air Traffic Organization (ATO) operations by providing facilities that are lower in cost when compared with Oklahoma City GSA metropolitan leased facilities and GSA national averages for leased facilities. Eighty percent (80%) of Aeronautical Center space is used for direct support of the ATO by AJW 14/173/223 (Engineering Organizations), Aviation System Standards (AVN), the Logistics Center, Air Traffic Control training, ATO Technical Operations Training and Certification. This program enhances financial discipline by providing Technical Operations and Air Traffic training through updated training facilities for resident and computer-based learning and development. In addition, 13% of Aeronautical Center space provides business service facilities for the DOT/DELPHI/Prism/Castle Data Center Operations, consolidated Accounting Operations services, Acquisition, ATO Data Center Operations, and Aviation Safety (AVS/CAMI).

Program Plan FY 2010 – Performance Output Goals
- Systems Training Building (STB) renovation construction - Phase 2 of 4.
- Complete Hangars 8 and 9 fire suppression systems to protect FAA aircraft whose value exceeds $600M.
- Storm sewer replacement phase 3 of 4.
- Telecommunications: Implement Cisco network for Aeronautical Center backbone to provide redundancy, reliability, security and availability. Router backplanes will be replaced to support increased bandwidth needed by Data Centers and increasing user requirements. Hardware/software upgrades will support newer model telephones and replace old hardware. Single mode fiber will be provided to north center campus for increased redundancy of core routers on the network, increased bandwidth to Data Centers and individual Aeronautical Center users.

Program Plan FY 2011-2014 – Performance Output Goals
- Systems Training Building (STB) renovation construction - Phases 3 and 4.
- Radar Training Facility and Base Maintenance renovation designs.
- Storm sewer replacement phase 4 of 4.
- Environmental Systems Support (ESS) building design and renovation.
- Telecommunications upgrades to include: installation of telecom equipment to replace network switches, uninterruptible power supply units, wireless access points, and core routers. Security assessment/disaster recovery testing; upgrades to Intelligent Peripheral Equipment (IPE) controller and hardware/software upgrades to campus fiber plans, upgrades of network software management tools, and additional telecommunications fiber/copper.

System Implementation Schedule
The following buildings will be returned to service as phased renovation construction is completed:
- Systems Training Building basement floor construction complete that corrected life safety issues. Basement returned to service, FY 2010.
- Flight Inspection Building, FY 2010.
- Air Navigation Facility #2, FY 2010.
- Hangars 8 and 9 fire suppression systems, FY 2009-2010.
- Systems Training building, FY 2013.
- Storm Sewer replacement, phases 3 and 4, FY 2012.

3B02, DISTANCE LEARNING
FY 2010 Request $1.5M

- Distance Learning, M10.00-00

Program Description

The Distance Learning program will replace Computer-Based Instruction (CBI) Delivery Platforms at all CBI Learning Centers, increase connectivity, and upgrade network multimedia support and services. The system consists of about 1,300 Learning Centers located at virtually every FAA facility around the world. The FAA is replacing the platforms for two reasons: (1) to support high-performance media and simulations required in many lessons; and (2) because replacement parts for current platforms are becoming obsolete and hard to obtain.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The major benefit of distance learning is the substantial reduction in student time away from work, and student travel and per diem costs associated with resident-based training. In addition, distance learning delivery methods increase training effectiveness, increase training opportunities for all FAA employees, and provide flexibility in training schedules through local management control. The FAA CBI system must deliver initial operator, transition, and maintenance training for many NAS programs. By providing a standard training delivery and equipment simulation platform across all NAS programs, the need for such equipment and the space it would occupy is much reduced. All of these factors contribute to a reduction in the unit cost of service for en route, terminal, and flight service. This program contributes well over $10M savings each year. These efficiencies combine to produce a better prepared, better trained, safer diverse workforce. Such an improvement in working conditions and workforce skills preparation is expected to support the 10-15% savings goal for selected products and services.

3B03, NAS Training Facilities – Simulator

FY 2010 Request $6.7M

- Training Simulators – Tower Cab, M20.01-02
- Tower Cab Simulator – Segment 2, M20-01-03

Program Description

The NAS Training Simulator project will acquire and deploy training simulators to selected air traffic facilities in the field. Similar technology implemented at the Academy and by the US Air Force has proven successful. This project focuses on using technology to assist FAA in training newly hired controllers during the next 10 years in response to projected staffing requirements. This program provides funding to acquire simulators, training media, and communications equipment for air traffic facilities. Segment 2 will provide 6 additional Tower simulators.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 1 –** Implement human resource management practices to attract and retain a highly skilled, diverse workforce and provide employees a safe, positive work environment.
- **FAA Performance Target 4 –** Maintain the air traffic controller workforce at, or up to 2 percent above, the projected annual totals in the Air Traffic Controller Workforce plan.

Relationship to Performance Target

Through the use of simulation at Terminal facilities, the FAA can further enhance training for air traffic controllers in a high fidelity, realistic environment. Not only will this reduce on-the-job training time, but also significantly reduce operational errors. Students need the simulated environment to reach the skill level necessary to become a fully proficient controller.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce unit cost of operations.

Program Plans FY 2010 – Performance Output Goals

- Complete installation of six simulator hardware and software databases at selected air traffic control tower hubs.
- Complete air traffic instructor simulator training.
- Continue Contractor Logistic Services.

Program Plans FY 2011-2014 – Performance Output Goals

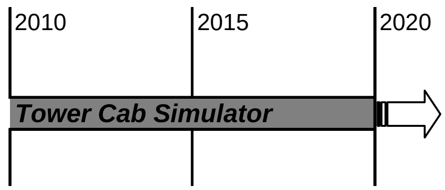
- Not Applicable.

System Implementation Schedule

Tower Cab Simulator

First site IOC: July 2008 -- Last site IOC: September 2009

Pending JRC/EC approval, additional systems will be added to the waterfall schedule



ACTIVITY 4. FACILITIES AND EQUIPMENT MISSION SUPPORT

4A01, SYSTEM ENGINEERING AND DEVELOPMENT SUPPORT

FY 2010 Request $31.7M

- A, CIP Systems Engineering and Technical Assistance – SETA and other Contractors, M03.01-00
- B, Provide ANF/ATC Support (Quick Response), M08.01-00

A, CIP SYSTEMS ENGINEERING AND TECHNICAL ASSISTANCE – SETA AND OTHER CONTRACTORS, M03.01-00

Program Description

This SETA project allows the FAA to contract for critical expertise to assist in system engineering and other technical areas used to develop the NAS Architecture and key modernization projects. The System Engineering support staff work on four of the key modernization plans: the Flight Plan, NextGen Implementation Plan, Capital Investment Plan, and the NAS Aviation Research Plan. System engineering and integration are key to the NAS Enterprise Architecture's success and to maintaining interface control between current systems and new systems.

Besides system engineering, the contracts under this program support the ATO in developing systems for automation, communications, navigation and landing aids, surveillance, and weather. Also provided are program management, financial management and investment analysis support to assist with planning, decision making, and budgetary oversight of the activities involved in implementing newly acquired systems, components, and equipment in existing operational NAS facilities.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The SETA project contributes to organizational excellence by providing support for designing and managing NAS modernization. With contractor assistance, the FAA is able to plan, analyze, and manage NAS system improvements more effectively. In addition, financial management and investment analysis support helps the FAA track cost, balance competing budgetary resources, and make important decisions necessary to ensure that limited program dollars provide the greatest return on investment.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.2 –** Provide a future air transportation system that meets customers' operational needs.

B, PROVIDE ANF/ATC SUPPORT (QUICK RESPONSE), M08.01-00

Program Description

This program provides quick response support for ATO organizations to solve issues related to information technology and financial management systems. Examples include: providing additional ATO Cost Accounting Reports; installing an Information Technology (IT) link to support operations research; IT support for the DOT accounting system (DELPHI) accounting system; and ensuring connectivity for automation systems in the multiple FAA buildings. It also provides emergency engineering response for unforeseen regional problems such as relocating an antenna for a remote communication facility and removing a decommissioned tower. These projects are unexpected and must be done swiftly.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1** – Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
    - 10-15 percent savings for strategic sourcing for selected products and services;
    - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
    - Annual reduction of $15 million in Information Technology operating costs; and
    - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

This project improves financial management by supporting the systems that generate financial baselines and track costs for individual projects. It allows financial management system problems to be corrected quickly so detailed cost and schedule information is available when needed. This allows managers to more quickly identify programs that are at risk and take corrective action. Quick action to resolve regional issues and sustain regional operations leads to a higher level of customer satisfaction.

Strategic Management Plan (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.2 –** Make the NAS more effective.

4A02, PROGRAM SUPPORT LEASES
FY 2010 Request $37.5M

- Program Support Leases, M08.06-00

Program Description

This program reviews and approves real property requirements needed to operate the NAS. It also budgets for the payments for approximately 2,398 land leases, 672 space leases, and 75 leases covering both land and space for operational facilities. It also funds the purchase of land when economically advantageous.

The request will fund approximately 3,145 leases and will include:

- Payment of rents on approximately 3,145 land and/or space leases that directly support navigation, communication, weather, and air traffic control facilities;
- Costs associated with the rental and management of land and/or space for service/maintenance centers, deployment/development centers, laboratories, test beds, and other types of facilities that support the deployment and operation of technical facilities;

- Payments for condemnation of real property interests;
- Funds for conversion of existing leases to fee ownership;
- Costs for real estate appraisals, market surveys, title reports, and other costs associated with the acquisition and management of real property assets;
- Funds for costs to lease construct or relocate offices, facilities, personnel, and equipment and combine or consolidate multiple offices when technically feasible and economically advantageous;
- Funds for the management and administration costs for establishing and maintaining a database of leases and owned facilities, for developing business tools to enhance logistics activities, and for implementing program efficiency practices; and
- Funding for certain costs associated with real property disposals with sale proceeds to be used to offset other direct and related program costs; and
- Funding for costs associated with the termination of ATO leases, the relocation of furnishings and/or equipment in connection with the closure and reuse of vacated Automated Flight Service Station space.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet.

Relationship to Performance Target

In support of the Agency Flight Plan Goal of Organizational Excellence this program is improving management of the FAA's real property assets; thus, contributing to the Organizational Excellence Objective 3, Improve financial management while delivering quality customer service. Real property costs are being effectively controlled through:

1. The oversight and approval of all requests for additional real property rights,
2. The oversight and approval of all major maintenance and enhancements to existing real estate, and
3. The co-location of sites that currently are leased separately; hence, eliminating rents, utility costs, and maintenance costs for the excess space.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.4 –** Reduce unit cost of operations.

4A03, LOGISTICS SUPPORT SERVICES (LSS)
FY 2010 Request $11.0M

- NAS Regional/Center Logistics Support Services, M05.00-00

Program Description

The Logistics Support Services (LSS) program uses contractor-supplied services to perform real property acquisition and materiel management contracting activities in support of FAA CIP projects, and to conduct accounting system capitalization and property control-related activities. These services currently represent a significant portion of the workforce for acquisition, real estate, and materiel management in the three Logistics Service Areas and at the Aeronautical and Technical Centers. The LSS program is instrumental in establishing new or upgraded facilities, including air traffic control towers and TRACONS throughout the NAS. LSS resources will also continue to be used for asset tracking and documentation efforts to obtain and maintain a clean audit opinion. The services also support the FAA Facility Security Risk Management (FSRM) program.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1** – Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target:

The program maintains documentation, suitable for independent audit, which is the basis for the accounting system's summary of the capital cost of facilities throughout the FAA. Having accurate accounting records and improving cost controls for real property management improves efficiencies in acquisition, leasing and managing property.

4A04, MIKE MONRONEY AERONAUTICAL CENTER LEASES
FY 2010 Request $16.2M

- Mike Monroney Aeronautical Center – Leases, F19.00-00

Program Description

The Mike Monroney Aeronautical Center lease provides all the land and 80% of the facility space comprising the Aeronautical Center, including maintenance of leased structures and building exteriors and replacement of major building systems within leased buildings: 1100 acres of land, 2.8M square feet of facility space.

The lease is comprised of the following components:
- Master Lease – Land, base rent, maintenance, and insurance,
- Airmen and Aircraft Registry Lease – Land, base rent, maintenance, and insurance,
- Thomas Road warehouse lease,
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators, and
- Grounds Maintenance.

The Center requires large parcels of land as NAS test sites for surveillance radar, communications, weather, and navigation/landing systems, as well as warehouse, administrative office space, and training facilities that support the missions of 5,500 employees and contractors, and 30,000 students annually. The Center supports air traffic training, aviation research, engineering support of NAS equipment, logistics supply and repair, aviation medical research, and other important aviation regulation, registration, certification, safety, and business functions.

The Aeronautical Center is a Level IV security site based on numbers of employees, facility square footage, sensitivity of records, volume of public contact, and mission-critical facilities whose loss, damage, or destruction may have serious or catastrophic impact on the NAS.

Funding for this program provides for the FY 2010 lease costs that are specified in the lease agreement. The lease will expire in 2028.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The Mike Monroney Aeronautical Center Lease sustains a cost effective workplace for Air Operations, Engineering, and Training that contribute to the FAA's 99.7% NAS system availability goal. Eighty percent (80%) of Aeronautical Center space is used for direct support of the ATO by Engineering Organizations, Aviation System Standards (AVN), the Logistics Center, Air Traffic Control training, ATO Technical Operations Training and Certification.

This program enhances financial discipline by providing Technical Operations and Air Traffic training through updated training facilities for resident and computer-based learning and development. In addition, 13% of Aeronautical Center space provides business service facilities for the DOT/DELPHI/Prism/Castle Data Center Operations, consolidated Accounting Operations services, Acquisition, ATO Data Center Operations, and Aviation Safety (AVS/Civil Aeromedical Institute (CAMI)). The Aeronautical Center leases ensure a viable future for the FAA by supporting the delivery of a future air traffic system to meet customer's operational needs. The Aeronautical Center has been designated by Presidential Decision Directive (PDD) 63 as 'US critical infrastructure' for the future.

4A05, TRANSITION ENGINEERING SUPPORT
FY 2010 Request $15.0M

- NAS Implementation Support Contract (NISC), M22.00-00

Program Description

NISC provides technical expertise to assist the agency in deploying, implementing, and integrating many different components and equipment into the NAS within established modernization schedules. Some of the work products that support transition, implementation, and integration activities include: transition plans and timelines, equipment installation schedules, engineering site preparation packages, site implementation plans, analysis of environmental impacts, test procedures, site test monitoring, and corporate work planning.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The FAA's transition engineering support contract provides experienced personnel at cost effective rates to support the ATO service centers and headquarters offices with the planning and coordination of NAS programs. It also provides support to key FAA program management functions. This support assists the FAA in the financial management of a variety of F&E NAS modernization programs and projects.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.5** – Increase Productivity.

4A06, Frequency and Spectrum Engineering

FY 2010 Request $3.6M

- NAS Interference Detection, Locating, and Mitigation (NAS IDLM), M43.01-00

Program Description

Through an interagency agreement in 2005 between the Departments of Defense, Homeland Security, and Transportation, the FAA is tasked to develop national assets for enhanced interference detection and location capabilities to help mitigate the adverse impacts of radio frequency interference (RFI) on present and future U.S. radionavigation, surveillance, and communications systems, especially the Global Positioning System (GPS). The NAS IDLM program will provide frequency spectrum integrity by minimizing RFI impact on Communications, Navigation, and Surveillance (CNS) radio services throughout the NAS. The program will record user reports (i.e., air traffic controllers, pilots) to quickly investigate, identify, locate, and mitigate sources of radio interference.

The IDLM program will procure replacement RFI vehicles and associated RFI investigation equipment used to find the source of the reported interfering radio signal. It will install fixed monitoring sites around eight OEP areas. Each site will monitor the GPS and other critical aviation frequencies around the airport to automatically detect, identify, and locate any RFI signal source allowing for quick resolution.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 1 –** Increase capacity to meet projected demand and reduce congestion.
- **FAA Performance Target 4 –** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

Relationship to Performance Target

NAS IDLM supports sustaining operational availability by locating and mitigating radio frequency interference to any FAA communication, navigation, or surveillance system to return it to service. This activity is critical to assuring that the critical radio transmissions for air traffic control are not blocked out by interference.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway 1 –** Achieve Operational Excellence.
- **SMP Objective 1.6 –** Optimize Service Availability.

Program Plans FY 2010 – Performance Output Goals

- Resolve 80% of all reported RFI incidents within 9 days.

Program Plans FY 2011-2014 – Performance Output Goals

- Resolve 82% of all reported RFI incidents within 9 days.

4A07, TECHNICAL SUPPORT SERVICES (TSS)
FY 2010 Request $22.0M

- Technical Support Services (TSS), M02.00-00

Program Description

TSS is the agency's primary vehicle to provide a supplemental work force to install capital equipment. This program helps the FAA ensure timely installation of equipment for NAS modernization. Engineers and technicians, hired under TSS, oversee prime contractors' installation of equipment and perform direct capital project work. They perform site surveys, site preparation, and equipment installation, as well as several other technical functions to ensure that the installation schedules will be met. Without this supplemental source of engineers and technical staff, installation and equipment modernization projects would be delayed.

In a typical year, more than 3,700 separate projects are completed by FAA using this implementation service. Customers using TSS benefit from access to high quality contractor labor support that is experienced, flexible, reliable, and cost effective. The quality of this customer service is substantiated by consistently high customer (engineer and Engineering Technical Officer) participation, which is at 89 percent, and satisfaction scores from the bi-annual award fee process, in which the contractor is rated higher than 90 percent.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 3 –** Improve financial management while delivering quality customer service.
- **FAA Performance Target 1 –** Organizations throughout the agency will continue to implement cost efficiency initiatives such as:
  - 10-15 percent savings for strategic sourcing for selected products and services;
  - By the end of FY 2009 reduce leased space for Automated Flight Service Stations from approximately 510,000 square feet to approximately 150,000 square feet;
  - Annual reduction of $15 million in Information Technology operating costs; and
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

The TSS contributes to cost control by helping the FAA install new equipment on a timely basis. This avoids added costs for holding and storing equipment and allows the FAA and the aviation industry to receive equipment and system modernization benefits on schedule.

Cost savings have also resulted from TSS moving its regional management counterparts into vacant, unused FAA space which saved tens of thousands of dollars in lease rental agreements that would have been paid through the contract vehicle. This cost-effective measure has taken place at several offices within all three FAA Service Area organizations.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.5 –** Increase Productivity.

4A08, RESOURCE TRACKING PROGRAM (RTP)

FY 2010 Request $4.0M

- Resource Tracking Program (RTP), M08.14-00

Program Description

The RTP is a computer management system (including hardware, software, development, training, and support) used by the FAA Service Centers, the Technical Center, and the Aeronautical Center for identifying requirements, internal budget preparation, implementation planning, resource estimating, project tracking, and measuring performance of projects. The Corporate Work Plan (CWP), which is part of the RTP, enables users to share FAA's project data during the various stages of implementation (i.e., planning, scheduling, budgeting, execution, and closeout). The CWP system and its supporting data are continuously used for reporting project metrics to project managers, responsible engineers, program offices, and various other customers.

The legacy RTP systems currently operate in a distributed environment. The final steps in centralizing the system are underway. The centralized system will increase the quality of customer service. Both management and engineers will have up to date information on projects. Furthermore, the centralization effort will standardize reporting at all management levels allowing managers to better control overall project costs.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 6 – Organizational Excellence.**
- **FAA Objective 4 –** Make decisions based on reliable data to improve our overall performance and customer satisfaction.
- **FAA Performance Target 2** – By FY 2008, 90 percent of major system acquisition investments are on schedule and maintain through FY 2012. In FY 2009, 90 percent of major system investments selected milestones are achieved.

Relationship to Performance Target

The RTP contributes to the FAA organizational excellence goal by providing an enterprise level project management system that allows field and headquarters' office to use consistent data for managing capital programs.

Strategic Management Plan (SMP) Pathway and Objective

- **SMP Pathway #2 –** Enhance Financial Discipline.
- **SMP Objective #2.2 –** Make the NAS more effective.

4A09, CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)

FY 2010 Request $79.0M

- CIP Systems Engineering & Technical Assistance – MITRE, M03.02-00

Program Description

The CAASD is an FAA-sponsored Federally Funded Research and Development Center (FFRDC) operated under a long-term Sponsoring Agreement with the MITRE Corporation. A Product Based Work Plan (PBWP) is developed within the context of the FAA Flight Plan, Next Generation Air Transportation System (NextGen) Integrated Plan, NextGen Implementation Plan, National Airspace System (NAS) Enterprise Architecture, National Aviation Research Plan (NARP), other agency long-range plans, and the CAASD Long Range Plan (FY 2009-2013). The PBWP and CAASD Long Range Plan, approved by the FAA's FFRDC Executive Board, define an outcome-based program of technically complex research, development, and system engineering assignments designed to support the goals and requirements of the NAS and the NextGen. CAASD activities include:

NAS and NextGen Systems Integration and Evolution. Develop and integrate the NextGen enterprise architecture, operational concepts, capability action plans, and roadmaps to achieve an integrated evolution and align agencies' enterprise architectures; analyze NAS-wide strategic issues involving multiple outcomes for investment and operational decisions; provide review of and definition, structure, and content for the NAS enterprise architecture and ensure alignment with the evolving NextGen architecture.

Communications Modernization. Conduct engineering analysis, communications network definition, and transition strategy studies for the FAA's Voice Communications and System-Wide Information Management programs; conduct spectrum analysis focusing on strategic issues related to the availability of adequate spectrum resources to support aeronautical communications for NextGen operational concepts.

Performance Based NAS. Conduct technical analyses to identify airports and runways that will benefit from RNP and RNAV procedures; develop algorithms and prototype performance case analyses to validate Flight Standards procedure development tools; analyze and model aspects of navigation assets, including Wide Area Augmentation System, Local Area Augmentation System,, divestiture of navigation aids, modernization of Global Positioning System, and interoperability with other Global Navigation Satellite Systems.

En Route Evolution. Perform system engineering analyses for new technologies, capabilities and procedures for the en route system architecture and operational applications; conduct analyses to identify and mitigate key technical and operational risks for specific NextGen mid-term capabilities; validate the operational feasibility and expected efficiency and productivity gains for the set of NextGen mid-term capabilities; conduct benefit and cost analyses of key NextGen mid-term capabilities, and assess the prioritization of these capabilities.

Terminal Operations and Evolution. Provide technical and operational insight into systems that can be used to safely permit reduced separation standards and/or significantly increase overall system capacity and productivity; provide technical and operational expertise to enhance the quality and efficiency Terminal Radar Approach Control (TRACON) controller training, to allow for reduced training time and cost, improve trainee success rates, and improved workforce capabilities (e.g., reduced operational errors, improved productivity).

Airspace Design and Analysis. Structure and execute technical analyses that will inform FAA and Industry decisions on airspace design and management; investigate, innovate, and develop modeling, simulation, and analysis capabilities facilitating airspace design; explore issues that influence strategic airspace management and design policy, such as sectorization concepts.

NAS System Operations. Assess system performance; develop improved analytic techniques and capabilities for system operations analysis; develop improved measurement techniques for assessing operations; improve the FAA's responsiveness to customer issues and improve traffic management strategies; design, model, and assess new system operations procedures for new capabilities and airspace changes that will be implemented in the near future.

Traffic Flow Management (TFM) Operational Evolution. Provide assessment of concept maturity, operational feasibility and implementation risks, including identification of cross-domain dependencies; collaborate with NAS users, other TFM researchers, and FAA contractors to create consensus on new capabilities, procedures, and priorities for evolving the TFM operations; translate concepts into requirements and assess the impact of enhancement capabilities on the TFM modernization system.

Future NAS Performance and Analysis. Improve understanding of the future environment, including anticipated demand at airports and for airspace; anticipate the impact of planned improvements on future airport and airspace capacity; perform analyses to assess the affordability and long-term economic implications of different investments, operational changes, or proposed policies.

Aviation Safety. Perform technical analyses of NAS-wide accident and runway incursion risk to identify airports or specific types of operations with the highest risk, and prioritize implementation of appropriate operational and technological mitigations, leading to a reduction in accidents and runway incursions; develop metrics and processes that allow FAA to proactively identify potential safety issues.

Mission Oriented Investigation and Experimentation (MOIE). Develop tools and techniques for studying system capacity, throughput, performance, system dynamics and adaptation to technology- and policy-driven change; strengthen the systems engineering skills and tools of the FFRDC.

NAS-Wide Information System Security. Provide guidance on security threats, technology, standards, and practices being applied in other government and commercial enterprises in order to evolve Information System Security to adapt to changing threats and technology advances; advise the FAA on creating an IT infrastructure that will be resilient, flexible, and adaptable, and provide a defense-in-depth strategy.

Broadcast and Surveillance Services. Research Automatic Dependent Surveillance-Broadcast (ADS-B) ground and cockpit-based solutions; prototype basic and advanced ADS-B applications that will result in improved efficiency and capacity for FAA and the airlines; assess the impact of ADS-B on safety, capacity, and efficiency benefits for the FAA and users; develop domestic and international requirements and engineering standards for future ADS-B applications.

Special Studies, Laboratory and Data Enhancements Provide a research environment where prototypes and capabilities can be brought together with the appropriate mixture of fidelity and flexibility to facilitate integration investigations, compressed spiraling of operational concepts and procedure development.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 2 – Greater Capacity.**
- **FAA Objective 2 –** Increase reliability and on-time performance of scheduled carriers.
- **FAA Performance Target 1 –** Achieve a NAS on-time arrival rate of 88.00 percent at the 35 OEP airports by FY 2012 and maintain through FY 2013.

Relationship to Performance Target

The CAASD assists the FAA in analyzing and designing new systems to increase the efficiency and effectiveness of NAS systems. It performs analytical research, develops operational concepts, and tests new procedures. FAA adoption of these new systems and procedures for use in the NAS improves on-time performance, increases capacity, and provides a safer and more efficient air transportation system.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #4 –** Ensure Viable Future.
- **SMP Objective #4.5 –** Optimize NextGen/OEP Portfolio.

4A10, Aeronautical Information Management (AIM)

FY 2010 Request $10.M

- Aeronautical Information Management (AIM) Modernization – Segment 1a, A08.03-02
- X, Aeronautical Information Management (AIM) Modernization – Segment 1b, A08.03-03

Program Description

Following a July 2006 ATO Executive Council Investment Analysis Readiness Decision (IARD), the Aeronautical Information Management (AIM) group was organized and assumed responsibility for information management systems and services that collect, quality check, configuration manage, store, maintain, and distribute aeronautical information to internal and external aviation customers. By leveraging the synergies of three former CIP programs (NAS Aeronautical Information Management Enterprise System (NAIMES), Notices to Airmen (NOTAM) Infrastructure/Distribution, and Military Operations (MILOPS)), the AIM group supports real-time aviation activities and enables aviation system customers to conduct safe and efficient air traffic operations by providing accurate and timely aeronautical information, products and services.

AIM provides worldwide sharing of information for all users of the aviation system including internal FAA and other government agencies, the international aviation community, the Department of Defense (DOD), domestic commercial air carriers, and general aviation customers. AIM directly supports Traffic Flow Management (TFM) and Collaborative Decision Making (CDM) in the NAS and military operations.

AIM is global in scope and receives or provides data to all NAS and aviation community systems and users that use or handle aeronautical, flight plan or weather information. Aeronautical information impacts all phases of flight including preflight activities, filing/amending/canceling flight plans, departure (taxi and takeoff), en route and/or oceanic navigation, and arrival (final approach and landing) phases. From preflight activities to landing, access to current meteorological conditions and aeronautical information is essential to pilots, controllers, and the entire aviation community.

The AIM Modernization program is following a two segment strategy to address mission shortfalls for managing NAS status information. Segment 1, NOTAM Modernization, provides a modern information management architecture, modernizes NOTAM processing and addresses critical Central Altitude Reservation Function (CARF) problems. Segment 2, Digital Integrated Briefing, expands upon Segment 1 by providing integrated briefing capabilities including digital flight planning and digital weather. The AIM Modernization program is currently in the Investment Decision phase of the FAA Acquisition Management System (AMS). The Final Investment Decision is planned for the 3rd Quarter, FY 2009.

Relationship of Program to FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 1 – Increased Safety.**
- **FAA Objective 1 –** Reduce commercial air carrier fatalities.
- **FAA Performance Target 1 –** Cut the rate of fatalities per 100 million persons on board in half by 2025.

Relationship to Performance Target

The safety of the NAS is predicated on common and coherent situational awareness among the operators and users of the system. The lack of timely and/or accurate aeronautical information (e.g., (NOTAM data) and pertinent military operations data, as well as the internal and external mechanisms for delivering this information to the appropriate end users, has been shown repeatedly to be contributing factors in operational errors and runway incursions. AIM Modernization will target enhancements and new functionality to improve and expand the customer services.

Standardizing and centralizing aeronautical data within the NAS will contribute to meeting the FAA's safety performance goals and will enhance the safety of FAA air traffic control systems. Enhancing NAS safety is dependent upon the timely and accurate exchange of information between internal and external users.

Strategic Management Process (SMP) Pathway and Objective

- **SMP Pathway #1 –** Achieve Operational Excellence.
- **SMP Objective #1.3** – Ensure safety and aircraft separation.

Program Plans FY 2010 – Performance Output Goals
- Complete development of the initial operating capabilities of the digital Federal NOTAM System (FNS).
- Implement transition plans from legacy AIM systems to AIM Modernization systems.
- Complete development of the initial operating capabilities for the Advanced Dynamic Airspace Management (ADAM) system.
- Initiate program planning for AIM Modernization – Segment 2.
- Ensure 25% of all airport NOTAMs are submitted electronically.
- Ensure US NOTAM delivery is ICAO compliant.

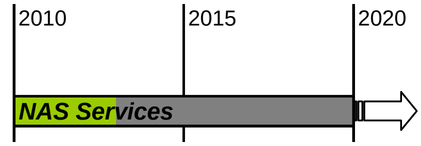
Program Plans FY 2011-2014 – Performance Output Goals
- Receive executive approval for Segment 2 of AIM Modernization.
- Complete legacy cut over to modernized system.

- Achieve final operating capability for FNS and ADAM.
- Complete interface to System Wide Information Management (SWIM).
- Complete digital weather and digital flight planning services.
- Initiate integrated pilot briefing and pre-flight management services.

Program Implementation Schedule

Aeronautical Information Management Modernization

First site IOC: June 2007 -- Last site IOC: September 2013



(Page Intentionally Left Blank)

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix C

Fiscal Years 2010 – 2014

(Page Intentionally Left Blank)

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2010 Budget	FY 2011 Est.	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.
	Activity 1: Engineering, Development, Test, and Evaluation	**$523.9**	**$767.5**	**$907.1**	**$1,217.9**	**$1,321.6**
1A01	Advanced Technology Development and Prototyping (ATDP)	$41.8	$37.5	$33.9	$30.4	$28.1
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$12.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$5.5	$5.6	$5.7	$5.9	$6.0
1A05	NextGen Network Enabled Weather (NNEW)	$20.0	$43.0	$56.4	$36.6	$33.8
1A06	Data Communication in support of Next Generation Air Transportation System (NextGen)	$51.7	$132.8	$214.6	$389.5	$714.7
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$33.8	$30.0	$30.0	$30.0	$30.0
1A08	Next Generation Air Transportation System (NextGen) - System Development	$66.1	$70.8	$100.2	$101.0	$119.1
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations	$63.5	$43.0	$32.0	$31.0	$28.0
1A10	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact	$35.6	$64.3	$66.7	$109.8	$77.0
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$51.8	$38.0	$33.0	$35.0	$35.0
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$44.6	$57.0	$53.0	$51.0	$44.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$64.3	$64.1	$45.2	$36.9	$18.0
1A14	Next Generation Air Transportation System (NextGen) - Safety, Security, and Environment	$8.2	$8.0	$10.0	$10.0	$8.0
1A15	Next Generation Air Transportation System (NextGen) - Networked Facilities	$24.0	$160.4	$213.4	$337.8	$166.9
	Activity 2: Air Traffic Control Facilities and Equipment	**$1,570.9**	**$1,470.9**	**$1,513.8**	**$1,446.6**	**$1,400.3**
	A. En Route Programs	**$683.4**	**$636.0**	**$682.9**	**$639.1**	**$586.7**
2A01	En Route Automation Modernization (ERAM)	$171.8	$131.5	$130.0	$125.0	$129.0
2A02	En Route Communications Gateway (ECG)	$3.6	$16.3	$19.8	$18.5	$9.9
2A03	Next Generation Weather Radar (NEXRAD)	$6.9	$6.7	$2.8	$3.3	$1.2
2A04	Air Traffic Control System Command Center (ATCSCC) Relocation	$10.3	$2.1	$2.1	$0.0	$0.0
2A05	ARTCC Building Improvements/Plant Improvements	$51.3	$57.0	$62.0	$62.4	$62.4
2A06	Air Traffic Management (ATM)	$31.4	$15.2	$8.5	$13.4	$8.1
2A07	Air/Ground Communications Infrastructure	$8.6	$2.5	$2.8	$2.0	$2.0
2A08	ATC Beacon Interrogator (ATCBI) - Replacement	$4.7	$0.0	$0.0	$0.0	$0.0
2A09	Air Traffic Control En Route Radar Facilities Improvements	$5.3	$5.6	$5.8	$5.9	$0.9
2A10	Voice Switching Control System (VSCS)	$16.7	$15.9	$0.0	$0.0	$0.0
2A11	Oceanic Automation System	$7.7	$9.8	$14.9	$12.1	$6.0
2A12	Corridor Integrated Weather System (CIWS)	$2.3	$5.5	$3.0	$0.0	$0.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2010 Budget	FY 2011 Est.	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.
2A13	Next Generation VHF Air/Ground Communications System (NEXCOM)	$70.2	$60.5	$64.7	$52.0	$45.0
2A14	System-Wide Information Management (SWIM)	$54.6	$76.0	$22.5	$6.3	$3.9
2A15	Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$201.4	$175.2	$284.2	$270.7	$256.9
2A16	Windshear Detection Service	$1.0	$0.0	$0.0	$0.0	$0.0
2A17	Weather and Radar Processor (WARP)	$17.6	$6.7	$1.8	$0.7	$0.7
2A18	Collaborative Air Traffic Management Technologies (CATMT)	$18.1	$49.5	$57.9	$66.8	$60.7
	B. Terminal Programs	**$501.0**	**$451.2**	**$432.9**	**$440.9**	**$457.8**
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$17.3	$0.0	$2.2	$10.0	$11.1
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$9.9	$8.6	$7.7	$2.1	$0.5
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$28.0	$32.0	$41.8	$42.0	$39.5
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$3.0	$20.0	$65.0	$75.0	$86.7
2B05	Terminal Automation Program	$9.6	$6.0	$2.5	$2.5	$2.6
2B06	Terminal Air Traffic Control Facilities - Replace	$176.0	$145.0	$160.0	$165.0	$170.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$38.9	$48.0	$53.3	$52.7	$52.7
2B08	Terminal Voice Switch Replacement (TVSR)	$10.5	$0.0	$0.0	$0.0	$0.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$26.0
2B10	Airport Surveillance Radar (ASR-9)	$3.5	$0.0	$0.0	$0.0	$0.0
2B11	Terminal Digital Radar (ASR-11)	$12.6	$4.1	$3.4	$4.4	$4.4
2B12	Runway Status Lights (RWSL)	$117.3	$85.7	$9.8	$0.0	$1.8
2B13	National Airspace System Voice Switch (NVS)	$26.6	$50.0	$50.0	$50.0	$50.0
2B14	Voice Recorder Replacement Program (VRRP)	$11.9	$9.6	$0.0	$0.0	$0.0
2B15	Integrated Display System (IDS)	$7.0	$8.7	$8.8	$8.2	$8.2
2B16	Integrated Terminal Weather System (ITWS)	$1.9	$4.7	$0.0	$0.0	$1.3
2B17	Remote Maintenance Monitoring	$1.0	$0.0	$0.0	$0.0	$0.0
2B18X	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)*	$0.0	$2.8	$2.4	$3.0	$3.0
	C. Flight Service Programs	**$29.4**	**$32.2**	**$23.8**	**$12.9**	**$8.7**
2C01	Automated Surface Observing System (ASOS)	$5.5	$6.7	$2.5	$0.0	$0.0
2C02	Flight Service Station (FSS) Modernization	$20.1	$22.3	$16.5	$8.5	$2.5
2C03	Weather Camera Program	$3.8	$3.2	$4.8	$4.4	$6.2
	D. Landing and Navigation Aids Programs	**$195.7**	**$146.6**	**$144.1**	**$141.5**	**$134.4**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$5.0	$5.0	$5.0	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$8.6	$7.8	$5.0	$7.0	$7.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2010 Budget	FY 2011 Est.	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.
2D03	Wide Area Augmentation System (WAAS) for GPS	$97.4	$101.1	$100.5	$100.3	$107.9
2D04	Runway Visual Range (RVR)	$5.0	$5.0	$5.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$8.7	$5.0	$5.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$6.0	$6.0	$5.0	$5.0	$0.0
2D07	Visual Navaids - Establish/Expand	$3.7	$3.2	$3.4	$5.0	$0.0
2D08	Instrument Flight Procedures Automation (IFPA)	$7.9	$0.5	$2.2	$1.8	$2.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$6.0	$6.0	$6.0	$8.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$7.0	$7.0	$5.0	$5.0
2D11	GPS Civil Requirements	$43.4	$0.0	$0.0	$0.0	$0.0
	E. Other ATC Facilities Programs	**$161.4**	**$204.9**	**$230.0**	**$212.2**	**$212.7**
2E01	Fuel Storage Tank Replacement and Monitoring	$6.2	$6.3	$6.4	$6.6	$6.7
2E02	Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)	$18.2	$15.0	$15.7	$16.3	$16.5
2E03	Aircraft Related Equipment Program	$10.0	$9.0	$13.0	$9.0	$9.0
2E04	Airport Cable Loop Systems - Sustained Support	$6.0	$5.0	$5.0	$5.0	$5.0
2E05	Alaskan NAS Interfacility Communications System (ANICS)	$9.0	$12.1	$10.7	$0.0	$0.0
2E06	Facilities Decommissioning	$5.0	$5.0	$5.0	$5.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$101.0	$147.5	$160.0	$165.0	$170.0
2E08	Aircraft Fleet Modernization	$6.0	$0.0	$9.0	$0.0	$0.0
2E09X	Independent Operational Test/Evaluation*	$0.0	$5.0	$5.2	$5.3	$5.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$130.4**	**$149.6**	**$171.8**	**$127.8**	**$112.3**
	A. Support Equipment	**$108.4**	**$138.5**	**$160.5**	**$116.3**	**$100.4**
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A02	Aviation Safety Analysis System (ASAS) - Regulation & Certification for Infrastructure System Safety (RCISS)	$10.5	$14.6	$22.5	$8.9	$11.5
3A03	Logistics Support Systems and Facilities (LSSF)	$9.3	$11.5	$0.8	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$10.2	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$18.0	$20.0	$30.0	$15.0	$19.4
3A06	Information Security	$12.3	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$20.0	$23.4	$37.1	$31.5	$9.5
3A08	Aviation Safety knowledge Management Environment (ASKME)	$8.1	$14.8	$17.2	$6.9	$16.0
3A09X	Logical Access Control	$0.0	$10.2	$9.0	$10.0	$0.0

BLI Number	Capital Budget Program	FY 2010 Budget	FY 2011 Est.	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.
	B. Training, Equipment, and Facilities	**$22.0**	**$11.1**	**$11.3**	**$11.5**	**$11.8**
3B01	Aeronautical Center Infrastructure Modernization	$13.8	$10.1	$10.3	$10.5	$10.8
3B02	Distance Learning	$1.5	$1.0	$1.0	$1.0	$1.0
3B03	NAS Training Facilities - Simulator	$6.7	$0.0	$0.0	$0.0	$0.0
	Activity 4: Facilities and Equipment Mission Support	**$230.0**	**$235.8**	**$238.2**	**$235.4**	**$239.7**
4A01	System Engineering and Development Support	$31.7	$32.3	$32.9	$33.5	$34.1
4A02	Program Support Leases	$37.5	$38.6	$39.7	$40.9	$42.1
4A03	Logistics Support Services (LSS)	$11.0	$8.5	$8.5	$8.5	$8.5
4A04	Mike Monroney Aeronautical Center Leases	$16.2	$16.6	$17.0	$17.5	$17.9
4A05	Transition Engineering Support	$15.0	$15.0	$15.0	$15.0	$15.0
4A06	Frequency and Spectrum Engineering	$3.6	$2.0	$0.0	$0.0	$0.0
4A07	Technical Support Services (TSS)	$22.0	$22.0	$22.0	$25.0	$30.0
4A08	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$4.0	$0.0
4A09	Center for Advanced Aviation System Development (CAASD)	$79.0	$79.0	$80.8	$82.7	$84.6
4A10	Aeronautical Information Management (AIM)	$10.0	$17.8	$18.3	$8.3	$7.6
	Activity 5: Personnel Compensation, Benefits, and Travel	**$470.0**	**$498.2**	**$514.1**	**$530.3**	**$547.0**
5A01	Personnel and Related Expenses	$470.0	$498.2	$514.1	$530.3	$547.0
	* BLI numbers with X represent outyear programs not requested in the FY 2010 President's Budget.					
	Out-year funding amounts are estimates that assume enactment of the Administration's reauthorization proposal to reform FAA's financing system by adopting cost-based user fees and fuel taxes for the costs of air traffic services.					
	Total Year Funding	**$2,925.2**	**$3,122.0**	**$3,345.0**	**$3,558.0**	**$3,621.0**
	Targets April 2009	**$2,925.2**	**$3,122.0**	**$3,345.0**	**$3,558.0**	**$3,621.0**

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix D

Fiscal Years 2010 – 2014

(Page intentionally left blank)

APPENDIX D

FAA CAPITAL PROGRAM

INFORMATION FOR MAJOR PROGRAMS

Because of the criticality of on-budget and on-time acquisitions to the efficient transition to NextGen, The Government Accountability Office (GAO) was directed to determine the status of ATO's performance in acquiring ATC systems.

In December 2007 the GAO issued its report GAO-08-42 entitled, "AIR TRAFFIC CONTROL FAA Reports Progress in System Acquisitions, but Changes in Performance Measurement Could Improve Usefulness of Information". This report documented the findings and provided recommendations to the FAA.

One recommendation was to identify or establish a vehicle for regularly reporting to Congress and the public on ATO's overall, long-term performance in acquiring ATC systems by providing original budget and schedule baselines for each program and the reasons for any baseline revision. The table provided in this Appendix provides the most current information for FAA's Major Active Programs and is in direct response to the GAO's recommendation.

(Page intentionally left blank)

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Comments
Advanced Technologies and Oceanic Procedures (ATOP)	May-01	Mar-06	$548.2	May-01	Mar-06	$548.2	
Air Traffic Control Beacon Interrogator Replacement (ATCBI-6)	Aug-97	Sep-04	$282.9	May-08	May-10	$255.1	The budget was revised downward to reflect lower system procurement and installation costs in May 2008.
Airport Surface Detection Equipment - Model X (ASDE-X/3X)	Sep-01	Jan-07	$505.2	Sep-05	May-11	$550.1	The program's schedule has been extended and cost has increased due to funding reductions and addition of more sites.
Airport Surveillance Radar - Model 11 (ASR-11)	Nov-97	Sep-05	$743.3	Sep-05	Sep-09	$696.5	The procurement and deployment schedule has been extended due to funding reductions.
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2	Aug-07	Sep-14	$1,681.5	Aug-07	Sep-14	$1,690.8	An increase of 9.3M was provided to fund the acceleration for Future Air to Air Applications Development
Aviation Surface Weather Observation Network (ASWON)	Oct-99	Apr-02	$350.9	Jun-06	Sep-12	$384.3	The current baseline is to deliver product improvements out to September 2012. Original program complete
Collaborative Air Traffic Management Technologies (CATMT) Work Package 2	Sep-08	Sep-14	$109.5	Sep-08	Sep-14	$109.5	
En Route Automation Modernization (ERAM)	Jun-03	Dec-10	$2,154.6	Jun-03	Dec-10	$2,154.6	
En Route Communication Gateway (ECG)	Mar-02	Dec-05	$315.1	Mar-02	Dec-05	$315.1	
En Route System Modernization	Aug-03	May-09	$201.9	Aug-03	Oct-07	$165.5	The last console modification was completed earlier than planned and below cost
FAA Telecommunications Infrastructure (FTI)	Jul-99	Dec-08	$205.7	Sep-06	Mar-08	$316.8	This program is complete. The initial schedule delay was caused by changes to InfoSec requirements, LINCs Bridge contract, and Growth in Telecom requirements.
Integrated Terminal Weather System (ITWS)	Jun-97	Jul-03	$276.1	Nov-07	Apr-09	$286.1	The baseline schedule and cost was increased due to funding reductions and requirements changes to add Terminal Convective Weather Forecasting.
Next Generation Air-to-Ground Communication System (NEXCOM)	Sep-98	Sep-08	$407.6	Dec-05	Sep-13	$324.7	The schedule delay was due to resource issues to install radios
System Wide Information Management (SWIM) Segment 1	Jun-07	Sep-10	$96.6	Jun-07	Sep-10	$96.6	
Traffic Flow Management (TFM) - Infrastructure	Aug-05	Apr-10	$398.1	Aug-05	Apr-10	$398.1	
Wide Area Augmentation System (WAAS)	Jan-98	Aug-99	$1,006.6	May-04	Dec-08	$3,339.7	Cost was increased due to satellite communications moving to the F&E appropriation from O&M and to extend the life cycle of the baseline. The schedule was extended to meet system specification and user requirements.

(Page Intentionally Left Blank)

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix E

Fiscal Years 2010 – 2014

LIST OF ACRONYMS AND ABBREVIATIONS

A	
A/DMT	arrival/departure management tool
A/G	air-to-ground
ABRR	airborne reroute execution
ACE-IDS	automated surface observing system controller equipment-information display system
ADAM	advanced dynamic airspace management
ADAS	automated weather observation data acquisition system
ADD	airworthiness directives development
ADS-B	automatic dependent surveillance-broadcast
ADS-C	automatic dependent surveillance-contract
ADS-R	automatic dependent surveillance- rebroadcast
ADSIM	airfield delay simulation model
AEDT	aviation environmental design tool
AEFS	advanced electronic flight strip
AFS	Office of Flight Standards Service
AFS-400	FAA Flight Technologies and Procedures Division
AFSM	Alaskan flight service modernization
AFSS	automated flight service station
AIM	aeronautical information management
AIO	Office of the Chief Information Officer
AIPI	aeronautical information process improvement
AIR	FAA Aircraft Certification Service
AirNav	airports and navigations aids
AIS	aeronautical information service
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
ALL	assimilate lessons learned
ALS	airport lighting system
ALSF-2	approach lighting system with sequenced flashing light model 2
ALSIP	approach lighting system improvement program
AMASS	airport movement area safety system
AMC	Mike Monroney Center
AMP	airspace management program
AMS	acquisition management system
ANF	air navigation facilities
ANICS	Alaskan national airspace system interfacility communications system
ANS	air navigation service
ANSP	air navigation service providers
ANT	automated NextGen tower
AOC	airline operational control
APMT	aviation portfolio management tool
APTS	AVN process tracking system
ARE	aircraft and related equipment
ARMS	airspace resource management system
ARMT	airport resource management tool
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ARTS	automated radar terminal system

ARTS IE/IIE	automated radar terminal system model IE/ model IIE
ARTS IIIE	automated radar terminal system model IIIE
ASAS	aviation safety analysis system
ASDE	airport surface detection equipment
ASDE-3	airport surface detection equipment – model 3
ASDE-X	airport surface detection equipment – model x
ASDP	advanced signal data processor
ASI	aviation safety inspectors
ASIAS	aviation safety information analysis and sharing
ASKME	aviation system knowledge management environment
ASOS	automated surface observing system
ASR	airport surveillance radar
ASR-7, 8, 9, 11	airport surveillance radar model 7, 8, 9, and 11
ASTERIX	All purpose structured Eurocontrol surveillance information exchange
ASTI	Alaskan satellite telecommunication infrastructure
ASWON	automated surface weather observation network
ATC	air traffic control
ATCBI	air traffic control beacon interrogator
ATCBI-4, 5, and 6	air traffic control beacon interrogator model 4, 5, and 6
ATCSCC	air traffic control system command center
ATCT	airport traffic control tower
ATDP	advanced technology development prototyping
ATM	air traffic management
ATO	Air Traffic Organization
ATOP	advanced technologies and oceanic procedures
AUM	arrival uncertainty management
AVN	Office of Aviation System Standards
AVS	Office of Aviation Safety
AVSSMS	AVS safety management system
AWOS	automated weather observing system
AWRP	aviation weather research program
AWSS	automated weather sensor systems
B	
BAC	budget estimates at completion
BLI	budget line item
BOS	beacon only sites
BWM	bandwidth manager
C	
C3	command and control communications
CACR	collaborative airspace constraint resolution
CARF	central altitude reservation function
CARTS	common-automated radar tracking system
CAASD	Center for Advanced Aviation System Development
CAMI	civil aerospace medical institute
CAST	commercial aviation safety team
CAT	category
CATM	collaborative air traffic management
CATMT	collaborative air traffic management technologies
CBI	computer-based instruction
CDA	continuous descent approach
CDM	collaborative decision making
CDTI	cockpit display of traffic information

CEA	compliance and enforcement actions
CEO	chief executive officer
CERAP	center radar approach control
CERCLA	Comprehensive Environmental Response and Liability Act
CFE	communications facilities enhancement
CFIT	controlled-flight-into-terrain
CHI	computer human interface
CI/EP	certification of imported/exported products
CIO	chief information officer
CIP	capital investment plan
CIWS	corridor integrated weather system
CIX	collaborative information exchange
CLEEN	continuous low energy, emissions and noise
CM	configuration management
CNS	communications, navigation and surveillance
Conops	concept of operations
CONUS	Continental United States
COTS	commercial off-the-shelf
CP	change proposal
CPDLC	controller-pilot data link communications
CRD	concept and requirements document
CSMC	cyber security management center
CSPO	closely spaced parallel runway operations
CSPR	closely spaced parallel runways
CTAS	center TRACON automation system
CTP	collaborative trajectory planning
CWP	corporate work plan
D	
3-D	three dimensional
4-D	four dimensional
DASI	digital altimeter setting indicator
DataComm	data communications
DCS	data communication system
DELPHI	DOT accounting system
DHS	Department of Homeland Security
DINS	defense internet NOTAM service
DME	distance measuring equipment
DMN	data multiplexing network
DOC	Department of Commerce
DoD	Department of Defense
DOT	Department of Transportation
DOTS+	dynamic ocean tracking system plus
DS/PP	designee supervision/past performance
DSP	departure spacing program
DSR	display system replacement
DST	decision support tool
DTE	DDS (Delegation Option Authorization/Designated Alteration Station/Special Federal Aviation Regulation – 36) Technical Evaluations
DUATS	direct user access terminal system
E	
E-Scan	electronic scan
EA	enterprise architecture

EBUS	enhanced backup surveillance
ECG	en route communication gateway
EDA	en route descent advisor
EDA	engineering design approval
EDDA	environmental due diligence audit
EDC	en route departure capability
ESS	environmental systems support
EFB	electronic flight bag
EFS	electronic flight strip
EFSTS	electronic flight strip transfer system
EFVS	enhanced flight vision system
EMS	environmental management system
EON	emergency operations network
EOSH	environmental & occupational safety and health
EPA	Environmental Protection Agency
EPI	enhanced precipitation identifiers
ERAM	en route automation modernization
ERIDS	en route information display system
ETMS	enhanced traffic management system
ETVS	enhanced terminal voice switches
EUROCONTROL	European organization for the safety of air navigation
EVS	enhanced vision system
F	
F-420	airport wind sensor model F-420
FAA	Federal Aviation Administration
FAALC	FAA logistics center
FACT	future airport capacity task
FANS	future air navigation system
FAROS	final approach runway occupancy signal
FBW	fly by wire
FBWTG	FAA bulk weather telecommunications gateway
FDIO	flight data input/output
FDP2K	flight data processing 2000
FFRDC	federally funded research and development center
FI	flight inspection
FID	final investment decision
FIS-B	flight information service – broadcast
FISMA	Federal Information Security Management Act
FM	frequency modulated
FNS	federal NOTAM system
FO	flight object
FS-21	flight service automation system
FSRM	facility security risk management
FSS	flight service station
FST	fuel storage tank
FTI	FAA telecommunications infrastructure
FW	firmware
FY	fiscal year
G	
G/G	ground to ground
GA	general aviation
GBAS	ground-based augmentation system

GDP	gross domestic product
GEO	geosynchronous communication satellite
GIS	geographic information system
GLS	GNSS landing system
GNSS	global navigation satellite system
GPS	global positioning system
GUS	ground uplink station
H	
HADDS	Host ATM data distribution system
HAZMAT	hazardous materials
I	high density airport
HF	high frequency
HITL	human-in-the-loop
HOST	host computer system
HPDME	high power distance measuring equipment
I	human system integration
HSPD	Homeland Security Presidential Directive
HUD	heads-up-display
HVAC	heating, ventilating and air conditioning
HW	hardware
I	
IA	investment analysis
IAPA	instrument approach procedures automation
IARD	investment analysis readiness decision
ICAO	International Civil Aviation Organization
IDAC	integrated departure arrival capability
IDLM	interference detection, location and mitigation
IDMS	identity management system
IDS	information display system
IES	integrated enterprise solution
IFDO	international flight data object
IFPA	instrument flight procedures automation
IFP	instrument flight procedures
IFR	instrument flight rule
IID	initial investment decision
ILS	instrument landing system
IMC	instrument meteorological conditions
IOC	initial operating capability
iOE/AAA	internet obstruction evaluation and airport airspace analysis
IOS	instructor operating station
IP	internet protocol
IPDS	instrument procedure development system
IPE	Intelligent Peripheral Equipment
IPT	integrated product team
IRU	inertial reference unit
IS	information system
IDS	integrated display system
ISD4	integrated display system model 4
ISO	international standards organization
ISS	information systems security
IT	information technology
ITP	in-trail procedures

ITWS	integrated terminal weather system
IVSR	interim voice switch replacement
J	
JAWS	Juneau airport wind system
JPDO	joint planning and development
JPALS	joint precision approach and landing system
JRC	joint resources council
L	
L5	additional frequency for GPS satellites
LAAS	local area augmentation system
LAACS	logical access and authorization control service
LAHSO	land and hold short operations
LAS	Las Vegas McCarran international airport
LCGS	low cost ground surveillance
LCSS	logistical center support system
LDIN	lead in lights
LDRCL	Low-Density Radio Communication Link
LED	light emitting diode
LIDAR	light identification detection and ranging
LIS	logistics and inventory system
LL	Lincoln Laboratory
LLWAS	low-level wind shear alert system
LNAV	lateral navigation
LOB	line of business
LOC	localizer
LP	localizer performance
LPDME	low power distance measuring equipment
LPGBS	lightning protection, grounding, bonding, and shielding
LPV	lateral precision with vertical guidance
LRR	long-range radar
LRU	line replaceable units
LSS	logistics support services
LSSF	logistics support system and facilities
M	
MALSR	medium-intensity approach light system with runway alignment indicator lights
MASS	maintenance automation system software
MCO	Orlando international airport
MDR	multimode digital radio
MEARTS	microprocessor en route automated radar tracking system
MF	maintenance facility
MIA	minimum IFR altitude
MIAWS	medium intensity airport weather system
MicroEARTS	microprocessor en route automated radar tracking system
MILOPS	military operations
MIT	Massachusetts institute of technology
MITRE	MITRE Corporation
M/LAT	multilateration
MMAC	Mike Monroney Aeronautical Center
MOC	Orlando international airport
Mode S	mode select
MOIE	mission oriented investigation and experimentation
MOPS	minimum operational performance standards

MPT	meter point time
MPS	maintenance processor subsystem
MSAD	monitor safety and analyzed data
MSRD	monitor safety related data
MVA	minimum VFR altitude
N	
NADIN MSN	national airspace data interchange network – message switching network
NADIN PSN	national airspace data interchange network – package switching network
NAFIS	next generation flight inspection system
NAIMES	national airspace system aeronautical information management enterprise system
NANU	navigation advisories to NAVSTAR users
NARp	National Aviation Research Plan
NAS	national airspace system
NASA	National Aeronautics and Space Administration
NASE	NAS adaptive services environment
NASPAC	national airspace system performance analysis capability
NASR	national airspace system resources
Navaids	navigation aids
NCAR	National Center for Atmospheric Research
NCIME	Navigation Control and Interlock and Monitoring System
ND	navigation display
NDB	non-directional beacon
NDS	NOTAM distribution system
NEO	net enabled operations
NEXCOM	next generation air/ground communications
NEXRAD	next generation weather radar
NextGen	next generation air transportation system
NFRAP	no further remedial action planned
NG	next generation
NGVRRP	next generation voice recorder replacement program
NIEC	NextGen integration and evaluation capability
NISC	national airspace system implementation support contract
NIST	National Institute of Standards and Technology
NLDN	national lightning detection network
NLN	national logging network
NMR	NADIN MSN Rehost
NNEW	NextGen network enabled weather
NOAA	National Oceanic and Atmospheric Administration
NPA	non-precision approach
NORDO	no radio
NOTAM	notice to airmen
NSPD 39	National Security Presidential Directives 39
NTSB	National Transportation Safety Board
NVS	national airspace system voice switch
NWS	National Weather Service
O	
OEAAA	obstruction evaluation/airport airspace analysis
OASIS	operational and supportability implementation system
OCS	operational control segment
OCX	modernized operational control segment
OEP	operational evolution partnership
OFDPS	offshore flight data processing system

O&M	operation and maintenance
OMB	Office of Management and Budget
OPD	optimized profile descents
Ops	operations
ORD	operational readiness demonstration
OSA	operational safety assessment
OSED	operational services and environment description
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration
OSPe	oversee system performance - external
OSPi	oversee system performance - internal
OTA	other transactions agreements
OTM	oceanic trajectory management
OTW	out-the window
P	
P3I	pre-planed product improvement
PACS	physical access control system
PAPI	precision approach path indicator
PATM	performance-based air traffic management
PBN	performance based navigation
PBWP	product based work plan
PCB	polychlorinated biphenyl
PDARS	performance data analysis and reporting system
PDD	presidential decision directive
PDR	preliminary design review
PFD	pilot flight director
PIREPS	pilot reports
PLM	programming language for microcomputers
PMC	program management committee
PNT	position, navigation and timing
PM	meter points
PPS	precision positioning service
PRM	precision runway monitor
PRM-A	precision runway monitor alternate
PSP	program safety plan
R	
RA	resolution advisory
RAM	reliability availability and maintainability
RAPT	route availability planning tool
RBRT	risk based resource targeting
RCAG	remote center air/ground
RCE	radio control equipment
RCISS	regulation and certification infrastructure system safety
RCL	radio communication link
RCOM	recovery communications
RCRA	resource conservation and recovery act
RDA	radar data acquisition
RDT&E	research, development, test, and evaluation
RD&E	research, engineering, and development
REIL	runway end identifier lights
REL	runway entrance lights
RFI	radio frequency interference

RIL	runway intersection lights
RIRP	runway incursion reduction program
NAV	area navigation
RMM	remote maintenance monitoring
RMMS	remote maintenance and monitoring system
RMLS NRN	remote monitoring and logging system national RMM network
RMSET	Remote Maintenance System Engineering Team
RNAV	area navigation
RNP	required navigation performance
RNP-3D	required navigation performance – 3 dimensions
RPM	revenue passenger mile
RPN-4	required navigation performance-4 nm
RTA	required time of arrival
RTP	resource tracking program
RUC	rapid update cycle
RVR	runway visual range
RWI	reduce weather impact
RWSL	runway status lights
S	
SAIDS	system Atlanta information display system
SAMS	special use airspace management system
SARA	superfund amendment and reauthorization act
SARPS	standards and recommended practices
SAS	safety assurance system
SAS	single authoritative source
SASO	system approach for safety oversight
SAT	site acceptance test
SAWS	standalone weather sensors
SBAS	satellite based augmentation system
SBS	surveillance and broadcast services
SC	special committee
SD	situation display
SDAT	sector design and analysis tool
SDF	Louisville international airport
SDP	signal data processor
SESAR	Single European Sky ATM Research
SETA	system engineering and technical assistance
SFA	special flight authorizations
SID	standard instrument departure
SIR	screening information request
SITS	security integrated tool set
SITA	Societe internationale de telecommunications aeronautiques
SL	STARS Lite
SLEP	service life extension program
SMA	surface movement advisor
SMGCS	surface movement guidance and control systems
SMO	system maintenance office
SMP	strategic management process
SMS	safety management system
SNT	staffed NextGen tower
SO	staff office
SpclAC	special airworthiness certifications

SPS	standard positioning service
SR	system requirements
SRM	safety risk management
SRT	standard reference tables
SSA	system safety assessment
STAR	standard terminal arrival routes
STARS	standard terminal automation replacement system
STB	system training building
STBO	surface trajectory based operation
STC	sensitivity time constant
STD	standard
StdAC	standard airworthiness certifications
STM	surface traffic management
SUA	special use airspace
SVS	synthetic vision system
SW	software
SWIM	system-wide information management
T	
TACAN	tactical air navigation antenna
TAMR	terminal automation modernization replacement
TBFM	time-based flow management
TBM	trajectory based management
TBO	trajectory based operations
TCAS	traffic alert and collision avoidance system
TCM	taxi conformance monitoring
TDDS	terminal data distribution system
TDLS	tower data link service
TDWR	terminal Doppler weather radar
TFDM	tower flight data manager
TFM	traffic flow management
TFM-M	traffic flow management modernization
TFMS	traffic flow management system
THL	takeoff hold lights
TIS-B	traffic information service-broadcast
TMA	traffic management advisor
TMI	traffic management initiative
TMU	traffic management unit
TR	technical refresh
TRACON	terminal radar approach control
TRAMS	TCAS resolution advisory (RA) monitoring system
TSD	traffic flow management situation display
TSDE	traffic situation display re-engineering
TSO	technical standard order
TSS	technical support services
TSSC	technical support services contract
TVSR	terminal voice switch replacement
TWIP	terminal weather information for pilots
U	
UAS	unmanned aircraft system
UAT	universal access transceiver
UAV	unmanned aerial vehicles
UHF	ultra high frequency

UIS	unstaffed infrastructure sustainment
URET	user request evaluation tool
USNS	U.S. Notices to Airmen system
V	
VASI	visual approach slope indicator
VCE	VSCS common equipment
VDL	VHF data link
VFR	visual flight rules
VHF	very high frequency
VLJ	very light jet
VMC	visual meteorological conditions
VNAV	vertical navigation
VOR	very high frequency omni-directional range
VORTAC	very high frequency omni-directional range collocated with tactical air navigation
VRRP	voice recorder replacement program
VSCS	voice switching and control system
VSR	voice switch replacement
VT	virtual tower
VTC	VSCS training and backup system (VTABS) test controller
VTABS	VSCS training and backup system
W	
WAAS	wide-area augmentation system
WARP	weather and radar processor
WAT	work activity tracking
WINS	weather information network server
WJHTC	William J. Hughes Technical Center
WME	wind measuring equipment
WM/LAT	wide area multilateration
WMSCR	weather message switching center replacement
WP	work package
WRS	WAAS reference stations
WSDS	Wind Shear Detection Services
WSP	weather systems processor
WT	wake turbulence
WTIC	weather technology in the cockpit program
WTMA	wake turbulence mitigation for arrivals
WTMD	wake turbulence mitigation for departures
WTMSR	wake turbulence mitigation for single runway
WTS	work tracking software
WTS-BMgmt	work tracking software - budget management
WX	Weather