Federal Aviation Administration

National Airspace System Capital Investment Plan

FY 2011–2015

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Table of Contents

Table of Figures

Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2011–2015

1 Introduction

1.1 The Capital Investment Plan

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) describes the planned investment in the National Airspace System (NAS) for the next 5 years. A provision in annual appropriations laws requires us to transmit to the Congress a comprehensive capital investment plan for the FAA which estimates funding for each budget line item for 5 years. The total funding for each year is limited to the funding targets included in the President's Budget Request.

The planned activities for CIP projects are consistent with both the President's fiscal year (FY) 2011 budget request and our projected future year estimates. Several factors determine how funding estimates for budget line items are developed. Funding for a large capital investment project is based on the amount that fulfills commitments in the acquisition contract, and it also includes 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 reference for relating the capital projects to our strategic plan. We are currently developing an updated strategic plan, but we will not finish it until after we send this CIP to Congress. We do not anticipate radical changes in the new strategic plan.

The Flight Plan articulates the most important goals for improving our performance in delivering aviation services. These goals guide us in upgrading NAS performance and adjusting operations to meet the demands that future growth places on the system. Our strategic goals are supported by objectives, strategies, and initiatives that identify actions we need to take to meet the associated performance targets. Each objective has measurable performance targets that determine our progress in meeting the overall goals. We regularly compare our actual performance to the established targets to determine whether 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**—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.

We tie our capital investments to the strategic plan by identifying the goal they support. 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 for which that project's contribution is most significant. In the summary table in appendix A, several projects appear under each performance measure. This is because many projects are interdependent, and one project may not be successful in meeting a performance target without completing 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.

To better explain how a project contributes to a strategic goal we include a section titled, "Relationship of Program to FAA Strategic Goal, Objective, and Performance Target" in Appendix B 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 uses a disciplined process for determining funding amounts for modernization projects. We have established a rigorous method for evaluating, approving, and managing projects. To obtain approval, a project must develop a business case that estimates both project cost and benefits. A Capital Investment Team composed of representatives from budget and finance, and as appropriate representatives of ATO vice-presidents and other FAA organizations, reviews this business case. 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 prepared by the integrated product team is either modified or accepted, and the FAA commits to fully fund that baseline, so that projected benefits are not diminished because the project cannot be implemented consistent with its planned schedule.

Appendix D, requested by the Government Accountability Office, lists major programs and identifies those that have experienced baseline changes and describes the impact of those changes. There are several reasons for increases in a project's baseline. If available annual funding is below the established baseline, the project schedule is extended, which results in increased costs because the added years require inflation adjustments to labor rates, and the labor hours used will normally exceed the baseline estimates. The other common reasons for baseline increases are that the project encounters unforeseen technical problems that require additional engineering design and production time, or issues discovered during field installation require more elaborate site preparation.

To manage projects to stay within the established baselines, project oversight must continue after initial approval. The JRC conducts regular program reviews of progress and assesses the project's potential to deliver the planned benefits within the estimated cost envelope. Projects that are over cost and/or behind schedule can be restructured or cancelled. To reflect these decisions, we must update the Capital Investment Plan financial baseline and include these adjustments so we can continue to seek the best solutions for improving the safety and efficiency of air traffic services and expanding capacity.

Appendices B and C detail 5 years of capital investments, but this Introduction includes roadmaps that have schedule information with a longer time horizon. The roadmaps show the planned NextGen upgrades that will continue through 2025. Section 3 contains service roadmaps that show the planned operational improvements that will be possible with the NextGen system, and section 4 contains the infrastructure roadmaps that system engineers have developed to translate those improvements into hardware and software changes. These roadmaps are an essential part of the Enterprise Architecture that helps engineers look at the broader system engineering issues to ensure that modernization efforts are integrated for the several systems that 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 during the transition.

1.4 Important Factors Affecting Planning for the Future

1.4.1 Nature of Capital Investment

Capital investments normally require extensive planning and development time. They often take several years to implement because their designs are technologically complex; they require development of both new software and hardware; and they then require extensive testing to ensure that they meet the reliability standards to be used for air traffic control. Thus, project managers must plan for the operating environment forecast for 4 or more years in the future rather than assuming systems that can handle the present level of operations will be adequate. The FAA prepares a detailed forecast of future aviation activity every year to help project managers assess the future operating environment.

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 December 2009, estimates that aviation accounted for over $1.3 trillion in economic activity in 2007, which is 5.6 percent of the total U.S. economic activity. The spending on aviation-related economic activity supported an estimated 12 million aviation-related jobs, and U.S. air carriers transported over 40 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 Gross Domestic Product (GDP). Because our inflation-adjusted (real) economic output has a long-term growth trend, it has supported the continuing increases in the number of passengers and the miles traveled. There are some minor deviations in both GDP and RPM growth, which are caused by abnormal events, such as the terrorist attacks of September 11, 2001 and the recent adjustments in the financial sector. It is our expectation, however, that economic growth will resume after a period of decline. Such factors as population growth, increases in productivity, and introduction of new technology are likely to drive future growth in air travel. Growth in air travel demand normally leads 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, and we must implement the advanced NextGen capabilities to provide the improved services to handle this growth.

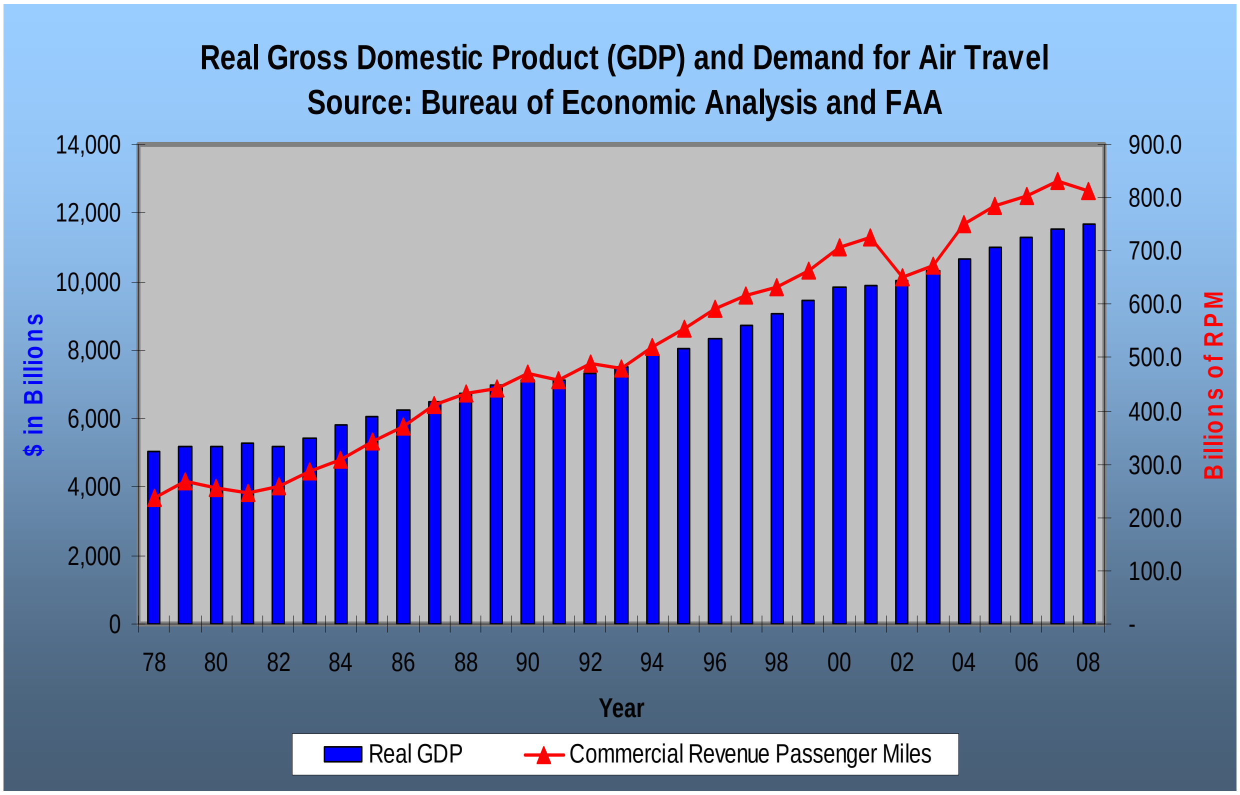


Figure 1 Air Travel Demand Growth Compared to Growth in GDP

1.4.3 Growth in En Route Operations

In 2009, air carrier operations dropped 6.9 percent due to the downturn in the economy and air carrier's efforts to adjust their capacity to match demand. There are signs of nascent growth in the economy, and the Administration's economic forecast is 1.8 percent annual growth in 2010. Despite the forecast for economic growth, it is unlikely there will be corresponding growth in air travel in 2010.

The FAA Aerospace Forecast Fiscal Years 2009-2025 stated, "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." That forecast projected that FAA workload will grow an average of 1.7 percent per year at terminal facilities and an annual average increase of 2.1 percent per year at en route facilities between 2010 and 2025.

The nature of the current downturn suggests that recovery will be slower than it was in past downturns and the strength of the recovery will be more muted. However, as we pointed out in section 1.4.1, we must plan for the forecasted long term growth 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 in future years.

Another long-term factor that affects the need for capital investment is the continuing effort to increase airport capacity, especially at the larger airports, which are experiencing significant delays. Some of these airports have been able to increase capacity by building new runways and making other airfield improvements. Since FY 2000, 21 airfield projects have opened at the busiest airports including 15 new runways, 3 taxiways, 1 runway extension, 1 airfield reconfiguration completed, and 1 airfield reconfiguration two-thirds completed. The 21 projects have provided these airports with the potential to accommodate 1.9 million more annual operations, decrease average delay per operation at these airports by about 5 minutes, and reduce the potential for runway incursions. In addition, four airports have airfield projects under construction that will provide these airports with the potential to accommodate an additional 110,900 annual operations and decrease average delay by about 1.5 minutes per operation. These larger airports are critical to overall NAS performance because they handle about 75 percent of airline passengers.

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. New runways often require that airspace around the airports be 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 surveillance systems to cover expanded departure and approach patterns. 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 carefully balancing investing so that adequate funding is provided to both sustain the highly reliable performance of the current air traffic control system and develop the more capable system that will handle future growth. We must ensure that current operational facilities and equipment deliver reliable and accurate services until our investments in new technology are ready to deliver the operational improvements to provide increased capacity.

2.1 Sustaining Current System Performance

The air traffic control system requires very high reliability and availability. Once an aircraft is airborne in controlled airspace, maintaining its separation from other aircraft for the entire flight from takeoff to landing depends on reliable operation of FAA communication, navigation and surveillance systems. Each system in the NAS has a high level of redundancy to support system reliability that will minimize service disruptions, and the FAA must replace equipment regularly to reduce the potential for 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. The FAA currently allocates more than half of the Facilities and Equipment expenditures to upgrade and replace facilities and equipment that have degraded over time. Uncorrected problems with buildings or the equipment inside can cause expensive disruptions in air traffic control.

2.2 Making Interim Upgrades to Existing Equipment

In addition to replacing critical facilities and equipment that have been damaged or are experiencing declining performance, the FAA must also upgrade equipment to stay current with manufacturer upgrades. Since many ATC systems now rely on commercial-off-the-shelf hardware and software, we must keep pace with changes as manufacturers release them. Normally each upgrade depends on installation of previous releases, and our skipping an upgrade can often lock us into an obsolescent configuration that we can no longer upgrade.

Electronic components and computer systems become obsolete, and sometimes we must replace them because manufacturers no longer produce repair parts. In other cases, when we replace obsolescent components in one type of equipment, we may need to change parts in connected equipment that sends information to or receives information from that obsolescent part. Examples of systems that the FAA must continually upgrade are the radios controllers use to communicate with pilots and the voice switches that allow controllers access to the many voice channels that they use to communicate with pilots and each other.

The FAA also replaces equipment because it needs 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 goal of reducing energy consumption. Funding for these projects will continue until the savings no longer exceeds the cost.

2.3 NextGen Investments

NextGen is an umbrella term for the ongoing, wide-ranging transformation of the United States' national airspace system (NAS), including our national system of airports, to ensure future safety, capacity and environmental needs are met. NextGen will allow us to fundamentally change the way we manage air traffic by combining new technologies for surveillance, navigation, and communications with workforce training, procedural changes, and airfield development.

The fiscal year 2011 budget includes over $515 million to deploy transformational programs 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 core technologies will allow us to introduce new capabilities promised for NextGen. They provide the communication, navigation, and surveillance technology to support the more sophisticated information flows that will allow better use of airspace capacity.

The FAA will use an additional $480 million over and above the funding for the transformational programs to develop procedures and technology to support the NextGen solution sets (e.g., trajectory-based operations, high-density arrivals and departures, and five others). Future investments in improved communications, navigation, surveillance, and automation systems will support transition to a more capable air traffic control system, which will allow use of less separation between aircraft and result in more efficient use of available capacity.

This CIP shows that the transition to NextGen is well underway. 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, a larger proportion of the field installation and infrastructure funding shown in figure 2 will be available for NextGen development and implementation.

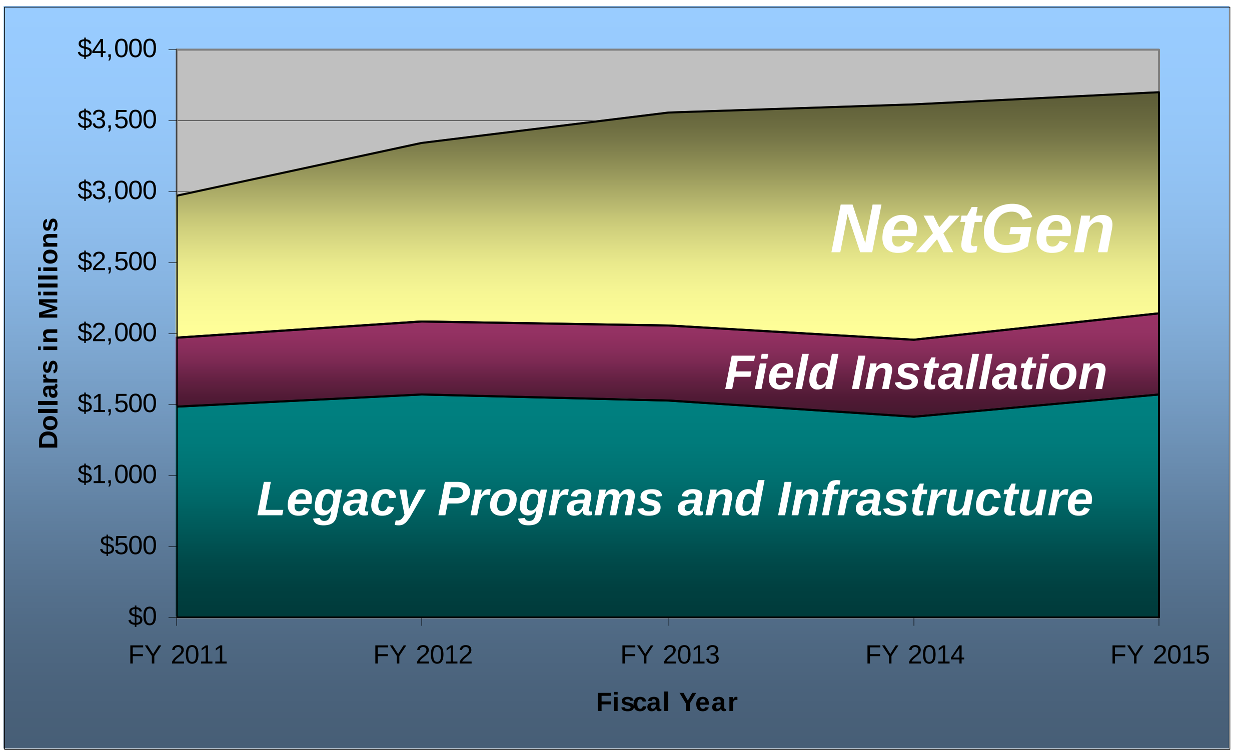


Figure 2 NextGen Portfolio Relative to the Total Capital Request

2.4 Major Initiatives in FY 2011 Budget

Some of the major initiatives funded in FY 2011 that address safety, capacity, and environmental issues are highlighted below. These high-priority projects address aviation challenges and reflect our best efforts to find solutions to them.

2.4.1 Safety

In FY 2011, the FAA is continuing its emphasis on eliminating runway incursions with a high level of investment in Runway Status Lights (RWSL) and continued funding for Airport Surface Detection Equipment – Model X (ASDE-X).

The RWSL program is requesting $55 million to finish constructing and installing systems at 8 of 22 airports. The JRC approved the RWSL program for 22 operational and 3 support sites. 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 ASDE-X program is well underway, and we have requested funding in FY 2011 to finish commissioning the final three systems. We postponed installing these systems because of other conflicting construction at the airport. They provide airport operating area status to controllers and also transmit information that enables operation of 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 that controllers can take swift action to reduce Category A & B runway incursions and aid pilots in preventing surface collisions.

We are requesting increase in spending on computerized safety systems in FY 2011 including:

- $23.4 million for the System Approach for Safety Oversight (SASO), a computerized database that provides safety inspectors with compliance records for the companies and aircrew being inspected;
- $14.8 million for Aviation Safety Knowledge Management Environment (ASKME), a database used for certification of new aircraft and subsequent modifications;
- $14.6 million for Regulation and Certification Infrastructure System Safety (RCISS) that upgrades the access to computerized data used by inspectors; and
- $8 million for the Aviation Safety Information Analysis and Sharing system which is included in the NextGen System Safety Management Transformation BLI. This system will enhance the FAA's capability to extract operationally significant safety-related information from the large, diverse, distributed data sources; identify anomalous events or trends; and fuse relevant information from all available sources to ensure that system safety risk is managed to an acceptable level.

2.4.2 Capacity

Most of the larger projects in the FY 2011 budget are the foundational technologies for NextGen as shown below:

- Spending on ADS-B is requested at $176.1 million to continue NAS-Wide deployment of ADS-B, TIS-B and FIS-B;
- Funding for DataComm is planned at $153.3 million to begin work on establishing text-based communications between aircraft and air traffic control facilities;
- The System Wide Information Management (SWIM) program is requesting $92.0 million to continue developing Segment 1 capabilities to establish the standards for information exchange among the various NAS systems, and to initiate Segment 2;
- The Collaborative Air Traffic Management (CATM) is requesting $35.9 million to continue developing software to strategically manage air traffic to minimize delays;
- The NextGen Network Enabled Weather (NNEW) program is requesting $28.3 million to develop a program that will allow rapid transfer of near real time weather information to improve both flight planning and the information pilots receive in flight to help them avoid adverse weather; and
- To continue development of the NAS Voice Switch, $30.2 million is requested

All of these technologies support the more sophisticated capabilities of NextGen to manage aircraft on the ground and in flight that will allow FAA to use airspace more efficiently. These technologies effectively expand capacity and reduce delays By allowing greater precision in planning routes and the ability to track aircraft as they fly those routes coupled with the ability to communicate more efficiently,.

Investments to sustain the condition of the existing infrastructure have received more emphasis in the past few years; for example amounts allocated to replacing electrical power systems have been substantially increased. 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 is cut off due to storms or construction accidents. This project also includes upgrading the electrical systems that protect electronic equipment from damage by lightning strikes. We have also increased the amounts budgeted for improving or replacing air traffic control towers. Many existing towers require improvements to infrastructure such as upgrades and replacement of heating, ventilation and air conditioning systems. Keeping towers operating reliably requires significant funding annually. We must also replace towers when new construction partially blocks views of the surface operating areas. Because air traffic control is so time critical, FAA facilities require exceptional reliability and stability. Preventing system outages caused by facility or electrical power failures avoids delaying or diverting aircraft, which is very costly.

2.4.3 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 mitigate 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 aircraft fuel efficiency. Improved fuel efficiency benefits the environment by reducing jet engine emissions, while also reducing costs for airlines and other operators. In addition to manufacturers, commercial operators—for economic as well as environmental reasons—are strongly motivated to decrease fuel consumption and related emissions from aircraft. Testing is currently underway to determine how to implement Continuous Descent Approach (CDA) techniques that minimize fuel consumption and have emission and noise benefits as aircraft descend to land. Optimum Descent Profiles (OPDs) which allow use of a CDA are in initial limited implementation with the expectation of further NAS implementation. NextGen capabilities will help significantly in reducing aircraft noise and emissions.

Manufacturers and users will be able to 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. Planning for and ensuring that aircraft fly shorter, more efficient routes, yields a double benefit: lower emissions and lower fuel consumption. Trajectory-Based Operations (TBO) and High Density Arrival and Departure initiatives will reduce distance traveled and decrease maneuvering in the terminal area to save both time and fuel. TBO will also provide similar efficiency benefits for en route and surface movements. 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 past two decades, the FAA has significantly upgraded the existing air traffic control system to keep pace with growing demand. Despite the recent economic downturn, delays continue to impact passenger travel at the major airports that serve the majority of passengers. Though staffed by a capable, dedicated workforce, our current air traffic control system is neither scalable nor flexible enough to meet projected future demand.

The Next Generation Air Transportation System (NextGen) represents a comprehensive overhaul of our NAS to make air travel more convenient and dependable, while improving safety and protecting the environment. The agency is well underway in laying the necessary infrastructure for users to enjoy NextGen benefits. The evolution of navigation, surveillance, and communication capabilities are enabling operational improvements that increase NAS capacity and efficiency.

Following through on an FAA request, the RTCA NextGen Mid-Term Implementation Task Force issued its Final Report on September 9. It contained several recommendations concerning opportunities to accelerate the transition to NextGen using existing technologies as a bridge to implement operational improvements. We have already begun work to address the Task Force's recommendations, and we will continue to follow up on opportunities to implement procedures and technology that will expand NAS capacity and provide better services to air travelers. These recommendations are a valuable contribution to our planning to modernize and improve the NAS. The NextGen Implementation Plan 2010 describes the agency's response to the task force recommendations and our efforts to deliver NextGen capabilities now through 2018.

A sustained engineering effort is necessary to support the ongoing development of those improvements. The FAA has developed a detailed Enterprise Architecture, which shows the migration from the existing systems to the more capable systems of the future. The architecture covers several functional areas, including automation, communications, surveillance, navigation, and weather. Over the past year, there has been a concerted effort to ensure that these functional area roadmaps in the architecture show the equipment upgrades needed to support the planned capability improvements consistent with the schedules shown in the NextGen solution sets. The architecture is the foundation for building a capital plan, and it guides project offices in scheduling and coordinating their work so that everything is installed in the right place and at the right time when new capabilities are added.

NextGen solution sets described in this section identify specific operational improvements that will enhance system capacity and efficiency. The timelines show the planned schedule for introducing new capabilities and the length of time necessary for full implementation. Integration efforts have been ongoing to identify the specific capital investments (shown in section 4) necessary to meet these timelines. Sections 3.1 through 3.7 summarize the projects that are essential for realizing these new capabilities.

3.1 Initiate Trajectory Based Operations

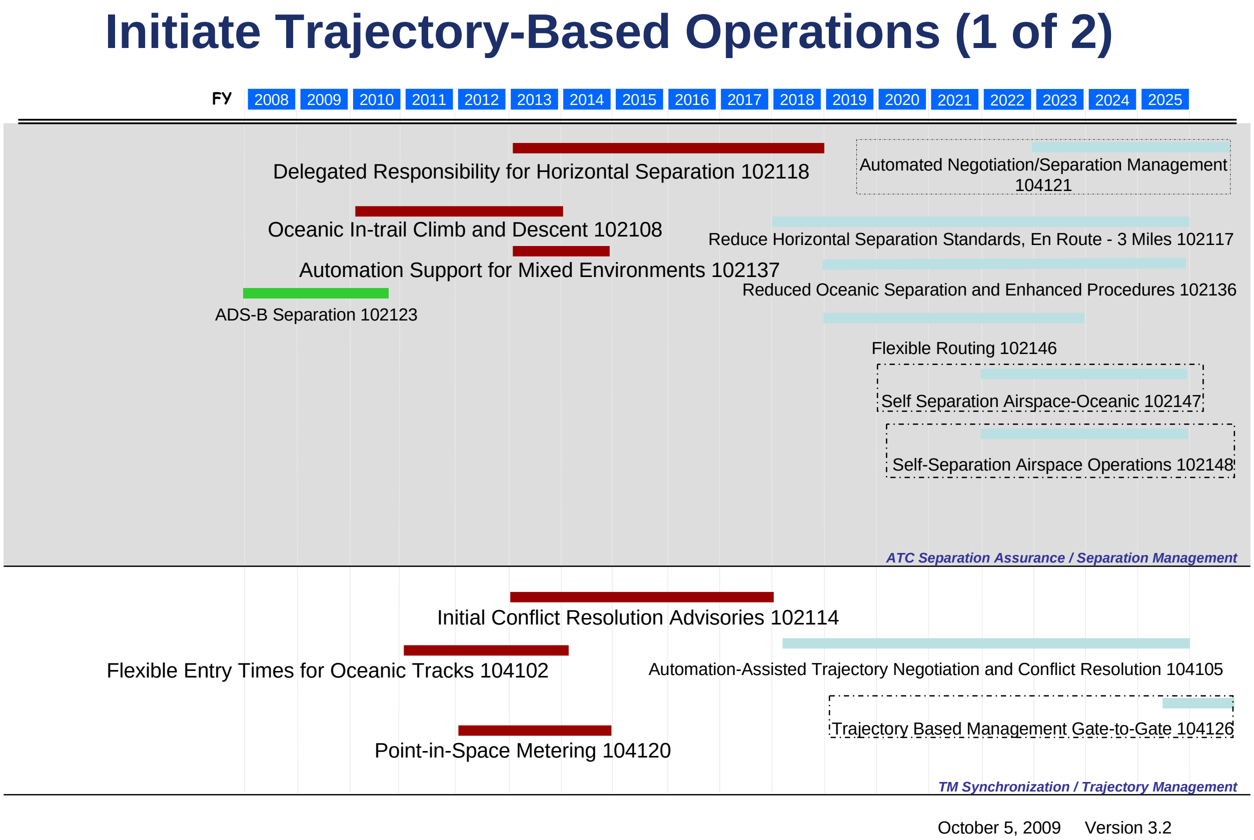
Summary Description:

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. Computer automation—ground and airborne—creates these trajectories, and the trajectories are exchanged with aircraft by DataComm, a data link system that can automatically transmit data from FAA facilities to aircraft and receive return messages. ADS-B reports the aircraft position, so the controller can determine whether the aircraft flying the trajectory will remain free of conflicts with other aircraft and restricted airspace. Key elements in making TBO work are the accurate exchange of complex information that DataComm provides and FAA's ability to negotiate via DataComm with pilots on how to maneuver if they have to deviate from their approved trajectory. This solution set focuses primarily on en route cruise operations, although all phases of flight will benefit from TBO.

Background:

Voice communication is the primary 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 automated 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.

Timeline:



Operational Improvements

This section describes the mid term-planned improvements associated with TBO that are within the scope of investments contained in this CIP. In the ATC Separation Assurance/ Separation Management box the planned improvements are the following:

1. Delegated Responsibility for Horizontal separation would allow pilots, when authorized by the controller, to maintain safe spacing with other aircraft. The aircraft would have to be equipped with Cockpit Display of Traffic Information (CDTI) and Automatic Dependent Surveillance – Broadcast (ADS-B). The CDTI would display surrounding aircraft to pilots and help them to maintain a specified distance from those aircraft. The control facilities would have to be equipped with the En Route Automation Modernization (ERAM) Mid-term work package and ADS-B display capability so controllers could monitor separation.
2. Oceanic In-Trail Climb and Descent, when authorized by the controller, would allow aircraft to safely reduce separation from the aircraft in front of them for quicker entry to their desired altitude on climb and fly more optimal descent profiles on arrival to save fuel. The aircraft would have to be equipped with ADS-B and ADS-C (a system similar to ADS-B that is used in oceanic airspace) and Controller Pilot Data Link Capability (CPDLC) and meet Required Navigation Performance 4 (RNP 4). These new capabilities

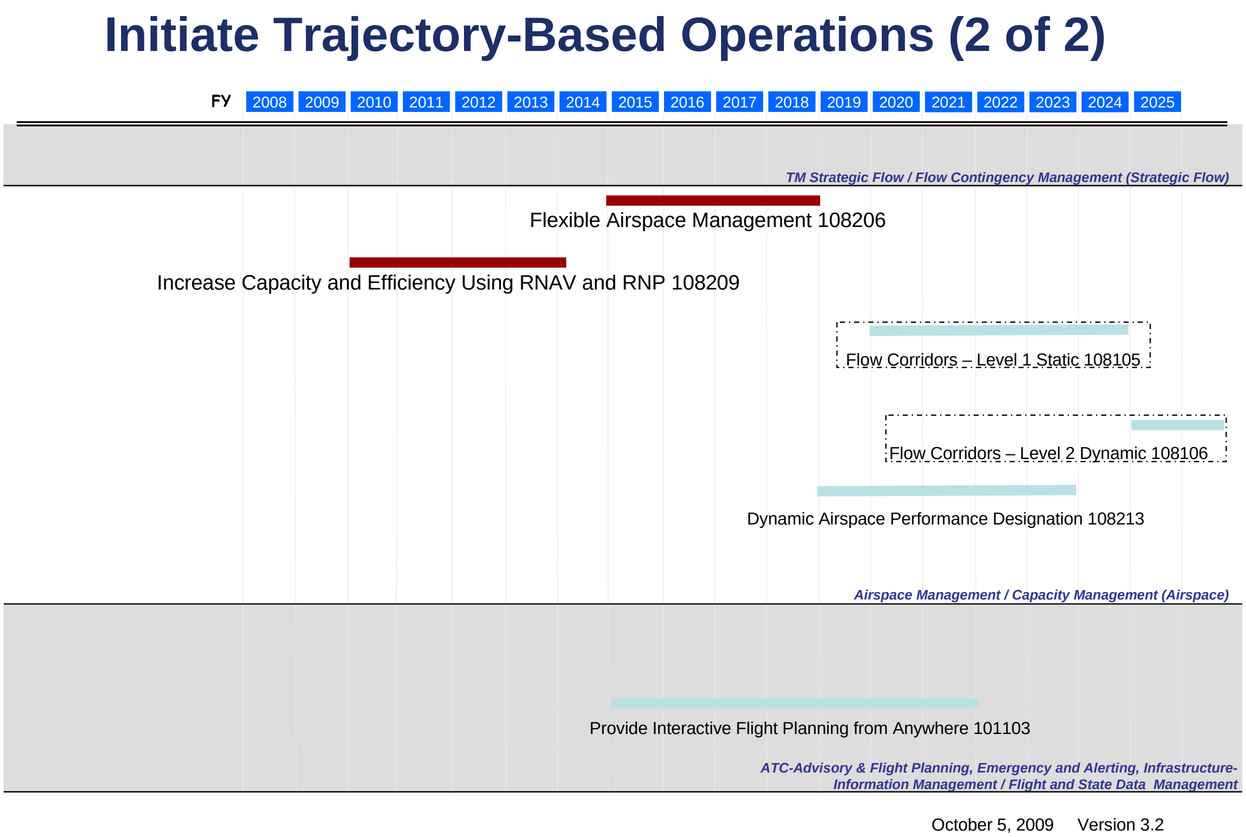
would allow aircraft to more precisely stay on an assigned path to maintain safe separation during these maneuvers. FAA investments would include upgrades to ATOP (an oceanic air traffic automation system) and CPDLC capabilities.

3. Automation Support for Mixed Environments would provide controllers with the tools to manage aircraft with differing navigation capabilities and provide safe separation when following aircraft are affected by the wake turbulence of an aircraft in front of them. The Post ERAM Release 3 work package will have to be operational. This enhancement to automation systems would be capable of providing variable levels of separation depending on the size of the aircraft and how they are equipped.

In the TM Synchronization/Trajectory Management box the planned improvements are the following:

1. Initial Conflict Resolution Advisories are an enhancement to the existing conflict probe software to provide rank-ordered advisories to the controller to better accommodate pilot requests for trajectory changes. FAA facilities must be equipped with the Post ERAM Release 3 work package; the upgraded Weather and Radar processing system (WARP); the 4-dimensional Weather Cube; and in the latter stages the NextGen weather Processor, which will replace WARP. Automation upgrades would allow ATC to better accommodate pilot requests by providing conflict detection and trial flight planning, and by developing resolutions when deviations from the original trajectory are necessary.
2. Flexible Entry Times for Oceanic Tracks will allow aircraft to reach their preferred trajectories sooner, which will minimize fuel burn. The FAA will have to upgrade the Dynamic Ocean Track System (DOTS) or develop the 4D Oceanic Trajectory Management (OTM4D) system and the accelerated Terminal Data Link System (TDLS) to support this capability. The DOTS analyzes weather data and calculates the most efficient tracks for oceanic flights, and the TDLS provides automated departure clearances to aircraft.
3. Point-in-Space Metering uses scheduling tools and TBO to ensure smooth flow of traffic and efficient use of airspace. The FAA must invest in Collaborative Air Traffic Management (CATM) upgrades; the Post ERAM Release 3 work package; and the Trajectory Based Flow Management (TBFM) tool to implement this capability. Pilots are assigned a specific trajectory and scheduled times to reach specific points on the assigned trajectory. This maximizes use of airspace by preplanning separation and minimizes the need for aircraft to change course or speed to maintain separation.

Timeline:



In the Airspace Management/Capacity Management box the planned improvements are the following:

1. Flexible Airspace Management upgrades automation to support reallocation of aircraft status information to different controller positions and, in some cases, to different facilities. These improvements will allow facility managers to shift responsibility for aircraft control to different sectors to better match the volume of traffic with available staffing. The FAA investments to implement this capability include the Airspace Information Management (AIM) system; CATM work packages 2 and 3; the ERAM Mid-term work package; terminal automation upgrades; Trajectory Based Flow Management (TBFM); the NextGen Weather Processor; and the NAS Voice Switch.

2. Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP) would rely on more accurate aircraft navigation systems to expand the number of routes available to increase airspace capacity. The FAA would have to invest in CATM work package 2; ERAM release 2 and the Post ERAM Release 3 work package; the WARP and Integrated Terminal Weather System (ITWS); the 4D weather cube and additional Distance Measuring Equipment (DME) systems. When aircraft equip with more accurate navigation systems, more routes are available because the FAA does not have to use larger separations to compensate for aircraft deviating from

assigned routes due to navigation errors. More accurate weather information also allows the FAA to reduce the length of alternative flight paths when diversions are needed to allow aircraft to avoid severe weather.

3.2 Increase Arrivals and Departures at High Density Airports

Summary Description:

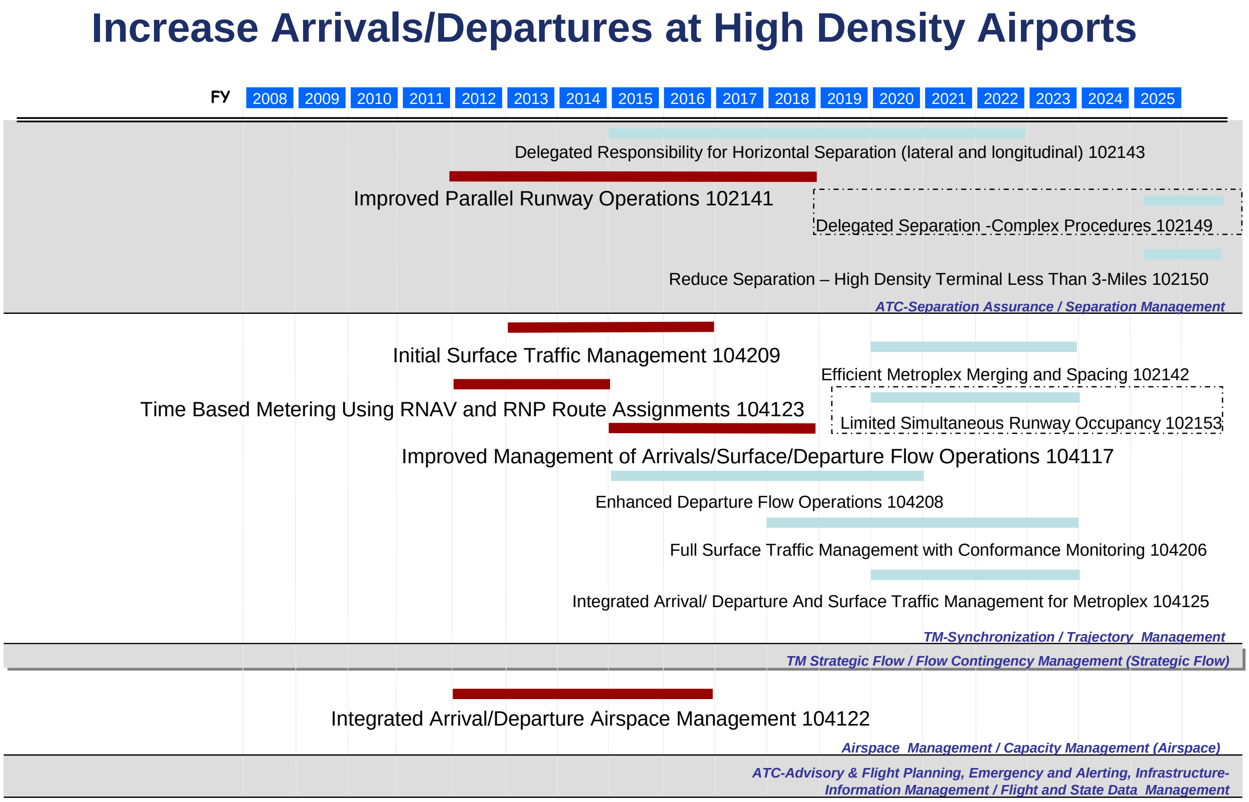
The solution set addresses improving use of available capacity at airports:

- With large numbers of operations;
- That have multiple runways with both airspace and taxiing interactions; and
- 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 a mixture of small and large aircraft, 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. Due to the effects of wake turbulence, controllers must increase separation to 5 miles or more between small aircraft following larger aircraft. 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 conflicts result, when winds dictate that an approach path for one of the airports limits the use of certain runways at nearby airports. The effect is to reduce capacity at these adjacent airports.

Timeline:



October 5, 2009 Version 3.2

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Arrivals/Departures at High Density Airports that are within the scope of investments contained in this CIP. In the ATC Separation Assurance/Separation Management box, the planned improvement is the following:

> Improved Parallel Runway Operations will explore concepts to recover lost capacity by reducing separation standards for two aircraft approaching closely spaced parallel runways. This requires increased use of procedures allowing either dependent or independent operations in lower visibility conditions, and potentially having ATC share separation responsibility with the flight deck. Investments required are an upgraded terminal automation system, the NextGen Weather Processor, the Integrated Terminal Weather System, the Ground Based Augmentation System for GPS, and the Parallel Runway Monitor. When parallel runways are less than 4,300 feet apart, special procedures are required to maintain separation for aircraft approaching the two runways side by side.

In the Traffic Management Synchronization/Trajectory Management box, the planned improvements are the following:

1. Initial Surface Traffic Management uses automation tools for departure scheduling to improve flow of surface traffic at high-density airports. Automation provides surface sequencing and staging lists for departures and predicts departure delays. Investments required are Trajectory Based Flow Management (TBFM); Tower Flight Data Manager (TFDM); Airport Surface Detection Equipment; and the System Wide Information Management (SWIM) segment 2. By better scheduling departures from the gate, the amount of taxiing time is reduced resulting in fuel and time savings.
2. Time Based Metering Using RNAV and RNP Route Assignments makes more efficient use of runways and airspace in high-density airport environments. For those aircraft that are equipped to fly more precise routes and conform to time metering, arrival and departure paths are shortened to save fuel and minimize delays. Investments required include the ERAM Midterm work package; Trajectory Based Flow Management; Weather and Radar Processor; 4D Weather Cube; and Distance Measuring Equipment. These investments allow the FAA to precisely track aircraft using these routes.
3. Improved Management of Arrivals/Surface Departure Flow Operations integrates advanced arrival/departure flow management with advanced surface operations to improve overall airport capacity and efficiency. Arrival and departure scheduling tools and 4D trajectory agreements are used to make collaborative real-time adjustments to sequencing of aircraft to optimize use of airport capacity. Investments required are Collaborative Air Traffic Management (CATM) work package 2; TFDM; NextGen Weather Processor; and DataComm segments 1 and 2. Automation equipment will be upgraded to incorporate Traffic Management Initiatives, current weather conditions, airport configuration, airline planned gate assignments, requested runways, wake turbulence vulnerability; and flight performance profiles to sequence arrivals and departures to maximize use of airport capacity.

In the Airspace Management/Capacity Management box, the planned improvement is the following:

> Integrated Arrival/Departure Airspace Management to take advantage of expanded use of terminal procedures and separation standards to increase flow and introduce additional routes and flexibility. Investments required are the CATM Work Package 3; the ERAM Midterm work package; the Trajectory Based Flow Management Integrated Enterprise Solution; the advanced terminal automation system; TFDM; Distance Measuring Equipment (DME); and Surveillance Interface Modernization. Airspace redesign will allocate additional airspace to accommodate expanded terminal procedures and more routes to increase capacity.

3.3 Increase Flexibility in the Terminal Environment

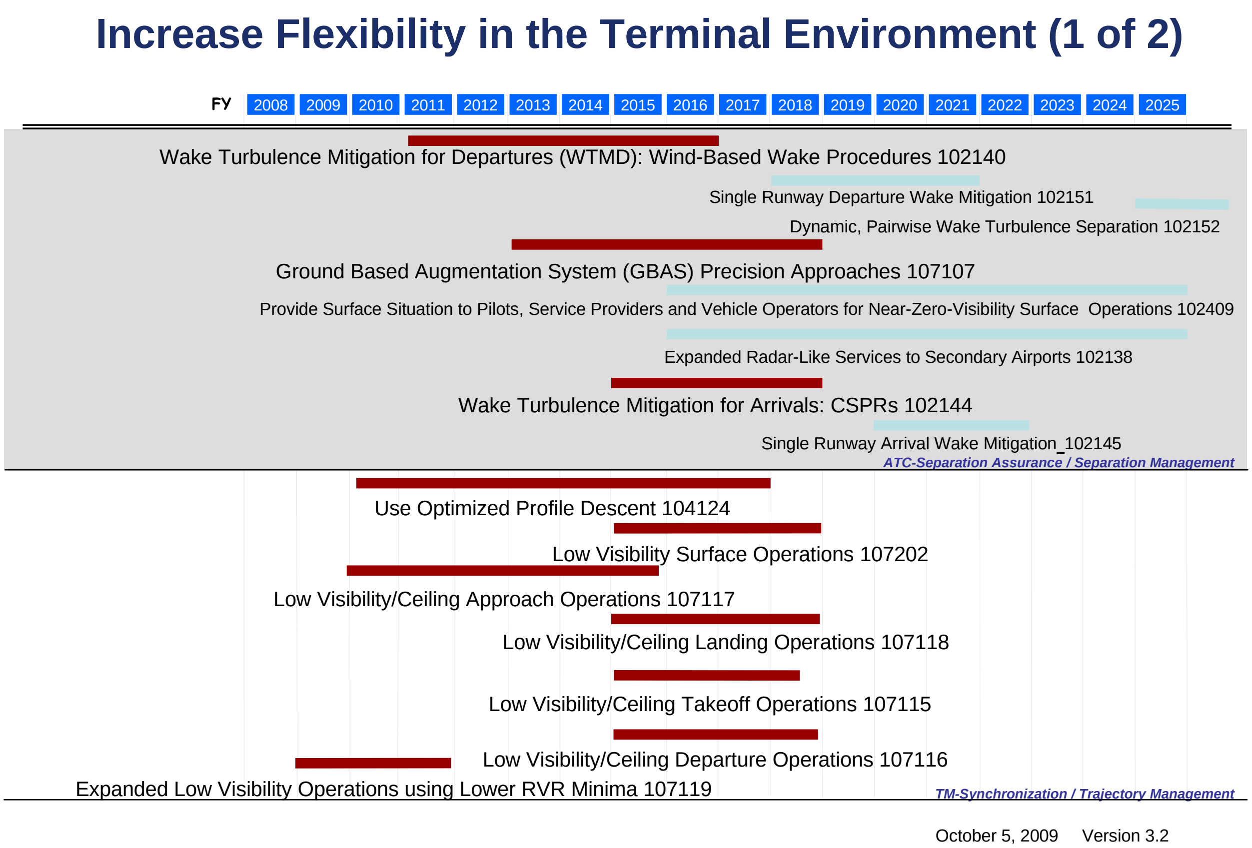
Summary Description:

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

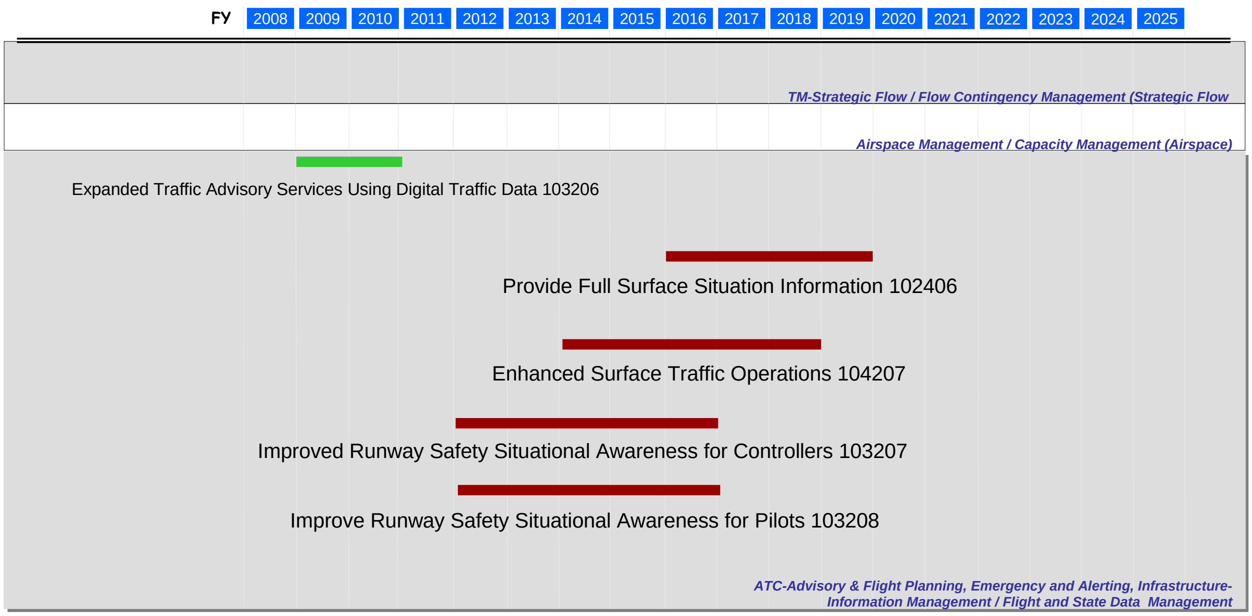
Background:

Flexible terminal operations will serve a mix of Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) traffic, with aircraft types ranging from airline transport to small general aviation aircraft. 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 aircraft with less sophisticated avionics to these smaller airports to mitigate traffic congestion. These airports can accommodate the potential increase in use of personal aircraft for pleasure and business.

Timeline:



Increase Flexibility in the Terminal Environment (2 of 2)



October 5, 2009 Version 3.2

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Flexibility in the Terminal Environment that are within the scope of investments contained in this CIP. In the ATC Separation Assurance/Separation Management box the planned improvements are the following:

1. Wake Turbulence Mitigation for Departures (WTMD): Wake turbulence separation standards can be adjusted quickly to allow more closely spaced departure operations, which would improve use of runway capacity, based on wind measurements. Investments required are the weather information display system; TFDM; and the WTMD detection system. The turbulence behind large and heavy aircraft presents a serious danger to smaller aircraft. The WTMD system measures winds across the runway to determine when the turbulence is reduced to a level safe for smaller aircraft. This allows controllers to minimize the amount of separation required which results in better use of runway capacity.
2. Ground Based Augmentation System (GBAS) Precision Approaches rely on installing LAAS at an airport to support precision approaches to Category I and eventually Category II/III minimums for properly equipped runways. GBAS can support approach minimums with fewer restrictions to surface movement and can support curved precision approaches and high-integrity surface movement requirements. Investments required include TFDM; enhanced terminal automation; National Weather Service Space Weather Center; and the GBAS equipment. This is an economical way to increase the number of runways with instrument approaches that allow operations in low-visibility conditions.

3. Wake Turbulence Mitigation for Arrivals allows reduced separation for aircraft approaching an airport. When crosswinds are stable and strong enough so that heavy aircraft wake turbulence will drift and decay minimizing the hazard to smaller aircraft, separation can be reduced for aircraft approaching closely spaced parallel runways. Investment required are an enhanced terminal automation system, TFDM, ITWS, and SWIM segment 2.

In the Traffic Management Synchronization/ Trajectory Management box the planned improvements are the following:

1. Use Optimized Profile Descent permits aircraft to gradually descend to an airport and minimize power settings during that descent to save fuel. These descent profiles have been tested, and they save significant fuel. Investments required include TBFM Integrated Enterprise Solution (IES); the Post ERAM Release 3 work package; an enhanced terminal automation system; WARP; the NextGen Weather Processor; ITWS; the 4D Weather Cube and DataComm segment 1.
2. Low Visibility Surface Operations improves the safety and efficiency of aircraft and ground vehicle movements on the airport surface because tower controllers have accurate location information. Investments required are TFDM; Automatic Dependent Surveillance – Broadcast (ADS-B); ASDE 3 and ASDE-X; and Runway Status Lights (RWSL). During darkness or foggy conditions controllers, pilots and ground equipment operators need help in avoiding conflicts on the airport surface. The ground surveillance systems inform controllers of surface movements and the runway status lights alert pilots when it unsafe to enter or cross a runway.
3. Low Visibility/Ceiling Approach Operations improves the ability of aircraft to complete approaches in low visibility/ceiling conditions. It requires aircraft be equipped with augmented GPS, ILS or similar technologies. Investments required are a 4D Weather Cube and GBAS.
4. Low Visibility/Ceiling Landing Operations permit aircraft to land in low visibility/ceiling conditions when equipped with augmented GPS, ILS or combinations of cockpit technologies and ground infrastructure. Investments required are GBAS, Precision Approach Path Indicator (PAPI) and Runway End Identification Lights (REIL)
5. Low Visibility/Ceiling Takeoff Operations allows aircraft to takeoff when visibility is very limited. FAA's contribution to this effort is financed by the Operations appropriation, and the aircraft must have advanced vision capabilities such as a heads up display, synthetic vision system, or an enhanced flight vision system.
6. Low Visibility/Ceiling Departure Operations allows appropriately equipped aircraft to depart in low visibility conditions. Investments include the 4D Weather Cube and GBAS.
7. Expanded Low Visibility Operations using Lower RVR Minima would allow aircraft to land when visibility is less than current minimums. This capability would depend on aircraft being equipped with sophisticated precision guidance equipment and some form of synthetic vision. The FAA would not have to invest in new capabilities, but it would have to sustain precision guidance systems and the runway visual range equipment. The

Runway Visibility Range (RVR) equipment measures visibility along the runway, and normally about one-quarter of a mile horizontal visibility is required before a pilot is allowed to land. With more precise landing guidance and a vision device to see through fog or other obscurations, pilots would be able to land in lower visibility conditions.

In the ATC Advisory and Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the planned improvements are the following:

1. Provide Full Surface Situation Information by broadcasting aircraft and vehicle position to ground and aircraft sensors would provide a comprehensive picture of the airport surface to controllers, equipped aircraft and flight operation centers to enhance safety and efficiency. This would also help prevent runway incursions. Investments required are TFDM segment 2; ADS-B, ASDE – 3 and ASDE – X; and an Airport Wireless System.
2. Enhanced Surface Traffic Operations would use DataComm to exchange taxi clearances, amendments and requests between ATC and aircraft. This would decrease the time to provide clearances to aircraft and potentially decrease taxi and takeoff delays. Investments required are TFDM and ADS-B.
3. Improved Runway Safety Situational Awareness for Controllers will improve runway safety. Additional ground based capabilities will be developed including improved runway markings and initial controller taxi monitoring capabilities. All of these improvements will increase the controller's awareness of the location of surface traffic. Investments required are TFDM segment 1; ASDE-3 and ASDE-X; and RWSL.
4. Improved Runway Safety Situational Awareness for Pilots improves pilot awareness of their location on the airport surface. Equipped aircraft will have a surface moving map to display their position and in future enhancements it will show the location of other aircraft near them. Investments required are TFDM, ADS-B, ASDE-3 and ASDE-X, and RWSL.

3.4 Improve Collaborative Air Traffic Management (CATM)

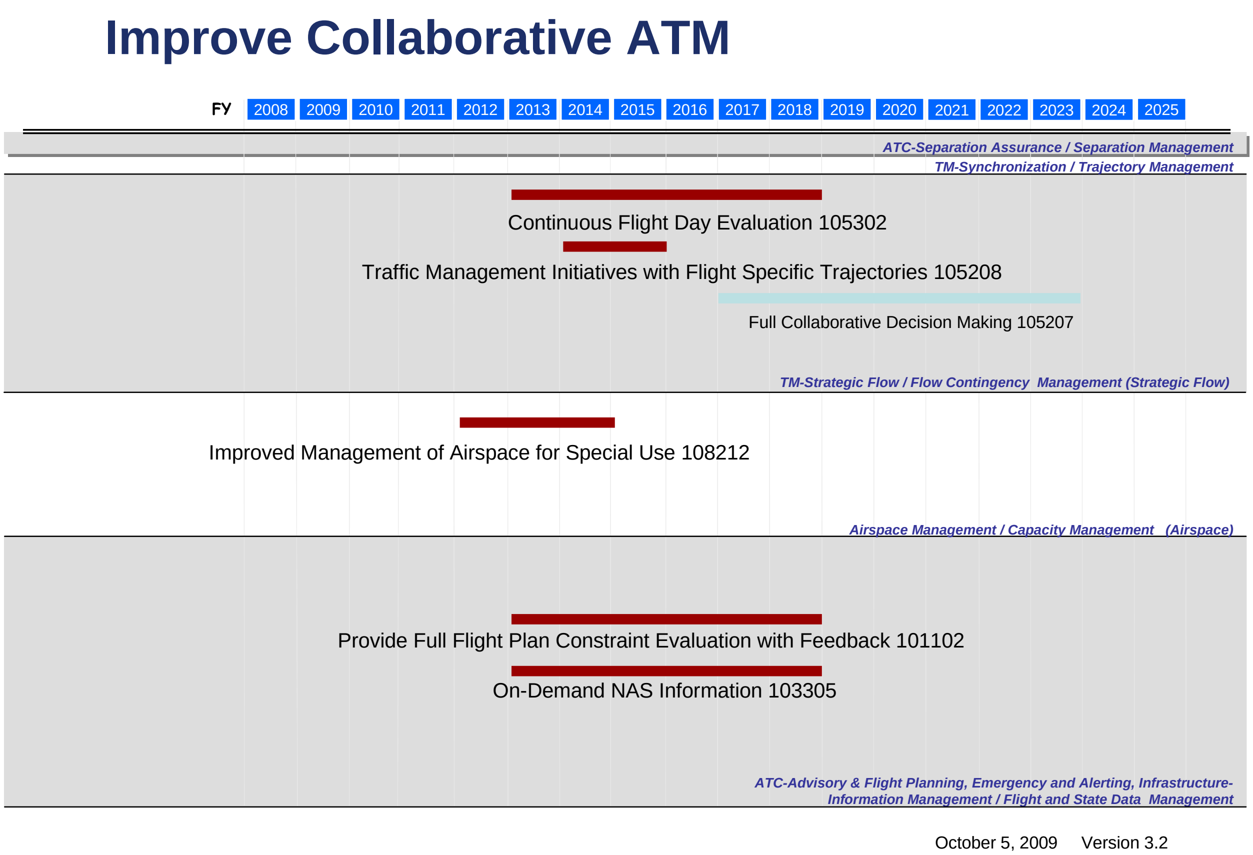
Summary Description:

This solution set covers strategic and tactical air traffic flow management, including interactions with operators to guide choices when the FAA cannot accommodate the desired route of flight. 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 flight analysis.

Background:

Current Air Traffic Management (ATM) tools for managing 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 NextGen is to accommodate flight operator preferences as much as possible. Restrictions should be imposed only when a real operational need exists. If restrictions are required, the goal is to maximize opportunity for aircraft operators to maintain operating efficiency based on their priorities while complying with the restrictions.

Timeline:



Operational Improvements

This section describes the mid-term planned improvements associated with Improve Collaborative Air Traffic Management that are within the scope of investments contained in this CIP.

In the Traffic Management Strategic Flow/Flow Contingency Management box the planned improvements are the following:

1. Continuous Flight Day Evaluation involves both real-time NAS performance and post-event analysis of traffic management initiatives. Real-time constraints are transmitted to the ATC Command Center to help determine whether ground stops need to be implemented or other air traffic constraints are required. Real-time information minimizes the delays associated with flow restrictions and continuous evaluation of past performance improves future decisions about when they should be used. Investments required are the Aeronautical Information Management (AIM) segment 2; CATM work packages 2, 3 and 4; the Post ERAM Release 3 work package; an enhanced terminal automation system; and SWIM.
2. Traffic Management Initiatives with Flight Specific Trajectories will generate and send flight specific trajectory changes for aircraft to FAA facilities for approval when these initiatives are implemented. This capability will increase the agility within the NAS to adjust and respond to dynamically changing conditions such as severe weather, air traffic congestion, and system outages. Investments required are the CATM work package 2; the ERAM Release 2; Post ERAM Release 3 work package; Terminal Data Link System (TDLS) Tech refresh; the 4D Weather Cube; the NextGen Weather Processor; DataComm Segment 1; and SWIM segments 1 and 2. Upgrading the information databases and the speed with which information can be shared is essential to this operational improvement.

In the Airspace Management/Capacity Management box the planned improvement is the following:

Improved Management of Airspace for Special Use calls for upgrading the automated links used to transfer information concerning when airspace reserved for special purposes such as military operations is not being used. Status changes are transmitted to the flight deck via voice or DataComm. Trajectory planning is managed dynamically based on real-time information on special use airspace. The ability to use special use airspace can shorten route lengths and avoid the congestion caused by forcing aircraft into narrow paths between restricted areas. This improvement builds on existing systems with the important upgrade of almost instantaneous information transfer regarding when it is safe to use this airspace. Required investments are AIM segment 2; the CATM work package 3; the Post ERAM Release 3 work package and accelerated TDLS.

In the ATC- Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the planned improvements are the following:

1. Provide Full Flight Plan Constraint Evaluation with Feedback both incorporates constraint information into FAA automation systems and makes this information available to users for pre-departure flight planning. The constraint information includes equipment outages, air traffic congestion, status of special use airspace, and significant weather information. Providing this information will allow selection of the most efficient flight path and avoid adjustments while in flight that increase flight time and fuel burn. Investments required are Alaska Flight Service Modernization (AFSM); other Flight

Service Station modernization; AIM segment 2; the Post ERAM Release 3 work package; the CATM work package 3; the 4D Weather Cube; the NextGen Weather Processor, the National Airspace Data Interchange Network (NADIN) Rehost; ADS-B; and SWIM segment 2.

2. On-Demand NAS Information makes NAS status and aeronautical information available to users on demand. It will be available to authorized users and equipped aircraft. This will allow pilots to make informed decisions on routes to fly and conditions at departure and destination airports. Investments required include weather observing information display systems; AFSM segment 1; AIM segment 2; CATM work packages 2 and 3; En Route Information Display System (ERIDS); the Post ERAM Release 3 work package; the 4D Weather Single Authoritative Source (SAS), and SWIM segment 2.

3.5 Reduce Weather Impact:

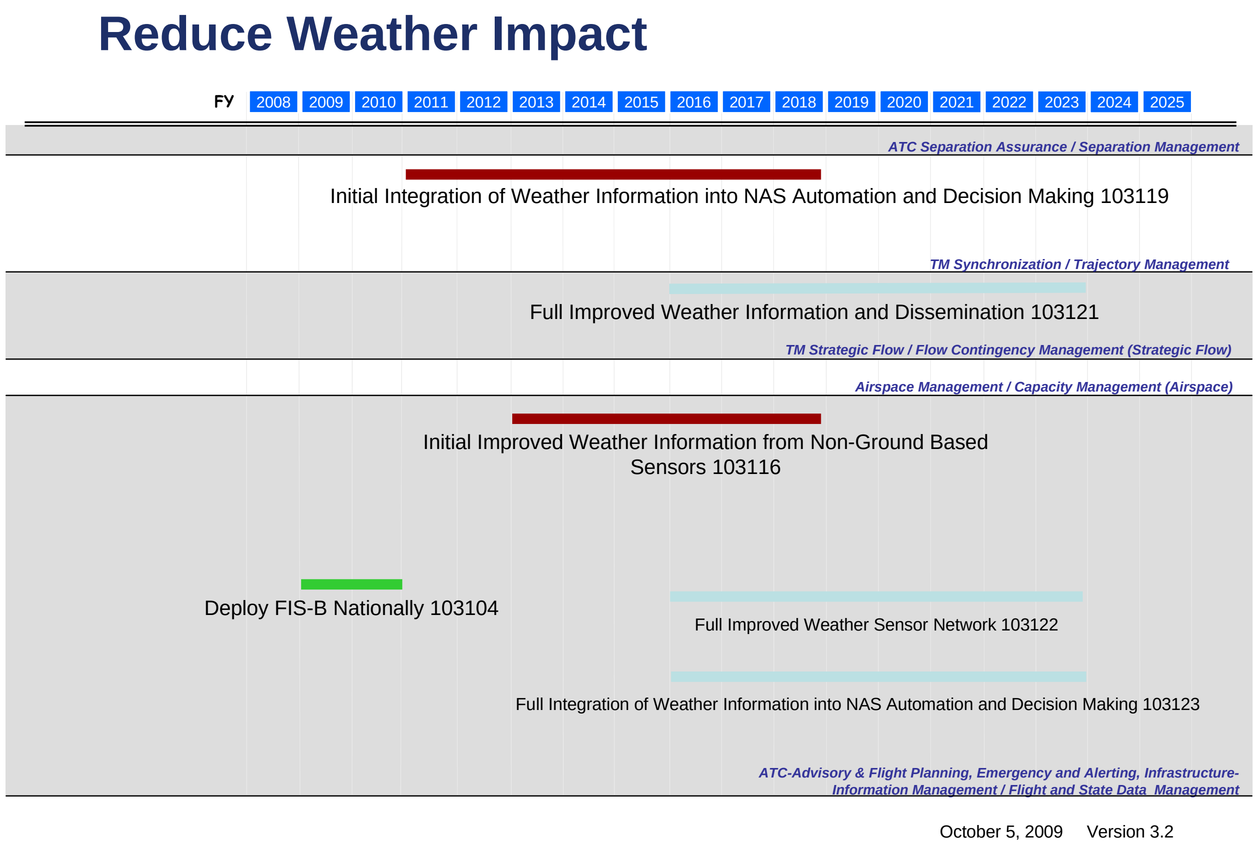
Summary Description:

Current NAS weather data is not well integrated into either manual procedures or automated decision-support systems. Moreover, data is not readily available to the full spectrum of decision makers, and forecast weather is not sufficiently accurate. To support the predicted volume of future air traffic operations, improvements are needed. Unpredicted changes in weather are of prime concern because of the significant impact and disruption they create throughout the entire NAS. The current system does not respond well to unpredicted weather situations or to weather systems that evolve differently than expected. This solution set will improve weather predictions to support proactively planning operations rather than hurriedly adjusting for impacts after the weather has changed.

Improvements include providing accurate, consistent, and integrated weather information to Air Traffic Management Specialists, other air traffic control facilities, airline flight operations centers (FOC), and the flight deck to support both tactical and strategic operational decision-making tools. Other refinements will be developed that improve weather observations, upgrade forecasts, and disseminate weather information to mitigate the severity of weather impacts on NAS operations. Improved forecasts will incorporate a better characterization of uncertainty and assist operators in safely planning and conducting four dimensional, gate-to-gate, trajectory-based operations to not only avoid storm hazards and provide comfortable flight conditions, but also to increase overall efficiency by improving routing/rerouting decision making. Decision support systems will directly incorporate weather data to aid decision makers in determining the impact of weather on NAS operations and the best response to potential weather-related operational effects, thus minimizing the level of traffic restrictions required in planning horizons that extend from 0–8 hours.

We will upgrade four functional areas. We will expand weather sensing capability to provide better observations to support better forecasting; make weather processing more sophisticated and better tailor forecasts for users; and integrate weather information into decision-support tools; and ensure users have access to all information. NextGen Network Enabled Weather (NNEW) will be the core of the NextGen weather support services. It will enable widespread distribution of weather products to enhance collaborative and dynamic NAS decision making. It will provide network access to weather information from many different sources.

Timeline:



Operational Improvements

This section describes the mid-term planned improvements associated with the Reduce Weather Impact solution set that are within the scope of investments contained in this CIP.

In the Traffic Management Synchronization/Trajectory management box the planned improvement is the following:

> Initial Integration of Weather Information into NAS Automation and Decision Making would disseminate timely, more accurate weather information to the FAA and airline dispatch decision support tools. It would also provide more users easier access to weather information. Having improved weather forecasts, and easier access to them, as well as integrating this information into decision support tools will improve efficiency of operations by avoiding unnecessary deviations from planned flight paths and save time and fuel. Investments required are upgrades to Flight service stations; AIM segment 2; the CATM work package 2; the Dynamic Ocean Tracking System (DOTS); the ERAM Midterm work package; upgrades to terminal automation system; TFDM; the Automated

Surface Weather Observation Network; the 4D Weather Cube; and SWIM segments 1, 2 and 3.

In the ATC Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the planned improvement is the following:

> Initial Improved Weather Information from Non-Ground Based Sensors would collect weather information from aircraft in flight and satellites to supplement the existing network of ground sensors to improve safety of flight. It would increase the reliability of forecasts of turbulence, convective weather, and in-flight icing. The advantage is that the improved accuracy of these weather forecasts will be route and altitude specific, which improves both safety and efficiency. Investment required are upgrades to Flight Service stations; AIM segment 2; the CATM work package 2; DOTS; the ERAM Midterm work package; the Post ERAM Release 3 work package; upgraded terminal automation; TFDM; the 4-D Weather Cube; data link from aircraft to ground; and SWIM segment 2.

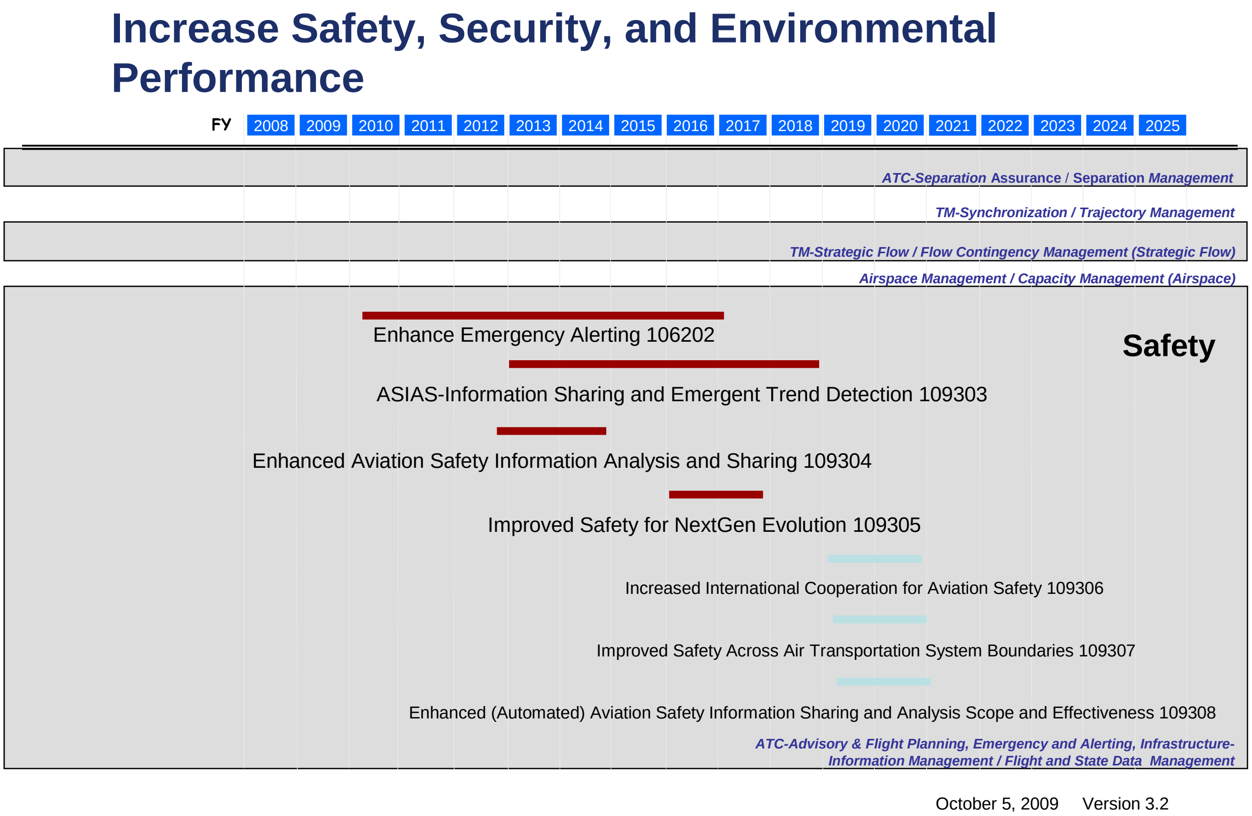
3.6 Increase Safety, Security, and Environmental Performance

Safety:

Summary Description:

Safety is FAA's highest priority. NextGen will emphasize integrating safety into the design and development phases of new equipment. Although there are many operational programs in the FAA that improve current safety performance, NextGen will be implementing new systems, and this gives the FAA 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 associated procedures to ensure that we have identified and taken steps to eliminate the safety risks. We will interweave safety analysis with every initiative that is part of the NextGen effort.

Safety Timeline:



Operational Improvements

This section describes the mid-term planned improvements associated with the Increase Safety timeline that are within the scope of investments contained in this CIP.

In the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the operational improvements are the following:

1. Enhance Emergency Alerting improves a controllers' ability to assist in locating a downed aircraft and in identifying and tracking visual flight rules flights. The combination of GPS and ADS-B can provide a downed aircraft's location and its identification number. This capability has proven successful in Alaska and has saved lives because it reduces the search time for downed aircraft. Aircraft using ADS-B report their position frequently, and the coverage can be more comprehensive than radar. Investments required are Alaska Flight Service Modernization; upgraded terminal automation systems; the Oceanic Automation System; the Post ERAM Release 3 work package; the 4D weather Cube; the FANS/1A oceanic communications system; and ADS-B.
2. ASIAS – Information Sharing and Emergent Trend Detection. The Aviation Safety and Information Analysis (ASIAS) will integrate and share high-quality, relevant, and timely safety information that is critical to the success of the Safety Management System.

ASIAS directly supports safety promotion and safety assurance initiatives with analytical results such as baseline information and trends, and it supports safety risk management through identifying issues and providing tools for analysis of hazards. Investments required are AIM segment 2; the Post ERAM Release 3 work package; the Remote Maintenance Logging System (RMLS)/Swim interface; DataComm segments 1 and 2; the NAS Voice Switch (NVS); and air-to-ground radios.

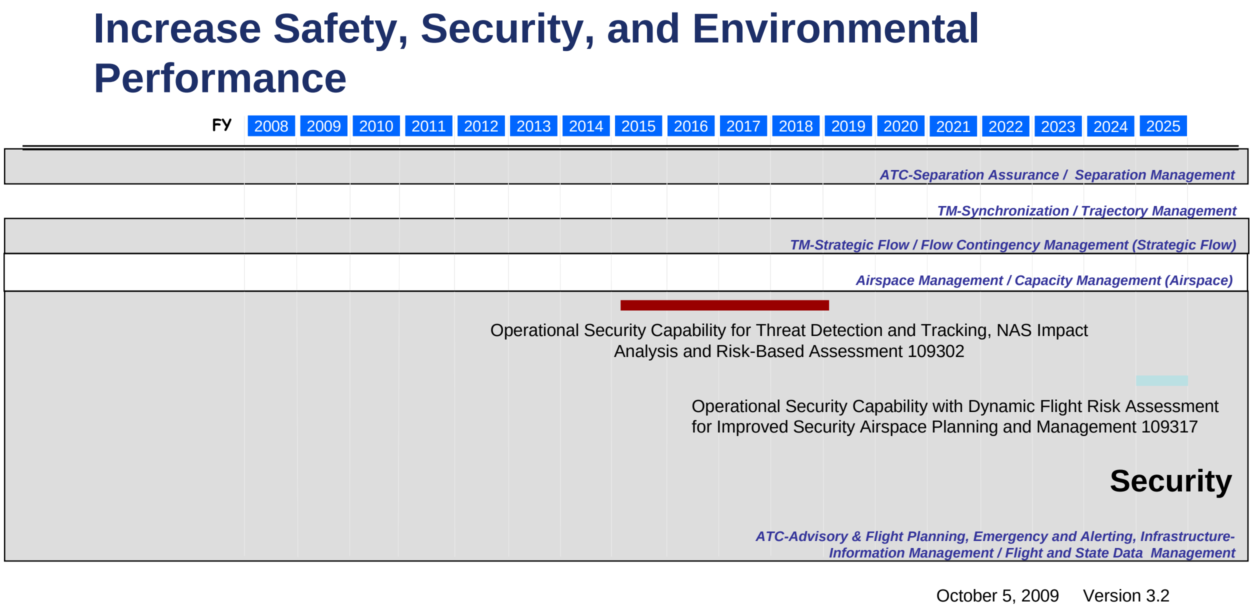
3. Enhanced Aviation Safety Information and Analysis and Sharing will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of risk management. Investments required are the same as those listed in item 2 above.
4. Improved Safety for NextGen Evolution mitigates the safety risk associated with changes to the air transportation system. This improvement provides advanced capabilities for an integrated and predictive safety assessment of new equipment and procedures; an improved validation and verification process for certification of new equipment; an enhanced focus on developing safe operational procedures; and enhanced training concepts for promoting safe system operation. Investments required are DataComm segment 1; the NAS Voice Switch; and ASIAS.

Security:

Summary Description:

Security is necessary for all aspects of NAS operations. The FAA has planned investments for 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 preparation, response and recovery from such events, as natural disasters (e.g., hurricanes) and biological emergencies (e.g., pandemic influenza).

Security Timeline:



Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Security timeline that are within the scope of investments contained in this CIP.

In the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the operational improvement is the following:

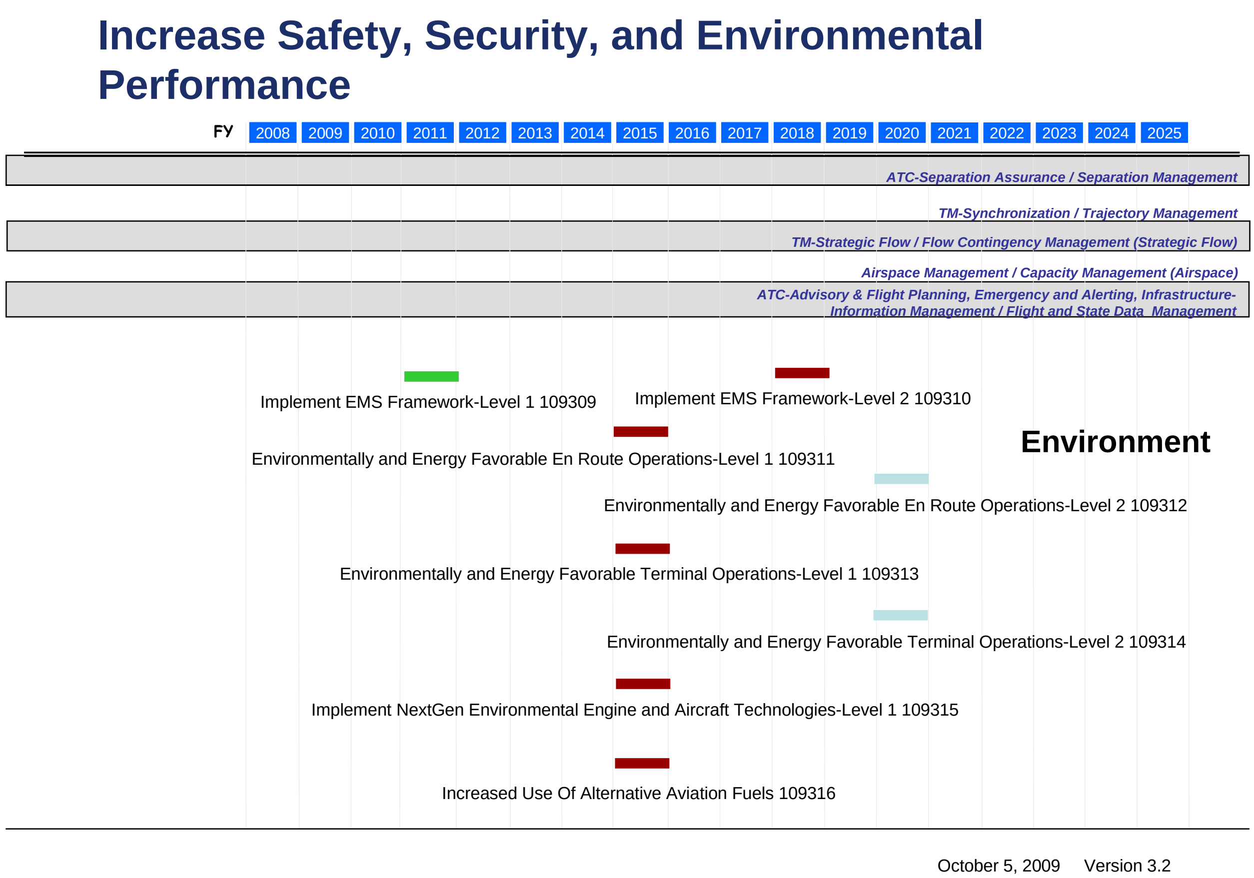
> Operational Security Capability for Threat Detection and Tracking, NAS Impact Analysis and Risk Based Assessment address NAS security threats with more effective and efficient prevention, protection, response and recovery based on a net-enabled shared situational awareness and a risk-informed decision-making capability. Investments required are Alaska and CONUS Flight Service Modernization; AIM segment 2; the oceanic automation system; the CATM work package 3; the En route Mid-term work package; terminal automation upgrades; TFDM; the 4D Weather Cube; and the Security Integrated Toolset. This toolset will allow controllers to determine whether aircraft under their control are registered aircraft with a legitimate flight plan.

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 (both positive and negative) in fuel use, emissions, and noise caused by operational improvements. Fuel consumption is also a concern because of the long-term outlook for fuel prices. The FAA must better understand the environmental consequences of its actions and strive for further improvements as it implements NextGen.

Environmental Timeline:



Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Environmental Performance timeline that are within the scope of investments contained in this CIP.

In the Environment box, the operational improvements include the following:

1. Implement EMS Framework – Level 2 which would support use of refined environmental goals and decision support tools to address and mitigate environmental issues associated with introducing NextGen. No capital investment projects are necessary to support this operational improvement.
2. Environmentally and Energy Favorable En Route Operations – Level 1 which would optimize en route operations. The investment required is AIM segment 2.
3. Environmentally and Energy Favorable Terminal Operations – Level 1 which would optimize aircraft arrival, departure, and surface operations to reduce emissions, fuel burn and noise using environmentally favorable procedures. Investments required are TBFM; upgraded terminal automation systems; and the 4D Weather Cube.
4. Implement NextGen Environmentally and Energy Favorable Engine and Aircraft Technologies – Level 1 to reduce aircraft noise, emissions, and fuel burn by determining whether improvements in aircraft engines, airframe technologies, and alternative fuels can meet the environmental goals for the future. No Facilities and Equipment funding is required to support this improvement.
5. Explore sustainable and alternative fuels by fostering development of renewable alternative fuels in aviation that are commercially viable and that improve supply, security, and environmental performance. No Facilities and Equipment funding is required to support this improvement.

3.7 Transform Facilities

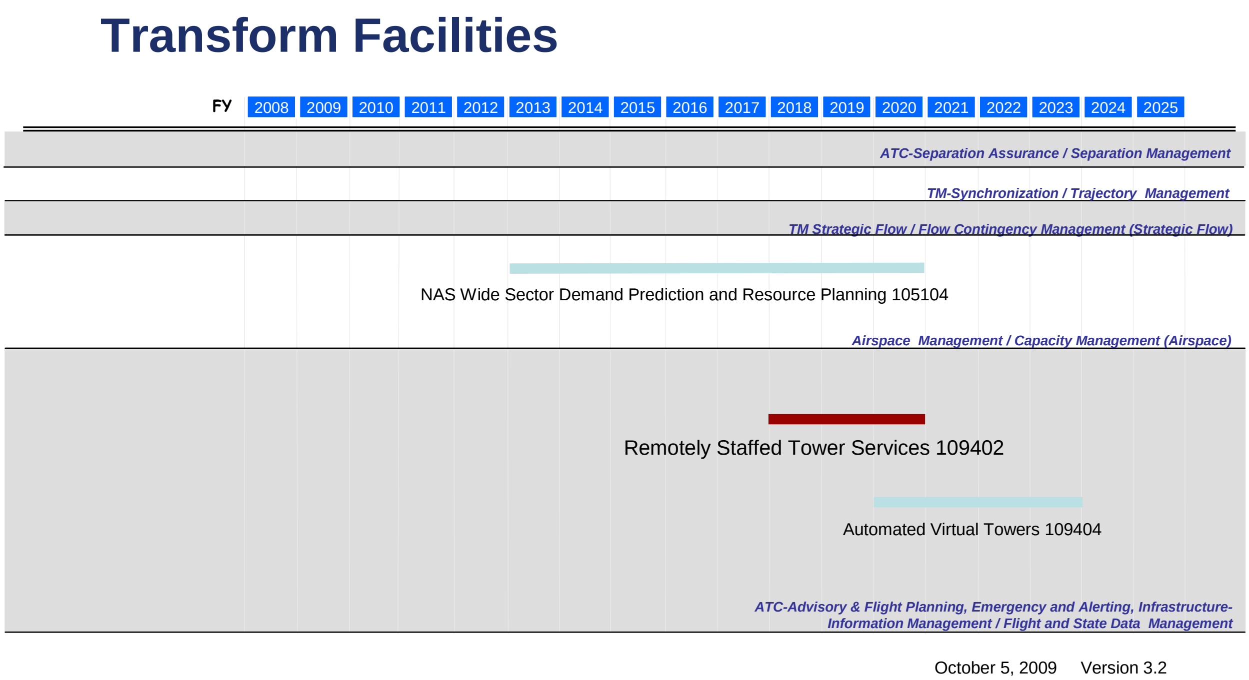
Summary Description:

NextGen redesigns air traffic control systems to make them flexible, scalable, and maintainable. It will break down the geographical boundaries that characterize air traffic control and lead 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 associated personnel.

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

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

Timeline:



Operational Improvements

This section describe the mid-term planned improvements associated with the Transform Facilities solution set that are within the scope of investments contained in this CIP.

In the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management box, the operational improvement is:

> Remotely Staffed Tower Services to provide ATM services for operations into and out of selected airports without constructing, equipping and/or sustaining tower facilities at these airports. Investments required are upgraded terminal automation systems; TFDM; DataComm segments 1 and 2; the NAS Voice Switch; ADS-B; ASDE 3 and ASDE – X; Runway Status Lights; and SWIM segments 2 and 3.

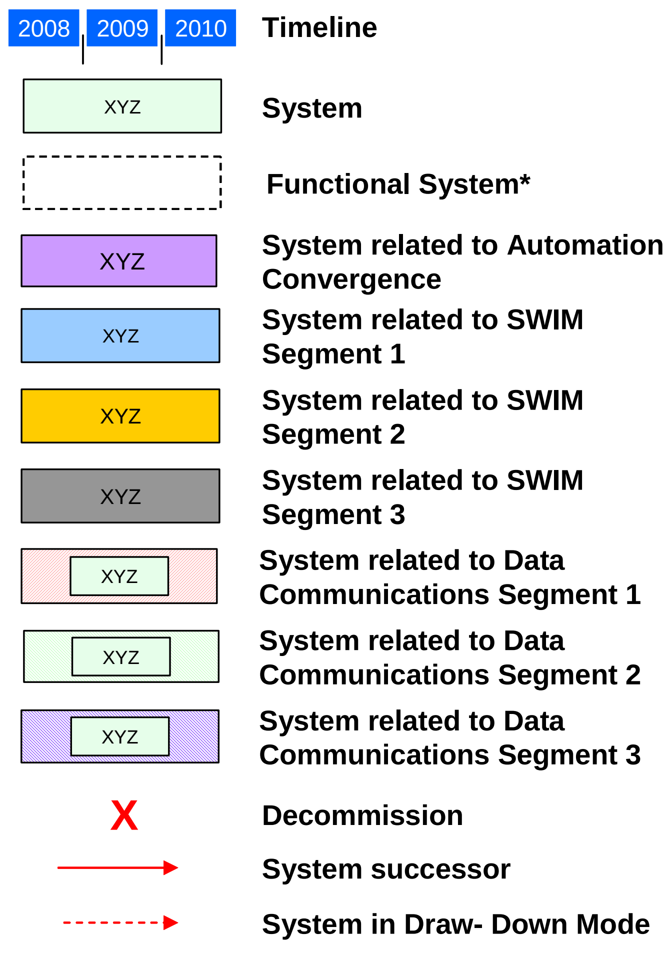
4 Enterprise Architecture Roadmaps

The detailed roadmaps appearing in the following sections are an integral part of the NAS Enterprise Architecture, as they show progression from the present system to NextGen. The roadmaps show planned activities that extend beyond the 5-year financial horizon covered in the CIP, because the transition to NextGen capabilities will occur incrementally over several years. The roadmaps help us plan an achievable transition to the sophisticated capabilities that we need in order to meet expected future growth in an organized and timely manner. They also help to ensure that the interim steps we take to modernize the existing system are consistent with the future system we envision. Some of the system improvements shown in the roadmaps will not receive funding until after the 5-year timeframe of the CIP, but projects that are foundational technologies for NextGen and the first steps toward that transition will have substantial funding during the next 5 years.

Transition to NextGen will be an incremental process taking several years, and it will require detailed engineering design for the equipment and testing of operational changes that must accompany the equipment upgrades. Many changes will also require aviation users to add equipment to their aircraft and adopt new procedures so the roadmaps serve to inform them of the schedule they should expect for changes to their equipment and crew training. We update these roadmaps regularly to reflect results of studies, demonstration projects, and economic analysis related to projects; however, we generally make minimal changes to the roadmaps from year-to-year.

The funding tables at the end of each roadmap section contain both projects that are shown in the roadmap and those that are included in an overall FAA Enterprise Architecture. Some projects that support safety are not directly related to air traffic control equipment, so they are in the funding tables but not in the roadmaps. All projects with estimated funding over the next 5 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 3 shows and defines the symbols used in the roadmaps. The dashed lines indicate that a system may be eliminated after economic and operational analysis determines that it is no longer necessary. 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, when they are not described, their acronyms are defined in appendix E.



* Applies to any System fill color type

Figure 3 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 it to project an aircraft's 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 the tower to the terminal to the 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 4 and 5 depict the planned architecture from 2009 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.

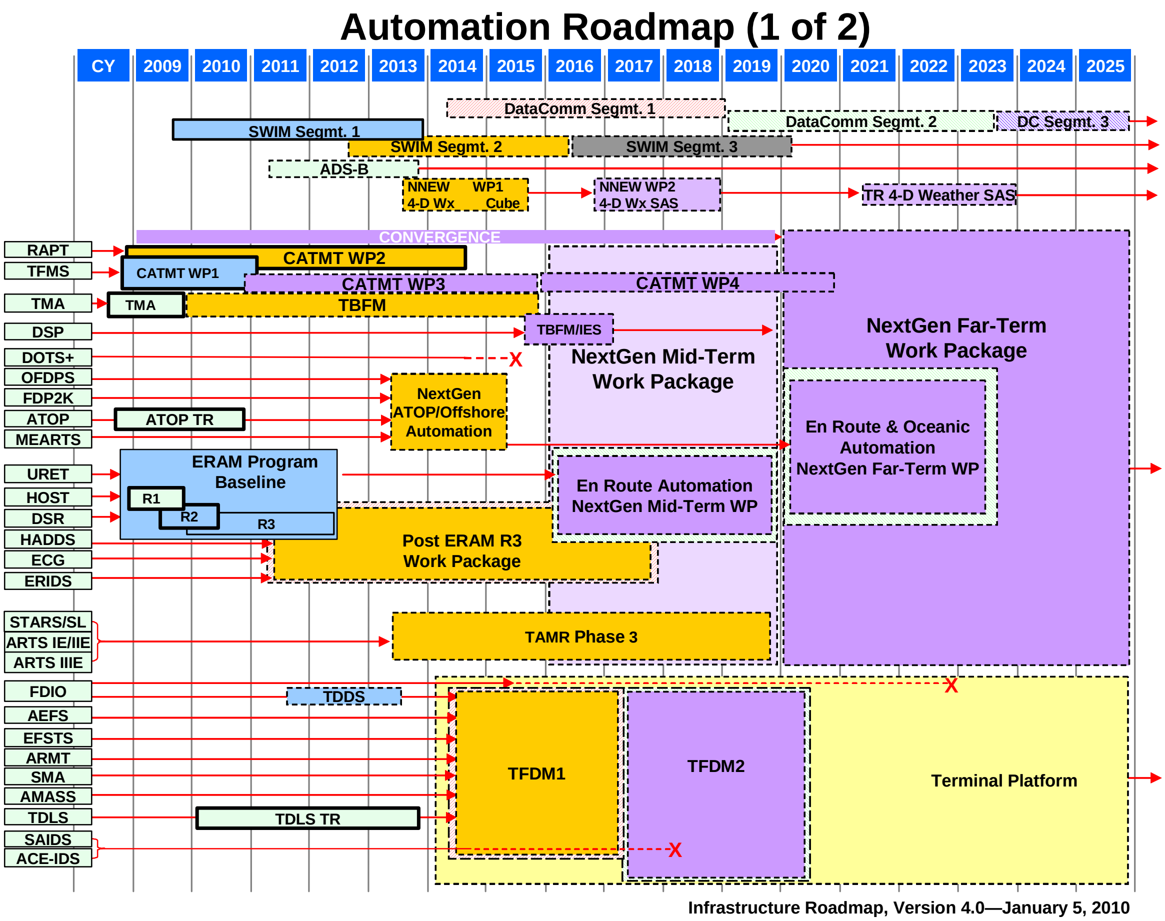


Figure 4 Automation Roadmap (1 of 2)

Enabling technologies for NextGen appear at the top of the automation roadmaps: Automatic Dependent Surveillance-Broadcast (ADS-B), Data Communications (DataComm), System-Wide Information Management (SWIM), and 4-D Weather (Wx) Cube (of which a subset will become the 4-D Weather Single Authoritative Source (4-D Wx SAS) systems are central to collecting and sharing information to expand capacity. They transmit and receive critical information to support air traffic control in both the en route and terminal environments. ADS-B will improve both the accuracy and update rate of surveillance systems. DataComm and SWIM will enhance data collection and communication to more fully use airspace capacity and offer more efficient flight paths. The 4-D Wx SAS for weather data will ensure that the same data is available to both the 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 making operational decisions.

The first grouping on the left side of the roadmap contains the systems used for traffic management, such as the Route Availability Planning Tool (RAPT), Traffic Flow Management System (TFMS), Traffic Management Advisor (TMA) and Departure Spacing Program (DSP). These 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 to strategically plan for how to best accommodate that demand. These systems 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. The FAA will continue to improve these functions as described in the Collaborative Air Traffic Management (CATM) NextGen solution set, expanding collaboration to individual pilots and improving information exchanged between the FAA and airline dispatch offices.

The next grouping on the left side comprises the oceanic control projects. The DOTS+ system uses weather information to determine the most fuel-efficient routes based on wind velocity and direction. The oceanic automation systems (OFDPS, FDP2K, ATOP, and MEARTS) process data regarding the position of aircraft on oceanic flights to aid controllers in separating flights in FAA controlled oceanic airspace. The FAA will consolidate the oceanic automation systems into the NextGen Advanced Technology and Oceanic Procedures (ATOP) Offshore Automation system after ATOP receives a technology refresh; and the FAA will begin analysis in 2015 to determine how to fold its functionality into the NextGen Far-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. The ERAM program replaces hardware and rewrites the ATC software used at en route centers. ERAM is being tested at the first operational site, and the FAA plans to have it operational at all en route control centers by December 2010. Its initial purpose is to modernize ATC automation systems and expand capacity. The post ERAM Release 3 work package will be developed to support Trajectory Based Operations. As the roadmap shows, the FAA plans to 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, until the Terminal Automation Modernization and Replacement Phase 3 (TAMR P3) program is approved to replace and modernize the Standard Terminal Automation Replacement System (STARS) and/or the Automated Radar Tracking System (ARTS) systems.

The TFDM will be a phased implementation of a new terminal local area network (LAN)-based infrastructure targeting reduction of redundant displays and integration of flight data functions, while 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), Electronic Flight Strip Transfer System (EFSTS), Airport Resource Management Tool (ARMT), Surface Movement Advisor (SMA), Airport Movement Area Safety System (AMASS), and the Tower Data Link Services (TDLS) function. Trade studies will identify if additional elements will be integrated in TFDM phase 2, such as the Automated Surface Observing System (ASOS) Controller Equipment-Information Display System (ACE-IDS), and System Atlanta Information Display System (SAIDS).

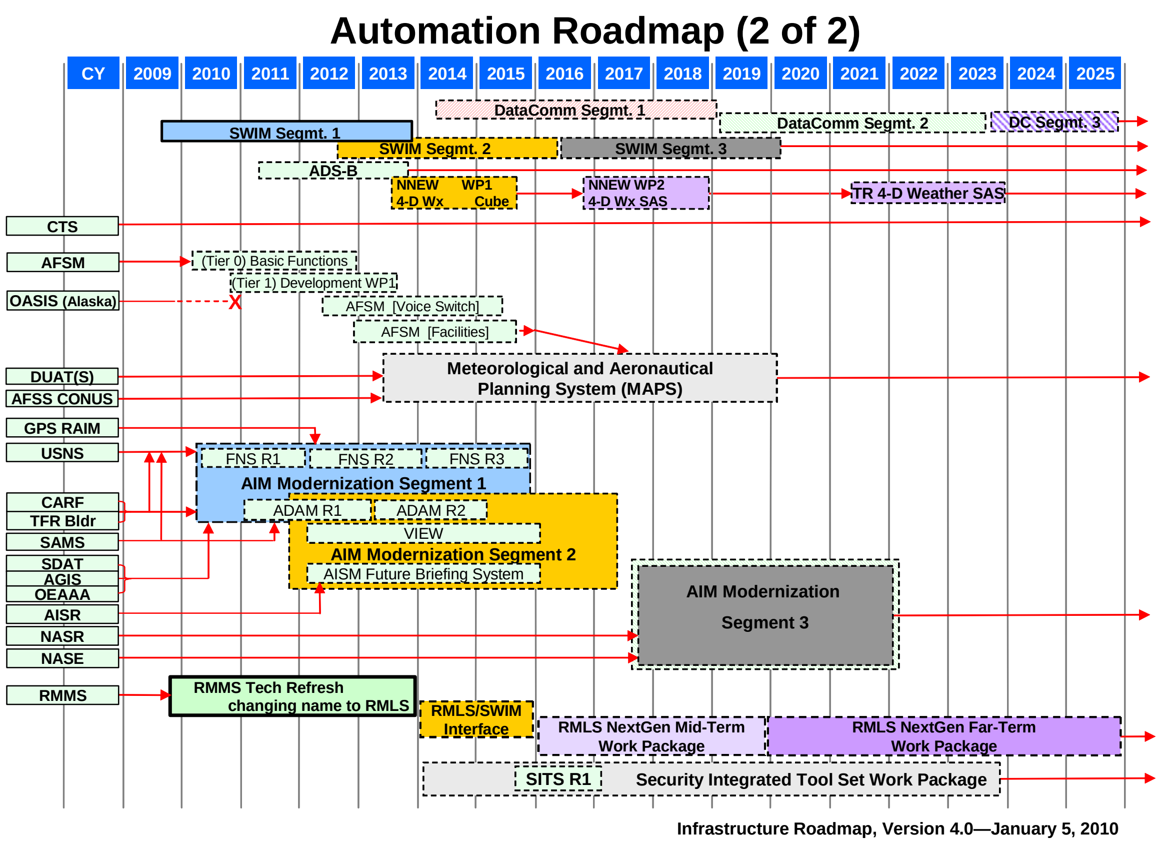


Figure 5 Automation Roadmap (2 of 2)

The Coded Time Source (CTS) project at the top left of the roadmap (figure 5) seeks to standardize the official source of time that synchronizes the information flows in the air traffic control equipment. It will also determine an appropriate backup to the primary source that can be used in case the primary source fails.

AFSM, OASIS (Alaska), DUATS, and AFSS CONUS just below CTS on the roadmap support flight services. Flight services are mostly used by general aviation pilots and include weather briefings and flight plan filings. 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 Automated Flight Service Automation Systems in the lower 48 States (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 and upgrade the buildings and supporting equipment for Alaska's flight service stations. In 2012, the FAA plans to decide the future configuration and mode of operation of all flight service stations.

The GPS Reliability and Integrity Monitor (RAIM) determines whether there are enough Global Positioning System (GPS) satellites in view during a planned flight for an aircraft navigation receiver to determine if any of the satellites are producing inaccurate or inconsistent navigation data. Aircraft can only use GPS for primary navigation if they can receive signals from a sufficient number of satellites so that their navigation receiver can detect and reject information from a malfunctioning satellite. The FAA plans to transition the current FAA operated RAIM system into the Aeronautical Information Management (AIM) system.

The next 10 systems (see following bullets) mainly provide status information on airports, airspace, and navigation facilities, but the FAA uses some of them to evaluate airspace. We will replace these individual systems with a modernized and consolidated AIM system.

- USNS — United States NOTAM (Notice to Airmen) System,
- CARF — Central Altitude Reservation Function,
- TFR Bldr – Temporary Flight Restriction Builder,
- SAMS — Special Airspace Management System,
- SDAT — Sector Design and Analysis Tool,
- AGIS – Airport Geographic Information system
- OEAAA — Obstruction Evaluation/Airport Airspace Analysis,
- AISR – Aeronautical Information System Replacement,
- 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 Remote Maintenance Monitoring System (RMMS) serves two functions. It allows the maintenance staff to monitor equipment performance electronically from a central location, and it provides software for management of workforce hours and maintenance actions. The existing system is undergoing a technical refresh and will be upgraded and renamed the Remote Monitoring and Logging System (RMLS) in 2014.

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 6 shows projected CIP expenditures on automation roadmap projects. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Automation Functional Area	**$814.9**	**$756.0**	**$736.9**	**$693.6**	**$740.2**
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$27.0	$30.0	$30.0	$30.0	$30.0
1A08	Next Generation Air Transportation System (NextGen) - System Development	$95.0	$100.2	$101.0	$119.1	$120.9
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations	$58.6	$26.0	$25.0	$22.0	$16.0
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$57.0	$54.0	$63.7	$61.1	$41.0
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$75.5	$53.0	$51.0	$44.0	$42.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$80.7	$39.1	$38.4	$18.0	$14.0
2A01	En Route Automation Modernization (ERAM)	$132.3	$89.1	$95.0	$89.8	$120.0
2A02	En Route Communications Gateway (ECG)	$6.0	$19.8	$18.5	$9.9	$13.4
2A06	Air Traffic Management (ATM)	$16.5	$7.5	$9.9	$8.1	$0.9
2A10	Oceanic Automation System	$4.0	$14.9	$12.1	$11.8	$0.0
2A12	System-Wide Information Management (SWIM)	$92.0	$39.9	$33.0	$13.6	$6.6
2A16	Collaborative Air Traffic Management Technologies (CATMT)	$35.9	$41.5	$34.4	$29.3	$3.3
2A17	En Route Automation Modernization (ERAM) - Post Release 3	$5.0	$10.0	$10.0	$10.0	$10.0
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$22.0	$41.8	$42.0	$39.5	$54.0
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$20.0	$78.2	$102.4	$126.9	$224.2
2B05	Terminal Automation Program	$3.9	$2.5	$2.5	$2.6	$2.6
2B16	Integrated Display System (IDS)	$8.7	$8.8	$8.2	$8.2	$2.9
2B19	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)	$3.1	$2.4	$3.0	$3.0	$2.7
2D08	Instrument Flight Procedures Automation (IFPA)	$0.6	$2.2	$1.8	$2.0	$2.0
3A02	Aviation Safety Analysis System (ASAS) - Regulation & Certification for Infrastructure System Safety (RCISS)	$14.6	$22.5	$8.9	$11.5	$10.6
3A07	System Approach for Safety Oversight (SASO)	$23.4	$37.1	$31.5	$9.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$14.8	$17.1	$6.9	$16.0	$6.1
4A10	Aeronautical Information Management (AIM) Program	$18.3	$18.3	$7.8	$7.6	$7.5

Figure 6 Expenditures in the Automation Functional Area[1]

Figure 6 lists funding for systems appearing in the roadmaps as well as the following systems that are part of the overall FAA Enterprise Architecture and support the FAA safety functions:

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

[1] Out-year funding amounts are estimates.

These three systems support databases of safety information to assist safety inspectors in reviewing performance of flight crews and companies that provide aviation services.

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, and because en route control sectors cover areas that extend beyond direct radio range, remotely located radio sites are used to provide extended coverage. The controller activates radios at these sites and ground telecommunication lines carry the information exchange to and from air traffic control facilities. If ground links are not available, communication satellite links can be used to connect pilots with controllers. Backup systems are always available to provide continued ability to maintain communications when the primary systems fail.

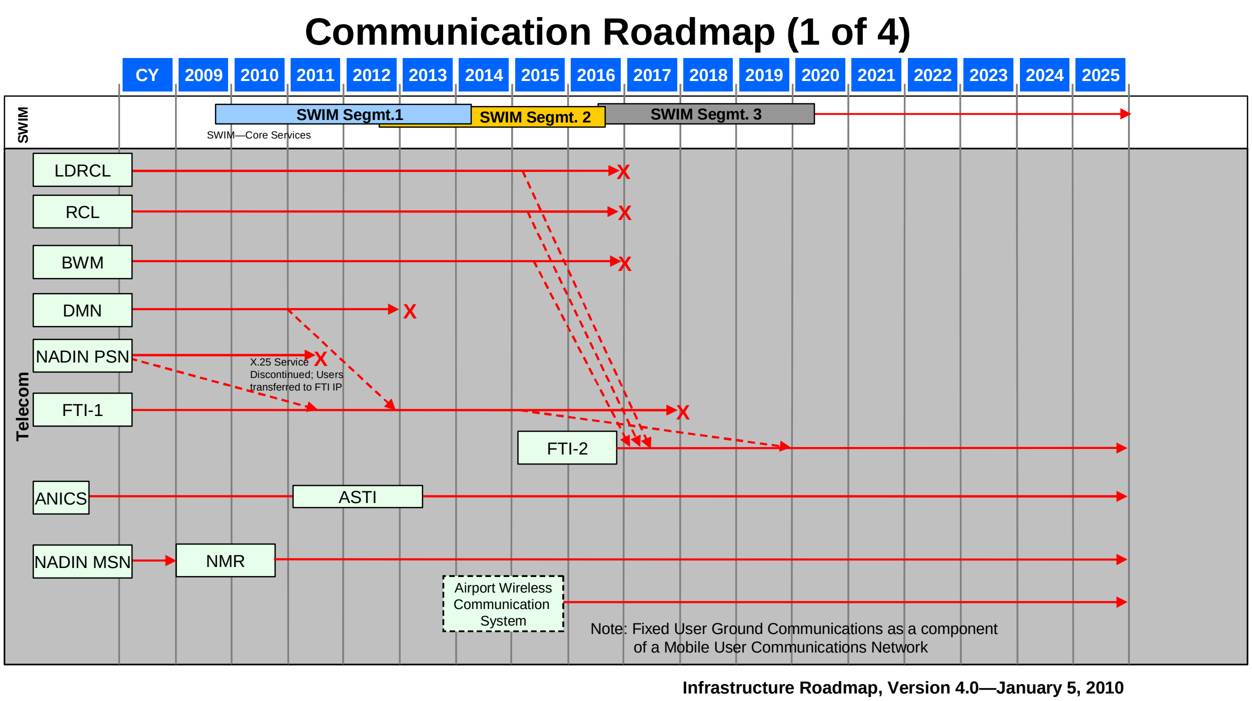


Figure 7 Communications Roadmap (1 of 4)

At the top of figure 7 are the System-Wide Information Management (SWIM) program segments, that 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, includes capabilities that were selected based on 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, and these systems have been linked in a national network to transmit operational and administrative information to and from air traffic control facilities. Current plans are to eliminate these systems during 2017 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 improves efficiency of message transmission by dividing messages into packages and sending multiple packages simultaneously to make fuller use of communication links. The packages are coded, and each complete message is reassembled at the receiving end. The FAA will transition some functions of NADIN PSN and DMN to the FTI network and its follow on contract. We will sustain the NADIN MSN (Message Switching Network) to comply with international standards for transmitting flight plans.

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 effort 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.

Figure 8 shows the Roadmap for NAS Voice switches. Voice switches in air traffic facilities enable controllers to select among the different channels they need to communicate with one another, with traffic management and weather specialists, with emergency services, and with pilots.

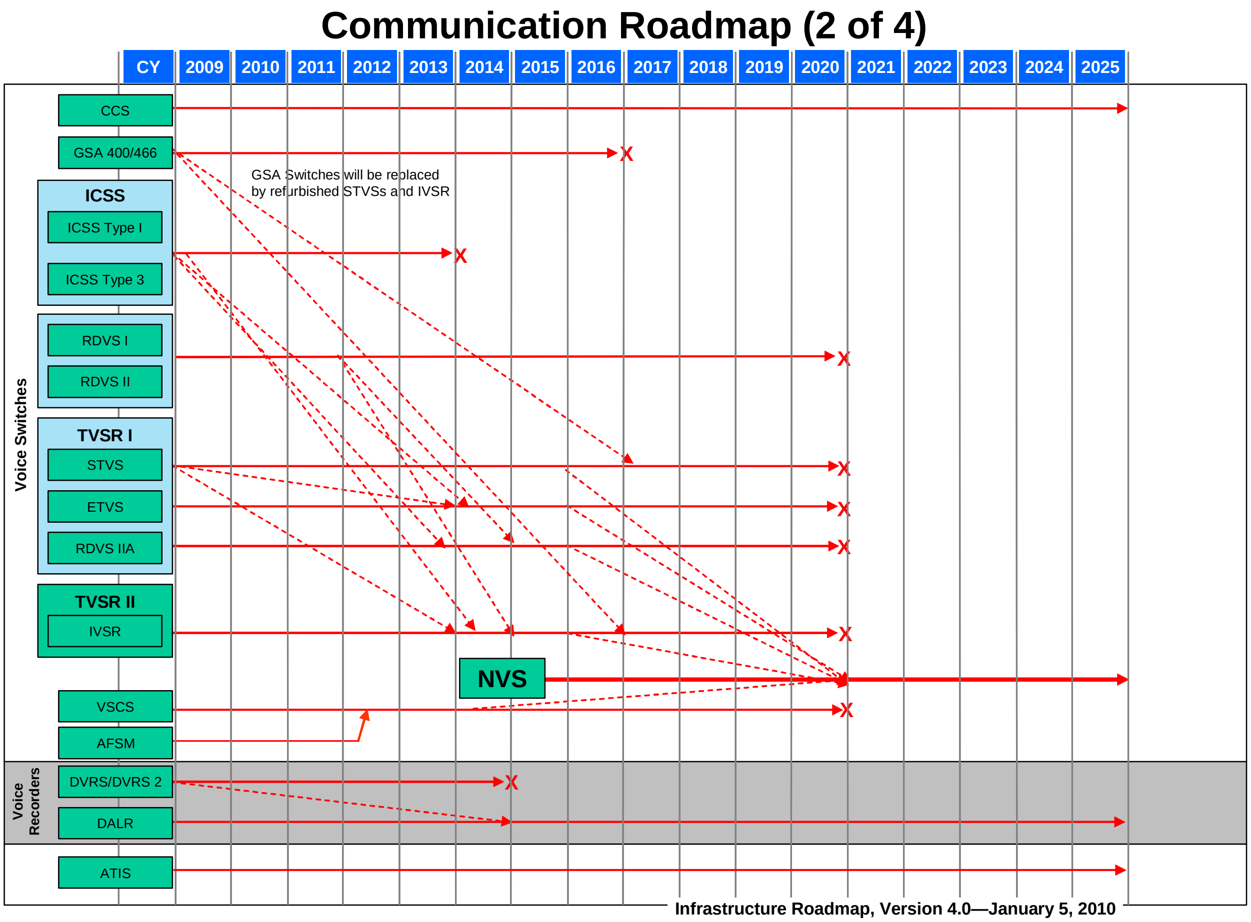


Figure 8 Communications Roadmap (2 of 4)

The Command Center Conference Control Switch (CCS) at the top of the diagram will remain in operation until 2011, when the new CCS installed at the facility in Warrenton, Virginia will become operational to support the Command Center relocation. It allows the specialists at the Air Traffic Control System Command Center (ATCSCC) to stay in contact with air traffic control facilities and external users of the NAS.

The nine switches shown below the CCS are different models of the switches used in terminal facilities. They are:

- GSA 400/466 – A voice switch developed by Litton/Amecom purchased through a national program/contract
- ICSS Type 1 and 3 – Integrated Communication Switching System
- RDVS I and II & IIA – Rapid Deployment Voice Switch
- TVSR I & II – Terminal Voice Switch Replacement program, which is the umbrella replacement program for all voice switches
- STVS – Small Tower Voice Switch
- ETVS – Enhanced Terminal Voice Switch

The ETVS program is 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 Voice Switching and Communications System (VSCS) is the voice switch used in ARTCCs. The FAA is upgrading the VSCS with a technical refresh to replace components that have a high failure rate.

The FAA has begun developing requirements for the NAS Voice Switch (NVS) and is planning installation starting in 2014. The NVS program will include voice switches, air/ground (A/G) radio control equipment, and the associated transmission services. The NVS will provide flexible networking for voice switch-to-voice switch connectivity as well as for voice switch to A/G radio connectivity. This architecture will facilitate meeting NextGen requirements for ATC workload sharing, unmanned aircraft system (UAS) operations, virtual tower operations, and business continuity. NVS switches will replace ARTCC and TRACON voice switches. Depending on the results of further analysis, NVS may replace some or all of the ATCT switches.

As mentioned under Automation (section 4.1), the Alaska Flight Services Modernization program will be replacing the voice switches in the automated flight service stations in Alaska in coordination with the NVS program. The Digital Voice Recorder System Replacement (DVSR) program and the Digital Audio Legal Recorder (DALR) replacement programs are upgrading the digital recorders that keep a record of controller voice messages that can be used for safety analysis. The Automated Terminal Information System (ATIS) broadcasts weather and other pertinent information to pilots as they approach an airport. We will maintain these systems during the entire timeframe of the roadmap.

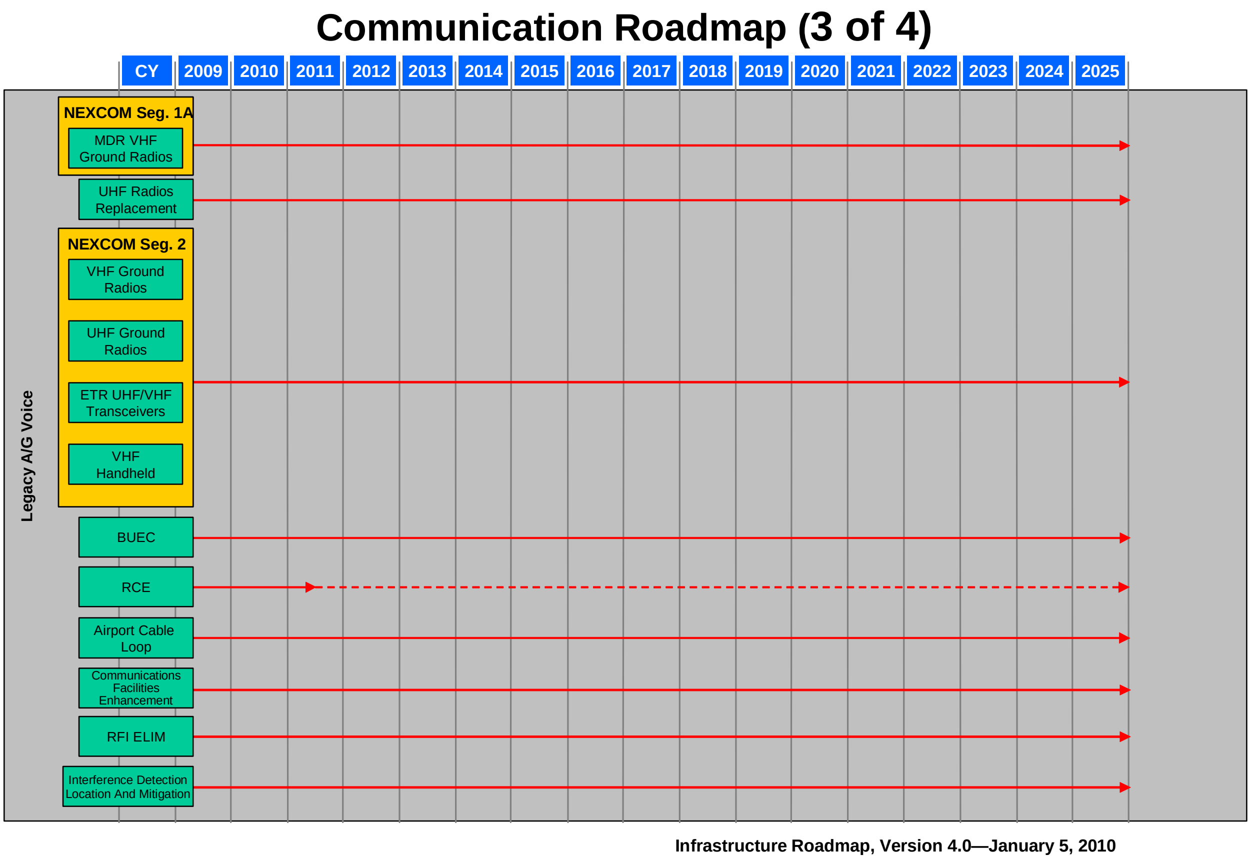


Figure 9 Communications Roadmap (3 of 4)

The third communications roadmap (figure 9) shows the programs that improve the radios used for air-ground communications and some of the supporting services to sustain NAS operations. The Next Generation Air/Ground Communications (NEXCOM) program is upgrading Very High Frequency (VHF) and Ultra High Frequency (UHF) radios. NEXCOM Segment 1A will replace the radios used for high and ultrahigh en route sectors. Segment 2 will replace the radios that terminal facilities use and will be a combined contract for both VHF and UHF radios.

The Back Up Emergency Communication (BUEC) program replaced the radios installed at remote sites that back up the primary radios that controllers use. The Radio Control Equipment (RCE) program is ongoing, and it modernizes the electronic equipment that allows controllers to control the radios they use at remote sites. The Airport Cable Loop program replaces the communications cables that report the condition of equipment necessary for airport operations such as the Airport Surveillance Radar. We are replacing copper wires with fiber optics and adding dual path operations so that a break in the cable does not stop the flow of information. Communication Facilities Enhancement (CFE) funds the replacement, relocation, or establishment of remote receiver transmitter stations to sustain radio contact with pilots when existing sites are damaged, air travel routes are relocated, or new air service requires additional sites.

The last two items on the roadmap are supporting services that we must continually do to ensure reliable radio communications. The Radio Frequency Interference (RFI) and Interference Detection, Location and Mitigation (IDLM) programs investigate occurrences of other transmitters interfering with FAA radios and navigation systems; locate the source; and either shut it down or adjust its operations so it no longer interferes with FAA controlled frequencies.

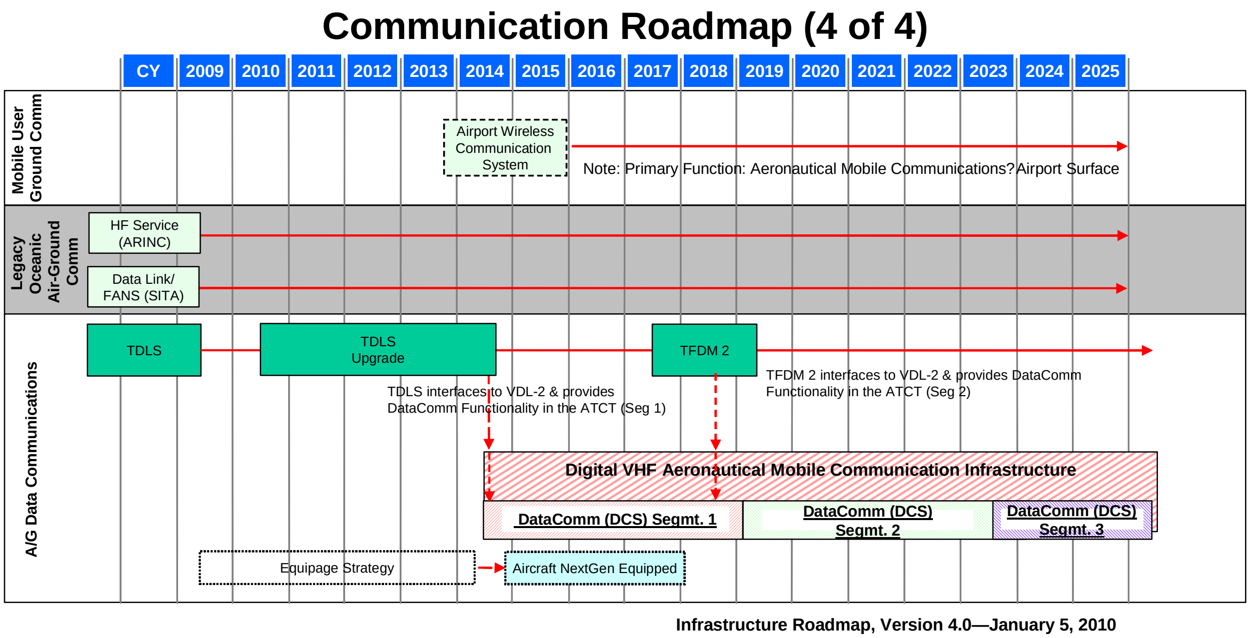


Figure 10 Communications Roadmap (4 of 4)

The fourth roadmap (figure 10) shows an Airport Wireless Communications System based on existing (Institute of Electrical and Electronic Engineers) IEEE 802.16e standards. We are considering using this system 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.

One of the communications systems used for oceanic air traffic control is the HF (high frequency) radio. Operated by a company named ARINC, HF radio allows the FAA to stay in touch with aircraft that are several thousand miles from shore. HF radio is supplemented by Data Link FANS (Future Air Navigation System), which relies on communications satellites to transfer messages over long distances.

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

Figure 11 shows the projected CIP spending for replacing communications systems and improving and modernizing communications channels. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Communication Functional Area	**$304.6**	**$334.8**	**$486.9**	**$825.7**	**$683.3**
1A06	Data Communication in support of Next Generation Air Transportation System	$153.3	$214.6	$389.5	$739.7	$555.5
2A07	Air/Ground Communications Infrastructure	$7.6	$2.8	$2.0	$2.0	$2.0
2A09	Voice Switching Control System (VSCS)	$15.6	$0.0	$0.0	$0.0	$0.0
2A11	Next Generation VHF Air/Ground Communications System (NEXCOM)	$49.9	$44.7	$33.4	$22.0	$80.3
2B08	Terminal Voice Switch Replacement (TVSR)	$11.5	$0.0	$0.0	$0.0	$0.0
2B14	National Airspace System Voice Switch (NVS)	$30.2	$50.0	$50.0	$50.0	$33.5
2B15	Voice Recorder Replacement Program (VRRP)	$9.4	$0.0	$0.0	$0.0	$0.0
2E05	Alaskan NAS Interfacility Communications System (ANICS)	$12.1	$10.7	$0.0	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$15.0	$12.0	$12.0	$12.0	$12.0

Figure 11 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.

The FAA uses 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 collisions. The ASDE-X uses several technologies to improve detection of aircraft and provides a clear display of the positions of aircraft and vehicles on or near taxiways and runways.

[2] Out-year funding amounts are estimates.

Figure 12 is the roadmap for surveillance systems.

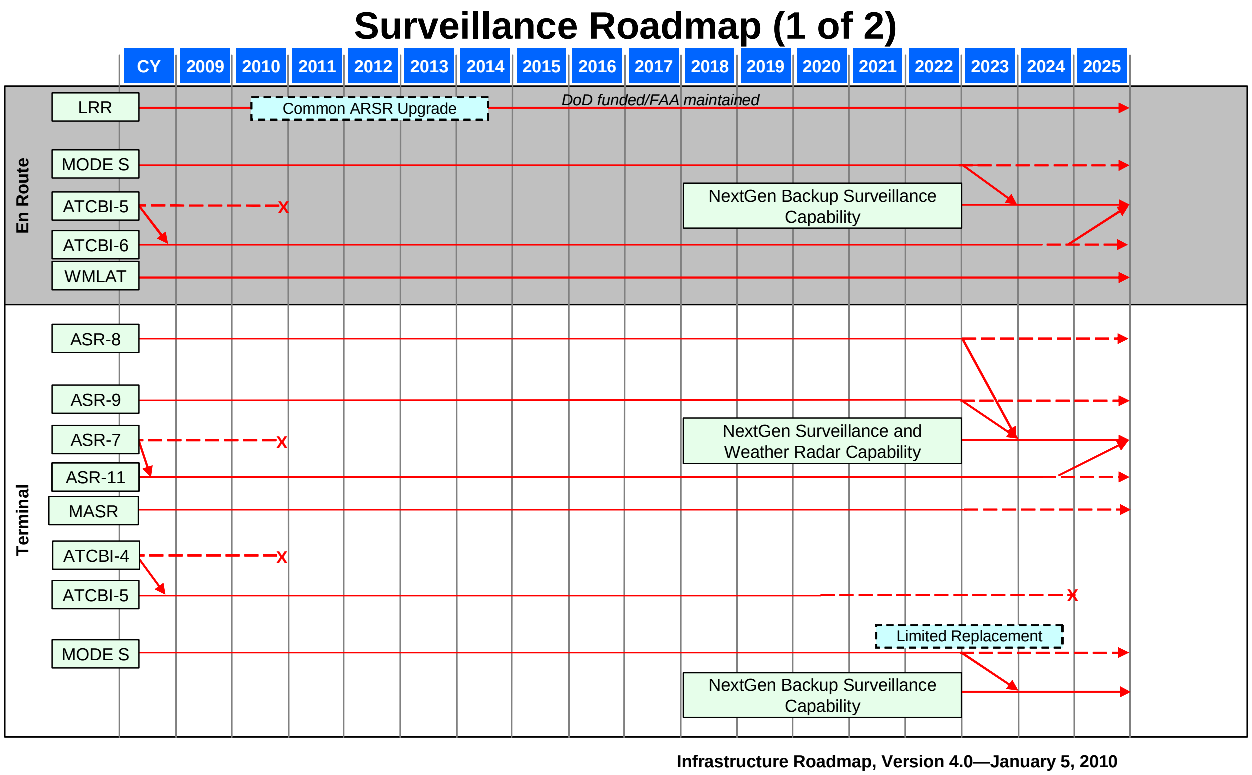


Figure 12 Surveillance Roadmap (1 of 2)

The major systems shown in the en route block 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 (does not require cooperation from the detected aircraft) that transmits radio frequency pulses and processes the reflected energy to determine aircraft range based on the total time for the signal to reach and return from the target, and the direction from the radar based on the antenna position. The ATCBI or Mode S transmits an electronic signal to aircraft, which triggers a transponder. An ATCBI triggers all transponders within its beam, while the Mode S is able to address each aircraft within its beam separately.

The FAA and the Department of Defense will jointly maintain the LRR through 2025 due to aviation security concerns. We are replacing the en route ATCBI 5 systems with the ATCBI-6 and plan to decommission the ATCBI-4 systems by the end of 2010. We will begin evaluating a next-generation backup surveillance capability in 2013 and decide whether to begin a replacement program in 2017.

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. The FAA will make an In Service Decision for WM/LAT system operations in Alaska and Colorado in 2010, which includes a decision on assuming WM/LAT operating costs.

There are four models of terminal radars currently in use. The Airport Surveillance Radar Model 11 (ASR-11) is the newest, and it has replaced some of the older radars that the ASR-9 program did not replace. Figure 12 shows that 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 2017 whether to replace these systems with new systems providing NextGen surveillance and weather capability. Current planning calls for keeping some terminal primary radars as a backup for ADS-B to address safety, security, and weather detection requirements.

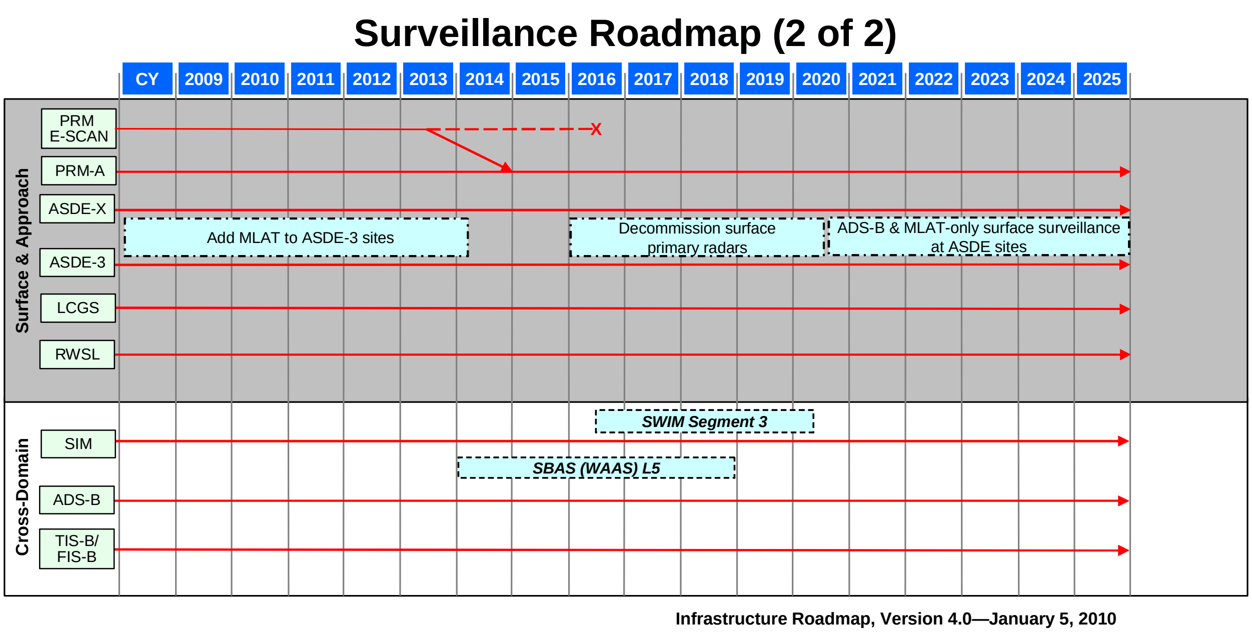


Figure 13 Surveillance Roadmap (2 of 2)

The second Surveillance roadmap (figure 13) shows the systems used on the surface and applications that ADS-B supports. 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 that two aircraft flying side-by-side maintain safe clearance between them while approaching closely spaced runways. 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 which is the technology used by the ASDE-X.

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, and 25 of the 35 planned ASDE-X sites were formerly ASDE-3/AMASS sites. The FAA will upgrade 18 ASDE-3 systems to ASDE-X and replace 7 existing ASDE-3 radars. Once all aircraft are equipped with ADS-B, we will maintain 9 ASDE-3 systems and 35 ASDE-X systems. We are accelerating installations of ASDE-X so that by 2010 we will have installed all but three of these systems, which we postponed due to construction conflicts at those airports.

The FAA is testing competing designs for the LCGS, and we will decide in 2011 which technology 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. This 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, and there is an operational system at Los Angeles International Airport. The FAA plans to have 22 systems operational within the 5-year timeframe of the CIP.

Over the next 2 years, the FAA will be evaluating whether to install Surveillance Interface Modernization (SIM) systems in terminal and en route radar systems. Use of SIM would precede a transition to SWIM for collection and storage of radar data.

The ADS-B line indicates a planned shift toward that technology for providing surveillance data to controllers. Nationwide implementation of ADS-B will enable a more frequent 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. ADS-B has a faster update rate (1 second versus 5 seconds for a radar), and unlike radar technology, the accuracy remains constant regardless of the distance from the aircraft to the receiving site.

Figure 14 shows the CIP costs associated with upgrading the surveillance units. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Surveillance Functional Area	**$252.8**	**$324.6**	**$347.4**	**$305.9**	**$189.7**
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.3	$5.8	$5.9	$0.9	$0.0
2A13	Automatic Dependant Surveillance-Broadcast (ADS-B) NAS-Wide	$176.1	$284.2	$270.7	$256.9	$157.3
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$4.2	$2.2	$10.0	$11.1	$13.4
2B10	Airport Surveillance Radar (ASR-9)	$3.0	$0.0	$0.0	$0.0	$0.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$4.1	$3.4	$4.4	$4.4	$4.4
2B12	Precision Runway Monitors	$1.0	$0.0	$0.0	$0.0	$0.0
2B13	Runway Status Lights (RWSL)	$55.0	$29.0	$56.4	$32.6	$14.6
2B17	ASR-8 Service Life Extension Program	$2.6	$0.0	$0.0	$0.0	$0.0
2B21	Mode S Service Life Extension Program (SLEP)	$1.5	$0.0	$0.0	$0.0	$0.0

Figure 14 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 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 with DME). There are over 1,000 VORs spread across the United States. They enable 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 also provide 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 be able to program and fly routes defined by geographic coordinates rather than flying from VOR to VOR. GPS receivers in the aircraft will also be used to report an aircraft's position when we implement ADS-B.

Precision landing guidance systems and associated equipment support low-visibility operations by providing radio signals and approach lights that pilots use to land safely in limited visibility. The current most widely-used precision landing aids are Instrument Landing Systems (ILS) that guide pilots to runway ends using a radio beam to define the approach glideslope, so that pilots can follow it to the runway 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 adverse weather conditions. Augmented GPS satellite signals also provide precision landing guidance. There are two augmentation systems that will be used for this purpose. The Space 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

[3] Out-year funding amounts are estimates.

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 referred to as Localizer Performance with Vertical Guidance (LPV) that 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 support precision approach services to all runways at an airport in weather conditions approaching zero visibility.

Figures 15 and 16 show the roadmaps for navigation aids.

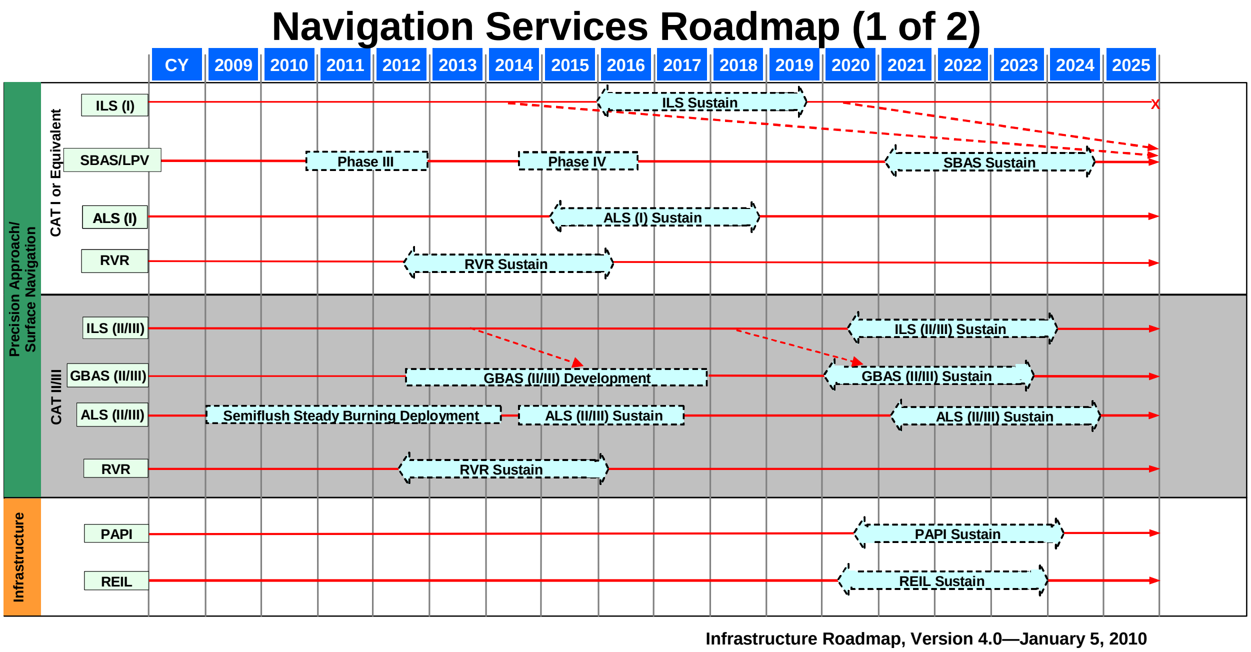


Figure 15 Navigation Roadmap (1 of 2)

There are three categories of precision approach. Category I is the most common. It 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 one-half mile or more. The Category II and III approaches have lower minimums (i.e., less vertical and horizontal visibility is required). Currently, the ILS is the primary system used for precision approaches. Category II and III ILS have redundancy and reliability levels that reduce the risk of equipment failures and allow an aircraft to descend to lower minimums. Alternatives for precision approach guidance are the SBAS/WAAS LPV and GBAS. As these alternatives come into broader use, the FAA can consider decommissioning ILS, but a number will remain in service to provide a back-up capability at the OEP airports and other airports as required. The FAA plans to make an initial decision in 2012 whether to drawdown Category I ILS, and a decision in 2020 whether to decommission all ILS.

In both Category I and Category II/III sections of the roadmap the Airport Lighting System (ALS) and the Runway Visual Range (RVR) systems are shown. The ALS helps the pilot see the runway before reaching runway minimums; and the RVR informs the tower of the measured visibility so that controllers can inform the pilot whether the runway visibility is above or below minimums. The FAA is testing use of light-emitting diodes (LED) to replace the incandescent lamps currently in use in the ALS to reduce both maintenance and operating costs. The runway lights and visibility sensors will need to be sustained and remain in operation for precision approach guidance regardless of the final decision on decommissioning ILSs.

Runway End Identification Lights (REIL) and the Precision Approach Path Indicator (PAPI) are also aids to landing an aircraft. The PAPI is replacing the Vertical Approach Slope Indicator (VASI), which uses an older technology to help pilots ensure they are on the proper glideslope for landing. The REIL and PAPI help pilots to visually align with the runway for both precision and non-precision approaches. Both will continue operating throughout the roadmap timeframe.

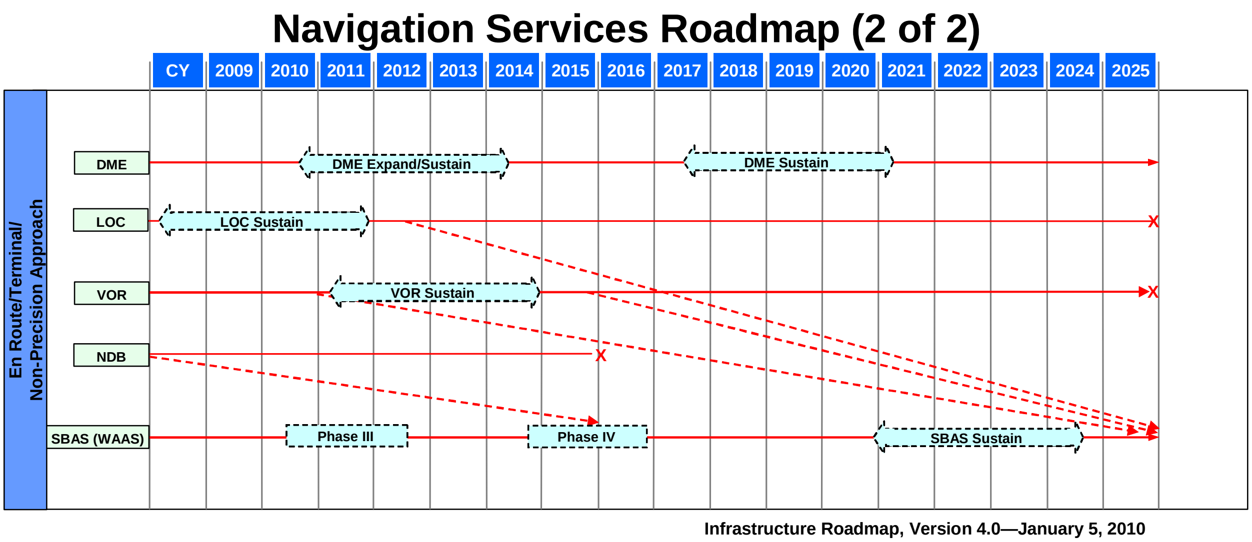


Figure 16 Navigation Roadmap (2 of 2)

As shown in Figure 16, 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 Localizer (LOC) is an ILS component that provides horizontal guidance to a runway end. In 2012, FAA will decide whether to drawdown the systems at airports where only localizers are installed.

The en route and terminal domains have traditionally relied on the system of VORs to define airways within the NAS. In 2010, the FAA will decide on the minimum operational ground network as part of the transition to satellite-based navigation. We will decide in 2015 whether to continue operating VORs as a backup for GPS or remove all VORs by 2025. If we retain VORs, they will need a service life extension program (SLEP).

The FAA is phasing out and plans to decommission Non-Directional Beacons (NDB) by 2015, because NDB only provide limited directional information. NDBs allow a pilot to determine direction from an NDB transmitter, but do not provide distance information; modern navigational equipment has more advanced capabilities.

The Department of Defense operates GPS. There are 24 to 30 active satellites in orbit, and a navigation receiver can determine an aircraft's position by interpreting the data transmitted by the satellites in view of its antenna. We expect two GPS upgrades 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. Introduction of the L5 signal will further improve that precision. 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.

Non-precision approaches provide guidance to pilots preparing to land on a runway when there is limited visibility; however they 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 17 shows the future capital investments for navigation systems included in the CIP. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Navigation Functional Area	**$214.2**	**$218.0**	**$221.9**	**$160.0**	**$165.9**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment	$5.0	$5.0	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$7.8	$5.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$95.0	$109.3	$107.1	$115.5	$121.4
2D04	Runway Visual Range (RVR)	$5.0	$5.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$5.0	$5.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$4.1	$5.0	$5.0	$0.0	$0.0
2D07	Visual Navaids - Establish/Expand	$3.8	$3.4	$5.0	$0.0	$0.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$6.0	$6.0	$8.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$7.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$58.5	$47.3	$55.3	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$20.0	$20.0	$20.0	$20.0	$20.0

Figure 17 Expenditures in the Navigation Functional Area[4]

[4] Out-year funding amounts are estimates.

4.5 Weather Systems

Timely and accurate weather observations and forecasts are essential to aviation safety and for making the best use of aviation capacity. Pilots need to know the direction and speed of winds aloft so that they can take advantage of tailwinds and minimize the effect of headwinds. They also need to know if there will be obstructions to visibility that restrict landings at their destination airport, and whether the runway is wet or dry and how that will affect braking action. Traffic flow managers and pilots use weather observations and forecasts to determine when they need to plan alternative routes to avoid severe weather. Pilots must avoid thunderstorms with hail and heavy rain, turbulence, and icing because they can damage the aircraft and potentially injure passengers. The FAA has a lead role in collecting and distributing aviation weather data – particularly hazardous weather. The agency distributes weather hazard information from its own systems and uses both the FAA and National Weather Service (NWS) computer forecast models based on data available from FAA and NWS sensors to develop forecasts for use by air traffic control facilities, pilots, airline operations centers, and other aviation-related facilities.

The FAA employs two categories of weather systems: 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, prevailing wind speed and direction, relative humidity, and cloud bases and tops, as well as wind shear and microbursts. These weather sensors provide real-time information to air traffic facilities and to centralized weather-forecasting models. Weather processing/dissemination/ display systems organize and process the sensor's observed data. Data from multiple sensors feed forecast models whose output 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, traffic flow managers, dispatchers, and pilots. Figure 18 shows the current and planned status of weather sensors.

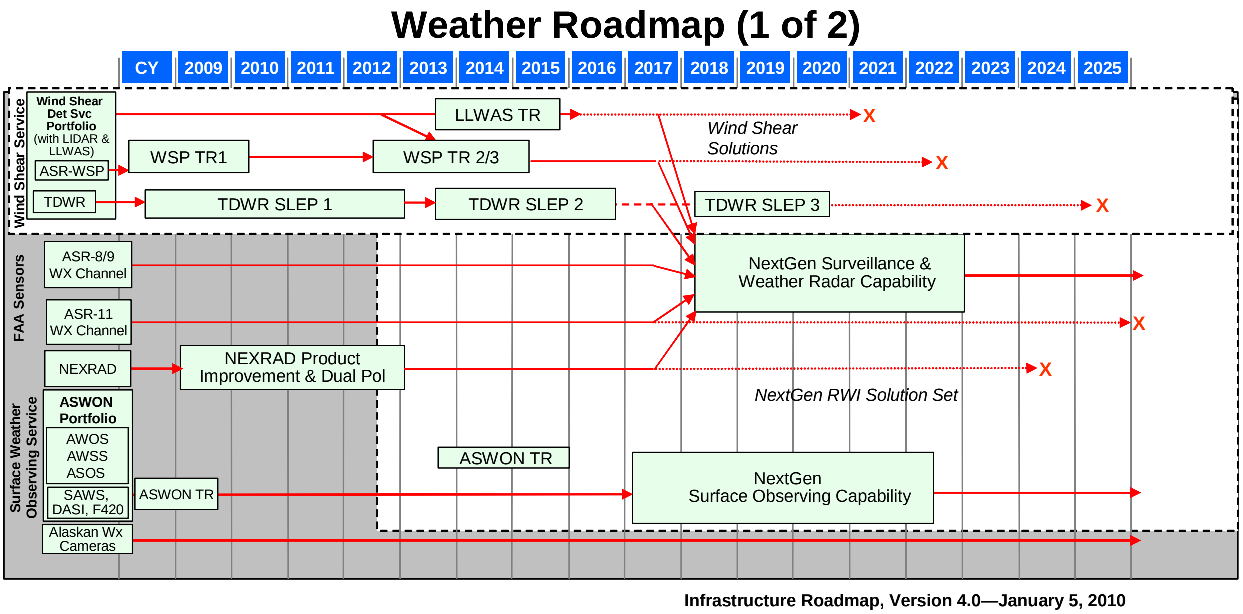


Figure 18 Weather Sensor Roadmap

The Wind Shear Detection Services Portfolio shown at the top of the roadmap includes: the Airport Surveillance Radar – Weather System Processor (ASR-WSP); the Terminal Doppler Weather Radar (TDWR); and the Low Level Wind Shear Alerting System (LLWAS). All these systems detect wind shear conditions near the runways and approach areas of airport to alert controllers, who can then warn pilots of gust fronts and wind shear in the vicinity of the airport. The Light Detection and Ranging (LIDAR) system uses lasers to detect dry microbursts and gust fronts that radar systems such as TDWR may not detect. Evaluation of LIDAR is underway at airports located in dry high plains or mountain environments, where wind shear is not always accompanied by sufficient precipitation for the TDWR to detect with 90 percent reliability.

Of the ground-based wind shear sensors, the most sophisticated is the TDWR. There are 46 operational TDWR sites 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 existence of 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 processes the six-channel weather from the two dimensional Doppler search radar signals of the ASR-9 to detect wind shear and approximate the output of the TDWR.

LLWAS supplements these radar systems, and it consists of wind sensors located at 6 to 29 points around the runway thresholds to measure surface wind direction and velocity. The LLWAS computer systems compare the wind velocity and direction detected by these sensors at different locations to determine whether wind shear events are occurring at or near the runways. The sensors can only measure surface winds and do not detect wind shear in the approach or departure paths as a radar would. LLWAS serves airports that do not have a TDWR or WSP. At several locations the system supplements the radars with point-specific wind measurements to verify the presence and location of wind shear. The FAA is in the process of deciding whether to implement a technical refresh on existing wind shear systems and has scheduled a follow-on decision for the 2017 timeframe to determine whether to replace all current wind shear sensors with a NextGen weather and surveillance radar system.

The ASR-9/11 Weather Channel and the Next Generation Weather Radar (NEXRAD) detect precipitation, wind, and thunderstorms that affect aircraft in flight; and the ASR-8 displays weather that reflects its radar signal. Replacing the weather information that the ASR-8/9 radars generate will be necessary only if the ASR-8/9 radars do not remain in operation. The FAA plans to decide in 2017 whether to combine these functions into a NextGen weather radar replacement. Development of the currently operating Next Generation Weather Radar (NEXRAD) occurred under a joint program of the Department of Commerce National Weather Service, Department of Defense, and FAA. These systems are Doppler weather radars that detect and produce over 100 different long-range and high-altitude weather observations and products, 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. Dual Pol is an important addition to NEXRAD that improves detection of in-flight icing and is expected to improve the forecasting of areas where in-flight icing will occur. Working with our partner agencies, we will also decide by 2017 whether to incorporate planned long-range NEXRAD capabilities into the combined NextGen weather and surveillance radar system that will have intermediate range gap-filler capabilities.

The Automated Surface Weather Observation Network (ASWON) Portfolio includes several surface sensors (AWOS/ASOS/AWSS/SAWS) that measure weather parameters on the surface and report conditions to air traffic facilities and pilots. The data they collect is important to pilots and dispatchers as they prepare and file flight plans, and it is vital for weather forecasting. 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 conditions including adverse weather. A technical refresh is underway to keep these systems operating reliably until we make a decision to implement the NextGen Surface Observing Capability. The Digital Altimeter Setting Indicator (DASI) and the F-420 wind sensors, that ATC towers use, may also require updating. We plan to work with our partner agencies and decide how we will ultimately incorporate their functions into the NextGen Surface Observing Capability.

Non-FAA sensors will play a more important role in the future. The roadmap shows non-Federal AWOS, aircraft weather sensors, pilot reports and the Lightning Data system that all provide weather data to the FAA. To introduce more precision into managing aircraft trajectories, we need more refined real time weather information. 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.

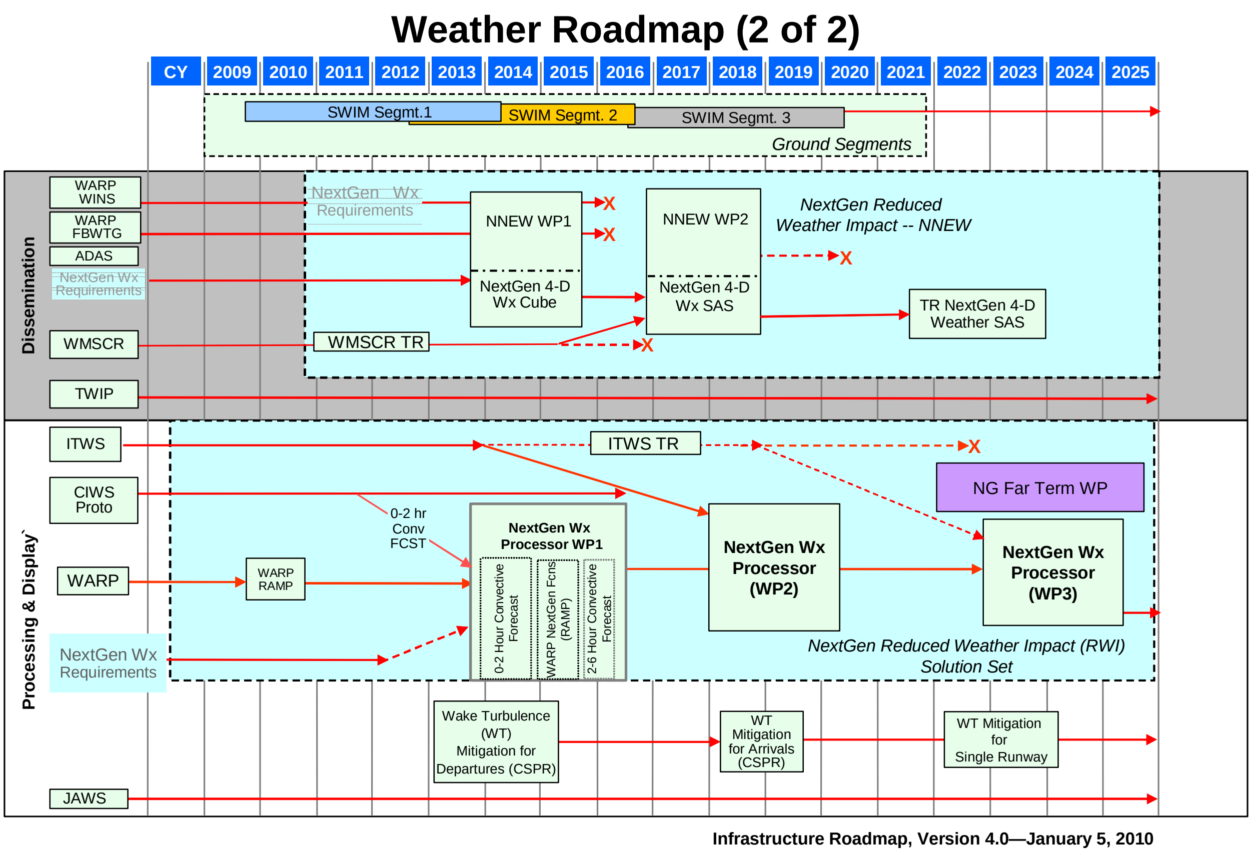


Figure 19 Weather Dissemination, Processing, and Display Roadmap

Figure 19 shows that NextGen requires efficient consolidation of large volumes of weather observations and forecast information for processing, display, and dissemination. Weather forecasts are integrated into decision support system algorithms to produce the more sophisticated forecasts of how weather will impact NAS operations. We are developing NNEW and the NextGen 4-D Weather Cube to enhance the collection and dissemination of weather information and provide access to all users throughout the NAS.

The NextGen 4-D 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 and users so that observations and forecasts can be more widely and consistently distributed via network-enabled communications. The 4-D Weather Cube will be part of the NextGen Networked Enabled Weather program and will support the Reduce Weather Impact solution set. The 4D Weather Cube will host the Single Authoritative Source (4-D Wx SAS), which ensures that the most accurate and consistent data will be distributed to users so that they can make decisions based on correct and coherent weather information. Decision support tools will use this weather information to assist users in understanding weather constraints and taking actions to reduce risk for aviation operations.

Currently, the Weather and Radar Processor Weather Information Network Server (WARP WINS) stores data from multiple NEXRAD radars for en route control facilities to use. SWIM may allow retrieval of this data as a NextGen capability in the future. WARP compiles information from a number of sources for interpretation by the Center Weather Service Unit forecasting stations. WARP also provides NEXRAD precipitation intensity data to controllers' displays. The Automated Weather Observation System Data Acquisition System (ADAS) is a communications link that transmits AWOS/ASOS/AWSS data to air traffic facilities. ADAS also correlates lightning groundstroke information to AWOS/ASOS/AWSS data to better determine the location of nearby thunderstorm activity. 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 imagery to airline dispatchers via an airline's communication provider for uplink to pilots for use in analyzing terminal weather conditions at major airports. The FAA will decide during 2014 whether to migrate WMSCR functionality into the NNEW for weather information distribution.

The Integrated Terminal Weather System (ITWS) consolidates weather information from automated sensors and surrounding radars (TDWR and NEXRAD) to provide real-time weather information for terminal control facilities. The system also projects movement of thunderstorms and gust fronts 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 inefficient maneuvering to accommodate a runway change as aircraft approach an airport. We have installed ITWS at 23 airports, and are planning to deploy it to 10 additional sites. ITWS will receive technical refresh in the near term, and we will incorporate its weather inputs and processing power into the NextGen Weather Processor by 2018.

The Corridor Integrated Weather System (CIWS) gathers weather information along the busiest air traffic corridors to help air traffic specialists 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 regarding when normal (direct) routes will be available. CIWS functionality 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; implement the CIWS functionality (0-2 hour convective weather forecast) and develop a 0-6 hour forecast for the TFM 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. We will incorporate ITWS capabilities 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 Juneau Airport Weather System (JAWS) is unique to the Juneau Alaska, area. 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 aircraft arriving at and departing the airport.

Figure 20 shows the planned expenditures included in the CIP for weather sensors and weather dissemination and processing systems. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Weather Functional Area	**$105.3**	**$143.4**	**$156.7**	**$120.7**	**$127.4**
1A05	NextGen Network Enabled Weather (NNEW)	$28.3	$56.4	$36.6	$33.8	$18.6
1A10	Next Generation Air Transportation System (NextGen)-Reduce Weather Impact	$43.2	$66.7	$109.8	$77.0	$97.6
2A03	Next Generation Weather Radar (NEXRAD)	$6.7	$2.8	$3.3	$1.2	$1.3
2A14	Windshear Detection Service	$1.0	$0.0	$0.0	$0.0	$0.0
2A15	Weather and Radar Processor (WARP)	$2.1	$2.5	$0.5	$0.7	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$8.6	$7.7	$2.1	$0.5	$0.0
2B18	Integrated Terminal Weather Systems (ITWS)	$5.5	$0.0	$0.0	$1.3	$9.7
2C01	Automated Surface Observing System (ASOS)	$6.7	$2.5	$0.0	$0.0	$0.0
2C03	Weather Camera Program	$3.2	$4.8	$4.4	$6.2	$0.2

Figure 20 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, that house hundreds of employees and the equipment they use 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) 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 Airport 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 to determine the feasibility of NextGen concepts, and it also supports the testing of new equipment that will be installed in the

[5] Out-year funding amounts are estimates.

NAS. The FAA has requested funding for 2011 and beyond to upgrade buildings and infrastructure such as roads. Annual funding is 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 either too small to handle the traffic growth that has occurred since they were built or they have inadequate visibility of runways and taxiways due to construction of new runways or new hangers. The second line item is the Terminal Air Traffic Control Facilities – Modernize program. It 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 facility size, replacing heating and cooling systems, and upgrading electrical power distribution systems.

The FAA is evaluating the design and configuration of future NextGen facilities to support the planned NextGen improvements in service and the potential changes in airspace that these facilities control. It is important that these new facilities are sized correctly so that we can realize the full benefits of the NextGen Architecture. 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 2017.

Figure 21 shows the planned expenditures for facilities projects for the air traffic control system. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Facilities Functional Area	**$475.4**	**$753.1**	**$799.2**	**$704.2**	**$948.6**
1A03	William J. Hughes Technical Center Facilities	$13.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$7.5	$5.7	$5.9	$6.0	$6.1
1A15	Next Generation Air Transportation System (NextGen) - Networked Facilities	$35.0	$192.1	$253.8	$157.2	$413.5
2A04	Air Traffic Control System Command Center (ATCSCC) Relocation	$2.1	$2.1	$0.0	$0.0	$0.0
2A05	ARTCC Building Improvements/Plant Improvements	$36.9	$52.0	$52.4	$57.4	$57.4
2B06	Terminal Air Traffic Control Facilities - Replace	$114.6	$150.0	$150.0	$150.0	$150.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$45.6	$53.3	$52.7	$52.7	$52.1
2C02	Flight Service Station (FSS) Modernization	$21.4	$16.5	$8.5	$2.5	$2.5
2E01	Fuel Storage Tank Replacement and Monitoring	$6.3	$6.4	$6.6	$6.7	$6.8
2E02	Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)	$14.1	$15.7	$16.3	$16.5	$15.8
2E04	Airport Cable Loop Systems - Sustained Support	$7.0	$5.0	$5.0	$5.0	$5.0
2E06	Facilities Decommissioning	$6.4	$5.0	$5.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$95.0	$160.0	$165.0	$170.0	$177.8
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A05	Facility Security Risk Management	$17.0	$30.0	$18.0	$19.4	$0.0
3A09	Data Center Optimization	$2.0	$0.0	$0.0	$0.0	$0.0
3B01	Aeronautical Center Infrastructure Modernization	$15.0	$10.3	$10.5	$10.8	$11.1
4A04	Mike Monroney Aeronautical Center Leases	$16.6	$17.0	$17.5	$17.9	$18.4

Figure 21 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 as well as support 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 disruption to air traffic control services.

Another category of support contracts provides spectrum engineering to allocate radio frequencies for new installations and to prevent outside interference with existing frequencies.

[6] Out-year funding amounts are estimates.

Figure 22 shows planned expenditures for specific mission support projects. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2011 Budget	FY 2012	FY 2013	FY 2014	FY 2015
	Mission Support Functional Area	**$310.9**	**$318.1**	**$306.9**	**$303.9**	**$318.8**
1A01	Advanced Technology Development and Prototyping (ATDP)	$25.5	$32.9	$29.4	$27.1	$29.9
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	$8.0	$10.0	$10.0	$8.0	$5.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$26.0
2B20	Remote Maintenance Monitoring	$6.5	$4.2	$3.7	$0.0	$1.2
2E03	Aircraft Related Equipment Program	$9.0	$13.0	$9.0	$9.0	$9.0
2E08X	Aircraft Fleet Modernization	$0.0	$9.0	$0.0	$0.0	$0.0
2E09X	Independent Operational Test/Evaluation - Outyear request	$0.0	$5.2	$5.3	$5.5	$5.6
3A03	Logistics Support Systems and Facilities (LSSF)	$11.5	$0.8	$0.0	$0.0	$0.0
3A06	Information Security	$15.2	$12.0	$12.0	$12.0	$12.0
3B02	Distance Learning	$2.0	$1.0	$1.0	$1.0	$1.0
4A01	System Engineering and Development Support	$32.3	$32.9	$33.5	$34.1	$32.9
4A02	Program Support Leases	$38.6	$39.7	$40.9	$42.1	$55.2
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	$2.6	$0.0	$0.0	$0.0	$0.0
4A07	Technical Support Services Contract (TSSC)	$22.0	$22.0	$25.0	$30.0	$30.0
4A08	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$0.0	$0.0
4A09	Center for Advanced Aviation System Development (CAASD)	$80.7	$80.8	$82.7	$84.6	$86.5

Figure 22 Expenditures in the Mission Support Functional Area[7]

[7] Out-year funding amounts are estimates

5 Conclusion

The last few years have been difficult for the aviation industry. Average yield (cents per passenger mile) has declined dramatically because of decreased business travel, and the number of flight operations has declined over 6 percent. This has resulted in significant adjustments in the number of flights and the capacity offered for air travel. Although it is likely that economic growth will resume in 2010, there will be a lag in the recovery of the airline industry. As mentioned in section 2.1, the economic forecast is for 1.8 percent growth in 2010 with continued growth in future years. Increased air travel has always followed economic recovery, and the FAA is planning to handle 30-40 percent more flights between now and 2025.

This near-term downturn in operations suggests that we could defer system modernization, but there are several reasons why that assumption is incorrect. Operational improvements that rely on capital investment often lag several years behind the appropriation of funding to carry out the investment, because the complex equipment necessary to support changes in operational improvements takes time to develop, build, install, test and then train controllers to use. Capital investment must anticipate future growth. In addition, flight delays are still occurring on a regular basis at the Nation's largest airports; so regardless of when future growth occurs, the need for additional capacity exists today.

Besides preparing for growth, we must deal with normal obsolescence. The computer systems and other technology that we use for air traffic control have an estimated life of 10 to 20 years. Regardless of whether there is growth or decline in air travel, we will have to replace several system components in the next 10 years. Without adequate funding during those years, we will not have contracts in place to provide the new equipment when it is needed. We are committed to modernizing the existing air traffic control system, and we will be doing that continuously into the future. It will support a transition to the NextGen to expand capacity to meet the needs of the future.

The NextGen transition to air traffic management is introducing greater flexibility into the NAS. Shared, real-time traffic and weather information available to all system users will enable airspace conflicts to be resolved collaboratively, resolving issues before they can reverberate throughout the entire system.

6 Appendices

The CIP contains five 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.
- Describes the projects contribution to meeting the Strategic objective and performance target.
- Lists FY 2011–2015 — performance output goals.
- Shows system implementation schedules.

Appendix C

- Provides estimated expenditures from FY 2011 through FY 2015 by Budget Line Item (BLI). Expenditures are in Millions of Dollars.

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 2011 – 2015

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. For this CIP, projects will continue to be aligned with the current 2009-2013 Flight Plan while FAA works on developing the next version of the Flight Plan. 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) 2011-2015 funding are included in Appendix A, B, and C.

The FAA's Flight Plan has four Strategic Goals and the table below shows how they are aligned with the DOT Goals.

DOT Strategic Goals are:	FAA Strategic Goals are:
1) *Safety*…………………………………………………………………..…	Increased Safety
2) *Reduced Congestion*………………………………………………...…	Greater Capacity
3) *Global Connectivity*……………………………………………..…..…	International Leadership
4) *Organizational Excellence*…………………………………………….	Organizational Excellence

Note: DOT Strategic Goals highlighted with Italics were under revision at the time this draft was prepared

A 3-digit code is used in the CIP to designate the goal, objective and performance target that a project supports, and this Appendix defines those terms as they are used in the FAA Strategic Plan. The first digit is the goal, the second digit is the objective, and the third digit is the performance target.

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 2011 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 planned 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 2011 BLI	CIP #	CIP Name
1A01H	W10.01-01	Juneau Airport Wind System (JAWS) – Harden Prototype & Implementation
1A01I	A28.01-01	Traffic Alert & Collision Avoidance System (TCAS)
1A01X	W10.01-02	Juneau Airport Wind System (JAWS) – Tech Refresh
1A08G	G7M.02-01	NextGen – System Dev – Systems Safety Mgmt Transformation
2A14	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
2D12	N17.01-01	Runway Safety Area – Navigation Mitigation
2E03A	M12.00-00	Aircraft Related Equipment Program
2E03X	M12.01-03	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technical Refresh
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 1
4A10X	A08.03-03	Aeronautical Information Management (AIM) Modernization – Segment 2

- **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 2011 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:** 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 2011 BLI	CIP #	CIP Name
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) Phase 1

- **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 2011 BLI	CIP #	CIP Name
1A01A	S09.02-00	Runway Incursion Reduction Program (RIRP) – ATDP
2B01	S09.01-00	Airport Surface Detection Equipment – Model X (ASDE-X)
2B01X	S09.01-01	ASDE-X –Tech Refresh & Disposition
2B13	S11.01-02	Runway Status Lights (RWSL) – Segment 1
2B13X	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 2011 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 2011 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 2011 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 2011 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 2011 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
1A01J	M52.01-01	Operational Modeling Analysis and Data
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
1A08D	G3M.04-01	Staffed NextGen Towers (SNT)
1A08F	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
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
1A11E	G2A.01-05	NextGen – HD – Trajectory Mgmt – Surface Traffic Data Sharing
1A11F	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
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.02-04	NextGen – CATM – Flight & State Data Mgmt – Concept Dev for Integrated NAS Design and Procedure Planning
1A12G	G5A.04-01	NextGen – CATM – Capacity Management – Dynamic Airspace
1A12H	G5M.02-01	NextGen – CATM – Joint Network Enabled Operation – (NEO) Program
1A13A	G6A.01-01	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD)
1A13B	G6A.01-02	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Arrivals (WTMA)
1A13C	G6A.02-01	NextGen – FLEX – Surface/Tower/Terminal Systems Engineering
1A13D	G6N.01-01	NextGen – FLEX – Separation Mgmt – Approaches, Ground Based Augmentation System
1A13E	G6N.01-02	NextGen – FLEX – Separation Mgmt – Closely Spaced Parallel Rwy Ops
1A13F	G6N.01-03	NextGen – FLEX – Separation Mgmt – Approaches, NextGen Nav Init
1A13H	G6N.01-05	NextGen – FLEX – Separation Mgmt – Enhancing Terminals and Airports – Terminal Enhancements for RNAV ATC (TERA)
1A13I	G6N.02-01	NextGen – FLEX – Trajectory Mgmt – Arrivals
1A13J	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
2A17	A01.10-04	En Route Automation Modernization (ERAM) – Post R-3
2B05B	A33.01-01	Terminal Flight Data Management System
2B18	W07.01-00	ITWS – Development/ Procurement/ Pre-Planned Product Improvement (P3I)
2B18X	W07.01-02	ITWS – ITWS Technical Refresh & Disposition
2D02	N03.01-00	Instrument Landing Systems (ILS)
2D06	N09.00-00	Sustain Distance Measuring Equipment (DME)
2D11	N12.03-01	GPS Civil Requirements
2B12	S08.01-02	Precision Runway Monitor Alternative (PRMA) – Multilateration Technology – Upgrade

– **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 2011 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 2011 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 2011 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	S04.02-03	LRR Improvements – Infrastructure Upgrades/Sustain
2A09	C01.02-03	Voice Switching and Control System (VSCS) – Tech Refresh – Phase 2
2A11A	C21.01-01 C21.02-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 1a and Segment 2
2A11B	C06.04-00	Communications Facilities Enhancement – UHF Replacement
2A15	W04.03-01	Weather and Radar Processor (WARP) Sustain
2B03	A04.01-01	Standard Terminal Automation Replacement System – Technical Refresh (TAMR Phase 1)
2B03	A04.01-02	Standard Terminal Automation Replacement System – Terminal Enhancements (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	S03.01-06	ASR-9 / Mode S SLEP, Phase 2
2B11	S03.02-04	ASR-11 – Tech Refresh – Segment 1
2B11X	S03.02-05	ASR-11 – Tech Refresh – Segment 2
2B14	G3C.01-01	Networked Facilities – NAS Voice Switch
2B15	C23.01-00	Voice Recorder Replacement Program – Next Generation Recorders (VRRP)
2B16	A03.05-01	Integrated Display System (IDS) – Technical Refresh and Sustainment
2B17	S03.05-01	ASR-8 SLEP
2B19	A04.05-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 2 Tech Refresh
2B20	M07.04-01	Remote Maintenance and Monitoring System (RMMS) – Tech Refresh
2B20X	M07.04-02	Remote Maintenance and Monitoring System (RMMS) – Remote Monitoring and Logging System (RMLS) – Tech Refresh
2B21	S03.01-08	MODE S SLEP, Phase 2
2C01	W01.02-02	Automated Surface Weather Observation Network (ASWON) – ASOS – Pre-Planned Product Improvements (P3I)

FY 2011 BLI	CIP #	CIP Name
2D01	N06.00-00	Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC)
2D04	N08.02-00	Runway Visual Range (RVR) – Replacement/Establishment
2D09	N04.04-00	Navaids – Sustain, Replace, Relocate
2E01	F13.01-00	Fuel Storage Tanks
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
3A05	F24.00-00	Facility Security Risk Management (FSRM)
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 2011 BLI	CIP #	CIP Name
1A09C	G1A.01-03	NextGen – TBO – Separation Mgmt – Automation Risk Mitigation Interface Requirements
2A06	A05.01-06	TFM Infrastructure – Infrastructure Modernization
2A06	A05.01-10	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1
2A10	A10.03-00	Advanced Technologies and Oceanic Procedures (ATOP)
2A13	G2S.01-01	Automatic Dependent Surveillance – Broadcast (ADS-B) – National Implementation – Segment 1 and 2
2A13	G2S.01-03	ADS-B Non-Radar Airport Surveillance
2A13X	G2S.01-02	Automatic Dependent Surveillance Broadcast (ADS-B) – Future Segment
2A16	G5A.05-01	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2
2A16	G5A05-02	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3
2D10	N04.02-00	Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI)
3A03	M21.04-01	Logistics Center Support System (LCSS)
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 2011 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 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

FY 2011 BLI	CIP #	CIP Name
1A08E	G6M.02-01	NextGen – Systems Dev – Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction
1A08H	G7M.02-02	NextGen – Systems Dev – Operational Assessments
1A11D	G2A.01-04	NextGen – HD – Trajectory Mgmt – Tailored Arrivals Oceanic

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 2011 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 2011 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

4. 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 2011 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 2011 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 2011 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 2011 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

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

FY 2011 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 2011 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;

    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 2011 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
1A15C	G3M.03-01	Test Bed Demonstration
1A13G	G6N.01-04	NextGen – FLEX – Separation Mgmt – Approaches, Optimize Nav Tech
2A04	F28.01-01	ATCSCC – Relocation
2A12	G5C.01-01	System-Wide Information Management (SWIM) – Segment 1
2A12	G5C.01-04	System Wide Information Management (SWIM) – Segment 2
2D08	A14.02-01	Instrument Flight Procedures Automation (IFPA)
2D08	A14.02-02	Instrument Flight Procedures Automation (IFPA) – Tech Refresh
2E06	F26.01-01	Decommissioning
3A01	F13.02-00	Environmental Cleanup / HAZMAT
3A09	F30.01-01	Data Center Optimization
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)
4A05B	M03.01-01	Web CM
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
4A05A	M22.00-00	NAS Implementation Support Contract (NISC)
4A07	M02.00-00	Technical Support Services Contract (TSSC) Program

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

FY 2011 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:** 90 percent of major system investments are within 10 percent variance of current baseline total budget estimates at completion (BAC).

FY 2011 BLI	CIP #	CIP Name
1A01G	M47.01-01	Dynamic Capital Planning

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

FY 2011 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 2011 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 2011 BLI	CIP #	CIP Name
3A06	M31.00-00	NAS Information Security – Information Systems Security

- **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 2011 BLI	CIP #	CIP Name
1A14	G7A.01-01	SSE – Security Integrated Tool Set (SITS)
3A04	C18.00-00	Command & Control Communications (C3)

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix B

Fiscal Years 2011 – 2015

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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.

FORMAT

Appendix B is organized by budget line item (BLI) consistent with the fiscal year (FY) 2011 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 2011 Performance Output Goals and FY 2012-2015 Performance Output Goals for all Capital funded CIP projects are reported as outlined below. To support FAA's Business Plan development and management CIP Performance Output Goals will be separated for FY11 through FY15. As this is a transition year for capturing output goals in this format a few programs are shown in this new format. The example below shows the new format.

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 2011 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 2011-2015 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 2011-2015 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

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 August 2009……

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……

Program Plans – Performance Output Goals

FY 2011:
- 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.

FY 2012:
- Complete tech refresh analysis.

FY 2013:
- Begin tech refresh effort.

FY 2014:
- Continue tech refresh effort.

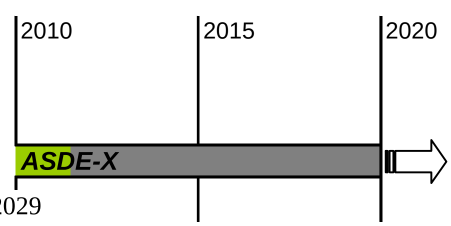
FY 2015:
- Continue tech refresh effort.

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.

Table of Contents

ACTIVITY 1: ENGINEERING, DEVELOPMENT, TEST, AND EVALUATION

1A01, ADVANCED TECHNOLOGY DEVELOPMENT AND PROTOTYPING (ATDP)

FY 2011 Request $25.5M

- 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, Traffic Alert and Collision Avoidance System (TCAS), A28.01-01
- J, Operational Modeling Analysis and Data, M52.01-01
- X, Juneau Airport Wind System (JAWS), Technology Refresh, W10.01-02

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. 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.

Program Plans FY 2011 – Performance Output Goals

- Conduct operational evaluation of enhanced FAROS technology.
- Conduct FAROS technology investment analyses.
- Conduct LCGS pilot project to evaluate 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 2012-2015 – Performance Output Goals

- Transition LCGS solutions to NAS implementation.
- Transition enhanced FAROS 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 Air Traffic Control (ATC) system and their environmental impacts. The tracking and monitoring capabilities of PDARS support studies and analysis of air traffic operations at the service delivery or national level. Also, the capacity and efficiency of the NAS is further expanded through capacity modeling which analyzes the impact of Next Generation air transportation system (NextGen) operational improvements. By recording the design and performance of the legacy NAS PDARS establishes a de facto base case for before and after comparisons of NextGen accomplishments.

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.

Program Plans FY 2011 – 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 Airport Surface Detection Equipment – Model X (ASDE-X) surface surveillance data.
- Expand PDARS capability to include fuel burn and emissions measurement and analysis.
- 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 2012-2015 – 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.
- Develop a module within the PDARS logic to accommodate Automatic Dependent Surveillance-Broadcast (ADS-B) reports.
- Complete PDARS network to include all ASDE-X surface surveillance data.
- Continue updates and support of the FACT 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 the Air Traffic Organization's (ATO) modernization programs and the Next Generation Air Transportation System (NextGen). This work includes developing and maintaining detailed second level 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.

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 assess requirements and to evaluate the impact of the concept on system capacity, efficiency, safety and human performance. Evaluation criteria includes 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) requirements to support the ATO's goal of reducing cost, and;
- Alternative automation, display, and facility configuration to increase productivity and hence capacity.

Program Plans FY 2011 – 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, including 4-D Advanced Arrivals.
- Continue RTCA support.
- Conduct studies for NextGen towers and other facility replacement/co-location/consolidation as required.
- Expand the concept development and validation of flow based trajectory management to identify opportunities for the utilization of new systems and capabilities.
- Define information and display requirements for a multi-sector planner or for flow based trajectory management.
- Expand cognitive and analytic models to support assessments.

Program Plans FY 2012-2015 – 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.
- Support collaboration between the SESAR and NextGen Program by working with the SESAR Joint Undertaking to coordinate concept development, validation, and measurement methodologies.
- Expand cognitive and analytic models to support assessments.
- Continue RTCA support.
- Studies for NextGen towers and other facility replacement/co-location/consolidation as required.
- Continue to develop concepts of use to describe the operational use of new communication, navigation, automation and surveillance capabilities.
- Continue concept development and validation to identify opportunities to right size the ATC infrastructure for cost efficiency and productivity.
- Develop investment analysis products for implementation of flow based trajectory management.
- Continue to conduct analyses and develop concepts to support the applications of 4-D trajectory management, including 4-D Advanced Arrivals.

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, National Weather Service (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 NAS 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 policies, requirements and metrics to improve weather capabilities in the NAS to meet NextGen objectives. The program funds analyses and studies that will assist in developing and validating requirements, defining the boundaries, contents, policies, participants and governance for the 4-Dimensional Weather Data Cube, developing and implementing metrics for avoiding weather-induced delays and improving prediction of those delays. It also identifies research needed to increase capacity.

Program Plans FY 2011 – Performance Output Goals

- Define the requirements for the NextGen 4-Dimensional Weather Data Cube, including boundaries, contents and policies needed, participants, including publishers, subscribers and criteria for entry into the Cube. This involves determining governance, including business rules, requirements changes and global harmonization policies needed.
- Perform weather requirements analysis, including gap analysis, traceability analysis, requirements allocation and validation.
- Develop an ICAO compliant Quality Management System including a verification program.

Program Plans FY 2012-2015 – 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 a new configuration after airspace redesign is implemented requires changes in the supporting infrastructure. 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.

Program Plans FY 2011 – Performance Output Goals

- Implement infrastructure changes for New York/ New Jersey / Philadelphia (NY/NJ/PHL) Metropolitan Airspace Redesign, phase II.
- Implement infrastructure changes for Chicago Airspace Project, next phase (III).
- Conduct initial design and modeling of Western Corridor Airspace.
- Develop plans for Denver Airspace.
- Complete design and feasibility studies associated with facility realignment.
- Complete additional airspace realignment associated with airspace redesigns in coordination with FAA right-sizing activities.

Program Plans FY 2012-2015 – Performance Output Goals

- Support implementation of initial sectors for Western Corridor Airspace Redesign.
- Implement infrastructure changes for NY/NJ/PHL Redesign, final phases (III and IV).
- Implement infrastructure changes for Chicago Airspace Project, final phases (IV).
- Implement additional terminal/en route/oceanic changes.
- This program supports infrastructure changes needed for airspace redesign and the items are identified after the initial redesign has been completed. Examples are given in the program description.

F, STRATEGY AND EVALUATION – ATDP, M46.01-01

Program Description

The FAA's Office of NextGen Systems Analysis 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 NextGen Systems Analysis, 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 National Aeronautics and Space Administration (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 contribute to the decision-making processes associated with the following *Greater Capacity Objective 1* strategies:

- Improve airspace access and modify separation standards to increase capacity and allow more efficient use of congested airspace.
- Improve bad weather departure and landing capacity 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.

Program Plan FY 2011 – Performance Output Goals

- Complete development, validation, and documentation of the modernized Airfield Delay Simulation Model (ADSIM+).
- Complete development of new simulation core module for the new NAS-wide simulation model.
- Begin development of Monte Carlo capability.
- Continue development of Graphical User Interface (GUI).
- Complete development of new Terminal Radar Approach Control (TRACON) model.
- Complete integration of schedule generation process into simulation string.

Program Plan FY 2012-2015 – Performance Output Goals

- Maintain 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.

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.

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

- **FAA Strategic Goal 4 – Organizational Excellence.**
- **FAA Objective 4 –** Make decisions based on reliable data to improve our overall performance and customer satisfaction.
- **FAA Performance Target 1 –** 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 improved data will lead to better decisions on program implementation, improvements in ATO's performance, and the resulting higher level of customer satisfaction.

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 (JNU), Alaska. Although JAWS data is provided to the aviation community as advisory, it is operationally 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 general aviation pre-flight and in-flight pilot weather briefings; Alaska Airlines for use in complying with their FAA Flight Standards directed Operations Specification; the National Weather Service for weather forecasting; and to other Alaska aviation weather 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, in December 2008, approved implementing the hardened prototype as the end-state JAWS. The end-state system will be operated and maintained by the FAA.

The National Center for Atmospheric Research (NCAR) developed the prototype JAWS and has been operating, maintaining, improving and upgrading the prototype since 1998. The JAWS prototype does not conform to FAA operations and maintenance standards, and the current architecture of the prototype JAWS is not supportable beyond 2009. Operating and maintaining the JAWS 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 involves 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 provides operation and maintenance history and technical support during the transition.

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

JAWS contributes to achieving the strategic goal of Increased Safety by providing critical wind information to enable commercial and general aviation required navigation performance (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.

Program Plan FY 2011 – Performance Output Goals

- JAWS Security Certification and Authorization Package (SCAP) May 2011.
- JAWS In-Service Decision September 2011.

Program Plans FY 2012–FY2015 Performance Output Goals

- FAA Operations and Maintenance begins in 2012.

I, 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 33,000lb.

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, when the aircraft being avoided takes a maneuver opposite to the one indicated on its TCAS. 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 further 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,
- TCAS 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.

Program Plans FY 2011 – Performance Output Goals

- Complete the deployment of 20 TCAS Resolution Advisory (RA) Monitoring System (TRAMS).
- Begin transition of TCAS version 7.0 / 7.1 activities to an appropriate service unit.
- Continue to monitor and assess TCAS operations to ensure that recently approved changes to the TCAS logic don't have any adverse effect on the NAS.
- Continue supporting applicable Office of Aviation Safety (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 2012-2015 – 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.

J, OPERATIONAL MODELING ANALYSIS AND DATA, M52.01-01

Program Description

The Operational Modeling Analysis and Data program provides support and oversight for developing and using operational models of air traffic activity. The Air Traffic Organization (ATO) manages the complex NAS, and uses a variety of models of both the entire NAS and its component parts, to analyze and understand NAS performance. Many operational units within the ATO use models for operational and capital investment planning. This program provides support to model users within the ATO by funding the development of new models and modification or upgrading of existing models and by providing standardized input data that these models require. This program will also provide guidance and assistance in the use of models to answer operational needs.

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 and average daily airport capacity for the 35 OEP airports of 103,068 arrivals and departures per day by FY 2011 and maintain through 2013.

Relationship to Performance Target

Operational modeling is used by the ATO to understand the causes of delay, which are usually related to capacity constraints. Models are also essential tools for estimating the improvement to NAS performance resulting from capacity-enhancing programs. This program will allow the ATO to determine the potential benefits of capacity initiatives and help in choosing the most promising investments to expand capacity.

Program Plans FY 2011 – Performance Output Goals

- Develop requirements for Operational Modeling database.
- Create an inventory of existing FAA operational models and modeling activities.
- Conduct a preliminary shortfall analysis of existing models.

Program Plans FY 2012-2015 – Performance Output Goals

- Create Operational Modeling database, and make available to users.
- Conduct shortfall analyses of existing operational models used by the FAA.
- Provide funding for the maintenance and enhancement of existing operational models.
- Develop new models based on the results of the shortfall analyses.

X, JUNEAU AIRPORT WIND SYSTEM (JAWS), TECHNOLOGY REFRESH W10.01-02

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 operated and maintained by the FAA.

Periodic replacement of Commercial Off-The-Shelf (COTS) system components assures continued supportability of the system through an indefinite service life. A technology refresh is planned in FY 2015 and FY 2020. The first cycle technology refresh of JAWS in FY 2015 will include replacement of computers and controllers, radios, firmware and software, anemometers, profilers, and will include National Center for Atmospheric Research (NCAR) consulting support. The second cycle technology refresh in FY 2020 will include computers and controllers, radios, firmware and software, and NCAR consulting support.

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

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.

Program Plan FY 2011 – Performance Output Goals

- None

Program Plans FY 2012–FY2015 Performance Output Goals

- Technology Refresh effort starts in 2015.

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

FY 2011 Request $14.0M

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

Program Description

The William J. Hughes Technical Center (WJHTC) System Support Laboratory line item sustains the facilities and supporting infrastructure necessary for research, development, test, and evaluation of NAS systems. The WJHTC provides the FAA's centralized set of laboratories that develop prototype systems that are tested and integrated into the NAS. Once systems become operational, the prototypes become part of the FAA's test bed and are used to support the operational field sites over their lifecycle. It is necessary to sustain these laboratories systems in configurations and capabilities that match field sites that currently exist or are planned in the future. Testing and support facilities include:

- En Route System Support Facility;
- Terminal System Support Facility;
- Oceanic System Support Facility;
- NextGen Integration and Evaluation Capability;
- 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.

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 upgrading and enhancing electrical and electronic equipment to allow testing of new or modified systems and reconfiguration of laboratory space to support the removal of decommissioned systems and installation of new 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 4 – 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 evaluation, and field support location. With centralization of these functions, each Business Unit need not establish and maintain separate laboratory facilities 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.

1A04, WILLIAM J. HUGHES TECHNICAL CENTER INFRASTRUCTURE SUSTAINMENT

FY 2011 Request $7.5M

- 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 fire safety codes. The average annual expenditure to sustain the WJHTC is about 3.9 percent of the Center's FY 2003 value.

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

- **FAA Strategic Goal 4 – 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;
  - 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.

Program Plans FY 2011 – Performance Output Goals

- Electrical Upgrades to Building 300 (incl. 3 substations).
- Building 300 Roof Replacement – Phase 1 (construction).

Program Plans FY 2012-2015 – Performance Output Goals

- Building 300 Roof Replacement – Phase 2 (construction).
- Center Facility System Improvements (years 1 through 4 of 20 year plan).
- Preliminary Site Development at Center's Main Entrance.
- Main Electric Substation Upgrade, including a parallel 12 kilovolt switchgear.
- Primary Electrical Feeder Replacement to Buildings 301 and 303.
- Expansion of the Center's Photovoltaic System.

1A05, NextGen Network Enabled Weather (NNEW)

FY 2011 Request $28.3M

- 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 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 that 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. Access to the 4-D Wx Data Cube for currently deployed systems (e.g., En Route Automation Modernization (ERAM), Dynamic Ocean Tracking System (DOTS), Advanced Technologies and Oceanic Procedures (ATOP), Integrated Terminal Weather System (ITWS) will be enabled by development of Service Adapters, which will translate from the weather data standards used in the 4-D Wx Data Cube to the weather data standards used by these systems. 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.

Program Plans FY 2011 – Performance Output Goals

- Continue NNEW work package one development and evaluation to include planning for a 4-D Weather Data Cube Capability Demonstration.
- Develop remaining service adapters for candidate IOC publisher/subscriber systems, to enable legacy systems (e.g., ERAM, ITWS) to access the 4-D Wx Data Cube.
- Develop and complete IOC Final (version 3) Web Coverage Service & Web Feather Service Reference Implementations. These services allow access to published data by operational weather and ATM systems that want to access these data.
- Complete version 4 of NNEW Metadata Guidelines. Metadata allows any system to electronically determine the characteristics of the weather data in the 4-D Wx Data Cube.
- Conduct interoperability tests and demonstrate web services for meteorological data, including data security

Program Plans FY 2012-2015 – Performance Output Goals

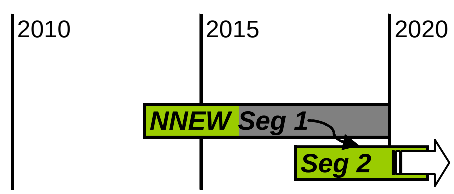
- Complete acquisition and implementation of NNEW work package one (includes acquisition artifacts such as Request for Proposal, hardware specifications, etc).
- Research, Development, and Delivery of 4-D Wx Data Cube IOC.
- Development and deployment of service adapters for selected FAA weather systems to ensure data sent to the 4-D Wx Cube by FAA sensors is compatible with the formats used by other weather inputs.
- Develop, modify, demonstrate, and evaluate dissemination data format standards to accommodate requirements for Segment 2.
- Develop and complete Final (version 5) of NNEW Metadata Guidelines.
- Update to version 4 of the Web Coverage Service & Web Feather Service Reference Implementations.

Implementation Schedules

NextGen Network Enabled Weather (NNEW)

Segment 1 First site IOC: Sept 2013-- Last site IOC: Dec 2015

Segment 2 First site IOC: Sept 2017-- Last site IOC: Dec 2020



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

FY 2011 Request $153.3M

- 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 routine 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 integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems. Segment 3 will implement the set of air-ground messaging functions, enabling the full transformation to the NextGen concept.

Near-term, in 2011 the Data Communications Program efforts focus on:

- Avionics validation and prototyping,
- Data Communication Air/Ground Network Service (DCNS) procurement,
- Software development for En Route Computer-Human Interface upgrades,
- En Route software capability enhancements to include Controller Pilot Data Link Communications (CPDLC) applications,
- Tower Data Link Services (TDLS) hardware and software enhancements to enable Revised Pre-Departure Clearance (DCL) services,
- William J. Hughes Technical Center (WJHTC) Integration & Test Planning, Lab Development, and test equipment procurement, and
- Spectrum repacking and band clearing.

Additionally, the program will accelerate TDLS efforts; such as the acceleration of software enhancements to the Air Traffic Services Facilities Notification and Context Management Application applications.

For the remaining years of the CIP, the Data Communications program will be engaged in several different key activities:

- Segment 2 planning and analysis,
- Data Communication En Route enhancements procurement,
- Continued En Route CPDLC software development,
- Controller and Technician training,

- Initial TDLS implementation, and
- DCNS implementation.

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. Data Communications will increase controller efficiency by automating routine 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, TRACON, and tower/ground operations. The busiest positions, whether in en route sectors, en route feeder sectors in metro corridors, terminal approach sectors, or airport clearance delivery positions in Operational Evolution Partnership (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: Optimized Profile Descent, 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.

Program Plans FY 2011 – Performance Output Goals

- Complete proposal evaluation for Data Comm Network Service Provider.
- Final Investment Decision – Segment 1a Data Comm Network Service (DCNS) Provider.
- Complete System Specifications for Segment 1.
- Request for Proposal release for Data Comm enhancements to En Route Automation.

Program Plans FY 2012-2015 – Performance Output Goals

- Segment 1a, Data Comm Network Service Provider Contract Award, FY 2012.
- Final Investment Decision – Segment 1b Data Comm enhancements to En Route Automation, FY 2012.
- Commence Data Comm enhancements to Tower Data Link Systems in Aeronautical Telecommunication Network (ATN) based Aircraft, FY 2012.
- Commence Data Comm enhancements to En-Route automation applications and interface, FY 2012
- Segment 1 Deploy Key Site – Tower, FY 2014.
- Segment 1 Deploy Key Site – En-Route, FY 2016.

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

FY 2011 Request $27.0M

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

Program Description

During the 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 demonstrations of new capabilities.
- End-to-end domain demonstration activities (Takeoff to landing).
- Near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and /or stakeholder NAS initiatives.
- 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 project 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 coordinate activities with national and international organizations, including DoD. Further, the International Air Traffic Interoperability demonstrations and development initiatives will assist the international communities and the FAA to validate new DoD 4-D Trajectory Based Operations (TBO) and Performance-based Air Traffic Management (PATM) alternatives.

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.

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

New emerging technologies, as they are developed, will be tested and demonstrated to allow the FAA to meet the NextGen mid-term goals and objectives.

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 2011 demonstration activities are planned to show a reduction in air traffic delays due to more efficient metering and spacing, increased capacity of the airspace, more efficient traffic flow management, and integrated arrival/departure routes. Oceanic 4-D Trajectory Management, En Route 4-D Operations, and High Density Airport time-based Area Navigation/ Required Navigation Performance (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 2012 and beyond.

Program Plan FY 2011 – Performance Output Goals
- Develop final integrated demonstration plan for UAS.
- Environmental analysis report for Atlantic Interoperability Initiative to Reduce Emissions (AIRE) and Asia South Pacific Initiative to Reduce Emissions (ASPIRE).
- Conduct multiple integrated oceanic arrival demonstrations.
- Demonstrate collaborative end-to-end domain systems.
- Conduct shared situational awareness flight trials.

Program Plan FY 2012 – Performance Output Goals
- Demonstration of enhanced avionics capabilities.
- Demonstration of synthetic vision systems.
- Demonstration of collaborative end-to-end domain systems.
- Standards and alternatives development.
- Initial OMB 300 preparation/development for NextGen transformational technologies.

Program Plan FY 2013-2015 – Performance Output Goals
- Demonstrate end-to-end domain 4-D Trajectory Management.
- Demonstrate transition into performance-based air traffic management system.
- Continue standards and alternatives development.
- Continue OMB 300 documentation.

1A08, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SYSTEM DEVELOPMENT
FY 2011 Request $95.0M

- 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, Staffed NextGen Towers (SNT), G3M.04-01
- E, Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction, G6M.02-01
- F, Wake Turbulence Re-Categorization, G6M.02-02
- G, Systems Safety Mgmt Transformation, G7M.02-01
- H, 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, and the development of a common air traffic workstation to accommodate the various NextGen technologies. 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, how their roles will affect personnel selection, training, and staffing. It will also address other required research and development activities in the human factors area that are needed to realize the NextGen vision.

Research will examine the roles of the Air Navigation Service Provider (ANSP) and maintenance personnel in ensuring safe operations at increased capacity levels and how those roles are best supported by allocation of functions between humans and automation. 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). Interoperability of air and ground decision support tools necessitates synchronization of conflict probe look-ahead times, conformance monitoring using 4D intent information, and consistency of alerting functions for ground and cockpit displays. 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.

Program Plan FY 2011 – Performance Output Goals

- Measure efficiency improvements from implementing a NextGen common workstation that incorporates human factors requirements.
- 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 2012-2015 – 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

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 capacity target. 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 System-Wide Information Management (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.

Program Plan FY 2011 – Performance Output Goals

- Conduct system design for future air-ground data communications requirements implementing flexible airspace management.
- Begin requirements definition for common trajectory implementation.
- Conduct initial analysis of common trajectory needs and develop initial implementation strategy.
- Conduct engineering trade study for weather radar replacement.
- Analysis, requirements, pseudo-code-supports provide effective collision risk safety net in an environment of closely spaced parallel RNP route from top-of-descent to the runway.

Program Plan FY 2012-2015 – Performance Output Goals

Trajectory Based Operations:

- Continue requirements definition for common trajectory implementation.
- Initiate development of system architecture for common trajectory.
- Initiate development of 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 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.

Flexible Terminal and Airports:

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

Collaborative Air Traffic Management:

- Develop initial systems and architecture for airborne SWIM.

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 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 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 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.

Program Plans FY 2011– Performance Output Goals

- Develop Data Communications Segment 2/3 Requirements.
- Continue development of a detailed set of scenarios to be used in concept validation.
- Conduct human in the loop simulations of TBO, particularly for integrated time based flow management.
- Refine the Midterm NextGen End-to-End CONOPS based on concept validation.
- Capacity benefits modeling to assess 166% increase in capacity.

Program Plans FY 2012- 2015 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 2011 and additional task validations completed in 2012-2015.
- 2013: Demonstrate capacity increase to 230% current levels.

D, STAFFED NEXTGEN TOWERS (SNT), G3M.04-01

Program Description

With the expected increase in air traffic in the United States over the next several decades, there is a need for new, innovative ways to provide tower services. In response to this challenge, Staffed NextGen Tower (SNT) provides a future air traffic system in which tower services are provided from remote locations without requiring the air traffic provider to have direct visual observation of the airport environment. SNT is planned for medium and high density airports as these airports are likely to have the surveillance infrastructure and most aircraft equipped with avionics that will support SNT operations. Automated NextGen Towers (ANT), a companion vision to SNT, is planned 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.

This project will provide the necessary requirements, specifications and supporting documentation leading to an initial investment decision in 2011 and a final investment decision in 2013 (Enterprise Architecture milestones) on an FAA system that should increase throughput and safety; provide for cost-effective expansion of services to a larger number of airports; and reduce tower construction costs. Requirements, operational procedures, and cost benefit information will be generated and documentation refined in preparation for the initial investment 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 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

Air Traffic Control Tower (ATCT) operations are projected to increase and SNT will provide future technologies, certified surveillance, standards and procedures to accommodate the forecasted demand in airport services. SNTs are planned for medium and high density airports as these airports are likely to have the surveillance infrastructure and the most aircraft equipped with avionics that will support SNT operations. SNTs will improve Instrument Flight Rules (IFR) throughput in low visibility and night conditions, allow for comparable service in Visual Flight Rules (VFR), and will allow the FAA to expand its service to meet this capacity demand In the end state, through the ability of providing service to multiple airports from one location, SNTs support expansion of ATM services to a larger number of airports and extension of services when towers close.

Program Plans FY 2011 – Performance Output Goals

- Develop performance standards and SNT alternatives.
- Develop initial investment decision documentation including Business Case Analysis Report, Implementation Strategy and Planning, and Basis of Estimate.
- Update Enterprise Architecture products and amendments.
- Maintain SNT equipment at field site (Dallas/Fort Worth (DFW)).

Program Plans FY 2012- 2015 Performance Output Goals

- Support standards and alternatives development for final investment decision.
- Develop final investment decision documentation including Business Case Analysis Report, Implementation Strategy and Planning, and Basis of Estimate.
- Update Enterprise Architecture products and amendments.
- Conduct system design activities (e.g. System/Segment Specification, System Specification Document).
- Perform integration for Decision Support Tools (DST) (e.g., conformance monitoring); electronic data distribution, Data Comm.
- Conduct sub-system engineering activities including procuring hardware and software.
- Maintain SNT equipment at field site (DFW).

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

Program Description

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. NextGen environmental goals are to reduce the system wide aviation environmental impacts in absolute terms notwithstanding the growth of aviation. The solution is to reduce the increased environmental impacts of aviation through new operational procedures, technologies, alternative fuels, policies, environmental standards and market based options to allow the desired increase in capacity. The environmental and energy development efforts under this program will lead to assessment of solutions to reduce emissions, fuel burn, and noise towards achieving NextGen environmental goals. The effort specifically focuses on explorations, simple demonstrations as well as methods to integrate these environmental impact mitigation and energy efficiency options with the NextGen infrastructure in a cost-beneficial and verifiable manner. It will also provide ways to adapt the NAS infrastructure to fully exploit the benefits of these environmental mitigation and energy efficiency options.

By 2016, this program will provide system knowledge to develop, implement and manage NextGen system alternatives to meet NextGen capacity growth demand. Development supports operational implementation between 2014 and 2025. There are two environmental projects under this program.

Environment and Energy – Environmental Management System
Solutions to achieve NextGen environmental goals must be based on the application of knowledge of human health and welfare impacts of aviation noise and emissions to determine appropriate means to mitigate these environmental effects. The Environmental Management System (EMS) will manage, mitigate and verify progress towards achieving the environmental goals in an iterative manner based on planning, implementing, measuring the effects of, and adjusting solutions that are based on well developed and demonstrated environmental impacts metrics. The EMS approach will allow optimization of advance options for noise, fuel burn, and emissions reduction to enable the air traffic system to handle growth in demand. Development and implementation of EMS must coincide with development of other components that are part of the NextGen System Development - Environment and Energy and NextGen Environment and Energy Research and Development programs. This program integrates this knowledge to develop and demonstrate the elements of a NextGen wide EMS.

Environment and Energy – Advanced Noise and Emission Reduction
Effective and proven capabilities as well as NAS-wide implementation of mitigation solutions through advanced aircraft (both engine and airframe) technologies, alternative aviation fuels and improved environmental and energy efficient operational procedures are the key to reduce significant environmental impacts while improving the energy efficiency of the system. Policy options, environmental standards and market based measures also provide mitigations that help meet environmental and energy efficiency goals. This program will focus on assessing the impacts of mitigation actions on the NAS and provide guidance on potential NAS adaptations needed in order to maximally benefit from the mitigation actions. This program provides an interface between the CLEEN (Continuous Lower Energy, Emissions and Noise) technologies program being pursued under NextGen Environment and Energy Research and Development program to develop noise and emissions reduction options as well as increase fuel efficiency and the EMS which will manage the NextGen environmental goals.

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 Research and Development program is to assess the NAS-wide performance of solutions that mitigate environmental risks while supporting the target of dynamic NextGen projected capacity growth.

Program Plans – Performance Output Goals
FY 2011:
- Apply methodologies and metrics to assess health and climate change impacts.
- Expand outreach program to encourage an EMS approach to NextGen environmental performance.
- Refine EMS framework based on lessons learned from adoption of EMS by initial organizations.
- Develop decision support tools for future advanced EMS to dynamically manage NAS environmental performance.
- Design architecture for NextGen EMS IT system and design EMS performance tracking framework.
- Demonstrate EMS pilot testing and standardize EMS approaches for organizational EMS.
- Develop strategy and framework for EMS incentive programs.
- Advance implementation of NextGen EMS and develop prioritization for EMS strategy.
- Analyze NextGen EMS and National Environmental Policy Act compliance.

- Analyze environmental impacts of new aircraft types (e.g., aircraft featuring CLEEN technologies, Very Light Jet (VLJ), Unmanned Aerial Vehicle (UAV) on the NAS and assess approaches to optimize system environmental performance.
- Analyze environmental impacts of alternative fuels on NAS and assess approaches to optimize system environmental performance.
- Explore and demonstrate environmental control algorithms for surface (taxi/ramp) area operational procedure to reduce emissions.
- Explore and demonstrate environmental control algorithms for terminal area operational procedure to reduce emissions and noise.
- Explore and demonstrate environmental control algorithms for en route flight procedures.
- Assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for emissions of aircraft CO2 and other potential pollutants.
- Investigate potential operational changes required to optimize aircraft operations for greenhouse gas reductions.
- Investigate impact on NAS wide operations of market based options, including Cap and Trade and carbon charges, to limit aircraft greenhouse gas emissions.

FY 2012 – FY 2015:
- Evaluate and refine EMS communication and outreach approaches.
- Evaluate and refine EMS framework, reporting and tracking system.
- Evaluate, refine and apply EMS decision support tools for contemporary aviation system.
- Develop and implement plans for next phase of EMS development and deployment.
- Define and identify optimum mitigation actions in iterative manner to achieve NextGen environmental goals.
- Continue analysis of environmental impacts of new aircraft types (e.g., aircraft featuring CLEEN technologies, VLJ, UAV) on the NAS and assess approaches to optimize system environmental performance.
- Continue analysis of the environmental impacts of alternative fuels on NAS and assess approaches to optimize system environmental performance.
- Continue significant exploration and demonstration of environmental control algorithms for surface (taxi/ramp) area operational procedure to reduce emissions.
- Continue significant exploration and demonstration of environmental control algorithms for terminal area operational procedure to reduce emissions and noise.
- Continue significant exploration and demonstration of environmental control algorithms for en route.
- Continue investigation assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for emissions of aircraft CO2 and other potential pollutants.
- Continue investigation of potential operational changes required to optimize aircraft operations for greenhouse gas reduction.
- In FY 2014 and FY 2015; refine and update approaches for NextGen EMS Performance Tracking.
- In FY 2014 and FY 2015; continue investigation for market based options, including Cap and Trade, carbon charges, etc., to limit aircraft greenhouse gas emissions and their impacts on NAS wide aviation environmental performance.

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

Program Description

This research and development program focuses on satisfying the capacity demands of future aviation 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 it no longer provides 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 program is part of a joint EUROCONTROL and FAA program that has reviewed the current required wake mitigation aircraft separations used in both the USA's and Europe's air traffic control processes and has determined 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 program builds on that joint work and is accomplishing a more general review to include regional jets, Unmanned Aerial Vehicles (UAV's), microjets, etc. The work is phased, and started with optimizing the present "1990's" standards to reflect the change in fleet mix that has occurred over the last 20 years. In 2010, the program will provide a set of recommendations for international review that focus on changes to the present static standards. To accomplish this, the program developed enhanced analysis tools to link observed wake behavior to standards, determined safety risk associated with potential new standards relative to existing standards; will simulate and validate new separation standards; integrate the work being accomplished by EUROCONTROL; and conduct high level analyses to link wake transport and demise characteristics to aircraft flight and surrounding weather parameters.

The next phase of the Wake Re-Categorization program is now underway. By 2014, it will develop sets of tailored leader aircraft and follower aircraft wake 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 in the same volume of airspace. By 2020, the final phase of the program will have developed the aircraft and ground based capabilities required to achieve the NextGen concept of safe, efficient dynamic pair-wise wake mitigation separations of aircraft. The dynamic pair-wise separation capability will allow the densest feasible safe packing 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 program 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. In the near term, 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 which will directly increase the average daily airport arrival and departure capacity. The farther term program work will more generally address how to obtain more "wake safe" flights in capacity constrained NextGen era airspace.

Program Plans – Performance Output Goals

FY 2011:

- Determine optimal set of aircraft flight characteristics and weather parameters for use in setting wake separation minimums.
- Develop metrics for setting tailored leader/follower aircraft wake mitigation separation standards.

FY 2012:

- Determine changes to FAA air traffic control systems that will be required in the ICAO implementation of the revised wake separation standards developed earlier by this program.
- Develop a sample set of leader/follower aircraft wake mitigation separation standards.

FY 2013:

- Continue development of additional sets of leader/follower aircraft wake mitigation separation standards.
- Determine the changes to FAA air traffic control systems required to implement the leader/follower tailored aircraft wake separation standards.

FY 2014:

- Complete development of the leader/follower tailored aircraft wake separation standards along with the planning for implementing the associated procedures and processes.
- Continue development of wake separation processes that account dynamically for the wake being generated by the lead aircraft.

FY 2015:

- Develop enhancements to modeling that will enable their use in evaluating the proposed dynamic wake mitigation separation processes.
- Initiate planning for simulations that will be needed to validate the operational feasibility of the proposed dynamic wake separation processes and procedures.

G, 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 integrated across multiple data sources and shared across the aviation community to identify precursors and contributing factors to accidents, allowing interventions to be developed and implemented before safety issues manifest as accidents.

Program Plans FY 2011 – Performance Output Goals

Aviation Safety Information Analysis and Sharing (ASIAS)

- Capability across all commercial aviation nodes to fuse data from public and non-public sources while maintaining data protection.
- Evolution of more sophisticated text mining capabilities across data sources, including flight operations, maintenance, dispatch, ATC operations, and Aviation Safety Reporting System.
- Initial ability to automatically monitor for unknown risk based on complex text mining capabilities and seamless data sources.
- Integration of data from at least one additional class of operations in the US domestic airspace.
- Demonstration project with limited set of JPDO participants for analysis of safety metrics and directed studies.
- The planned date for achieving final investment decision for the ASIAS program is summer FY 2011.

System Safety Assessment (SSA)

- User and system requirements for system baseline risk estimation.
- Standard user requirements for development and installation of a risk analysis function and application to NextGen concept in surface operations into the operational ASIAS platform.

Safety Management Systems (SMS)

- Method that can be used for continual surveillance of Design Approval Holder compliance with SMS.

Safety Risk Management (SRM)

- Guidance on taxonomy, analytical methods and integrated evaluation applications that ensure that consistent risk assessment processes are employed throughout AVS.

Program Plans FY 2012-2015 – Performance Output Goals

- Create policy, process standards, risk assessment/management tools, analysis infrastructure, and rudimentary safety assurance framework.
- Demonstrate a National Level SSA working prototype that will proactively identify emerging risk across the NextGen.
- Develop proof of concept for NextGen SMS including a prototype to implement on a trial basis with selected participants that involve a cross-section of air service providers.

H, 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.

Program Plan FY 2011 – Performance Output Goals

- Assess and integrate the local-regional-NAS-wide analysis capability of Aviation Environmental Design Tool (AEDT) and develop plans for further enhancements.
- Assess and integrate the local-regional-NAS-wide analysis capability of Aviation Portfolio Management (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 2012-2015 – 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 2011 Request $58.6M

- A, Separation Mgmt – Modern Procedures, G1A.01-01
- B, Separation Mgmt – High Altitude, G1A.01-02
- C, Separation Mgmt – Automation Risk Mitigation Interface Requirements, G1A.01-03
- D, Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt, G1A.02-02
- E, Trajectory Mgmt – Conflict Advisories, G1A.02-03
- F, Capacity Mgmt – 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 support implementation of Separation Management automation enhancements. The Separation Management automation enhancements to be addressed include: concepts and technologies initially developed by research organizations such as MITRE/CAASD and NASA; and performance enhancements to existing Separation Management automation functions identified through the development, deployment, and operational use of ERAM and predecessor systems such as User Request Evaluation Tool (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 (R-side) 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 (D-side) 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.

Program Plan FY 2011 – Performance Output Goals

- Develop prototypes of selected separation management capabilities to validate requirements for implementation into Post ERAM release 3. This material may include:
  - Requirements,
  - Prototypes,
  - White Papers/Report,
  - Safety Case, and
  - Enterprise Architecture Artifacts.

Program Plan FY 2012-2015 – Performance Output Goals

- Conduct separation management engineering activities necessary to support the En Route NextGen Mid-Term Baseline. Candidate functional areas include:
  - Performance Based Navigation,
  - Conflict Probe Enhancements,
  - Conflict Alert Enhancements,
  - Flight Data Display 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

Today's high altitude airspace has limited flexibility. There are constraints on rerouting traffic due to limitations imposed by individual controller workload, and adding or changing sector boundaries to mitigate that workload restriction is limited due to current operational techniques, and lack of communication and automation support. Controllers working high altitude airspace today must undergo extensive training to learn sector-specific geography and local area procedures. This focus on sector-specific knowledge as well as a lack of supporting automation limits the number of sectors a controller can learn and manage, resulting in limited flexibility to adjust staffing across sectors to respond to changes in traffic demand. There is also limited route flexibility in high altitude airspace due to the reliance on ground-based navigational aids (NAVAIDs).

The Separation Management - High Altitude Trajectory Based Airspace (TBA) Concept will develop and validate an operational concept for the mid-term, and beyond that, it will explore the use and implications of generic sectors, flexible airspace, and dynamic resource management in a high performance, trajectory-based environment. Validation activities will identify the automation system support and ATC display changes that will allow for more flexible use of high altitude airspace and improve controller's ability to respond to changes in traffic demand and flows. High altitude sectors will have more uniformity so a controller with this specialty will be able to control air traffic in all such specially designed sectors. Concept development and validation activities will determine operational and technical requirements (automation, decision support, procedures) that will support an increase in system capacity by creating a more flexible high altitude airspace 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

The program supports these goals by implementing automation changes, decision support needs, procedures, training, etc., for new high altitude operations that will increase system capacity by creating a more flexible high altitude airspace, staffing, and routes. The concept will enable improved responsiveness to demand/capacity imbalances and will thus improve the efficiency of NAS operations.

Program Plan FY 2011 – Performance Output Goals

- Upgrade laboratory capabilities and enhance software applications to support High Altitude human-in-the-loop (HITL) and fast-time evaluations.
- Conduct part-task HITLs, fast-time simulations, and airspace design analyses to continue to derive display, information, and decision support tool requirements for High Altitude TBO operations.
- Develop early prototype of High Altitude workstation to support transition to Phase I of High Altitude Airspace Specialty.

Program Plan FY2012-2015 – Performance Output Goals

- Complete concept validation activities of High Altitude TBA concept.
- Update High Altitude TBA Concept of Operations.
- Conduct safety and cost-benefit analyses of High Altitude TBA concept.
- Finalize requirements to support implementation of advanced concepts in High Altitude Airspace.
- Software engineering and development of tools to support high altitude airspace operations.

C, SEPARATION MGMT – AUTOMATION RISK MITIGATION INTERFACE REQUIREMENTS, G1A.01-03

Program Description

ADS-B information will be used for surveillance applications and Air Traffic Services Displays on automation systems such as Common Automated Radar Tracking System (CARTS), Automated Radar Terminal Systems Model IIE (ARTS IIE), 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).

This program will determine how to mitigate risks associated with interfacing ADS-B to various automation platforms beyond those planned for the FY 2010 In Service Decision. These additional platforms include ATOP, ERAM and TAMR, and the program will address new interface requirements and information security standards to be instituted so these platforms can support NextGen connectivity with SWIM and air traffic facilities.

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. This risk mitigation will address automation issues that could otherwise delay ADS-B deployment beyond the FY 2013 goal.

Automation interface development will also allow for a coordinated effort to interface ADS-B and other NextGen programs with existing automation platforms. These NextGen programs will allow better use of the NAS thereby improving capacity and efficiency of the system.

Program Plans – Performance Output Goals
FY2011:
- Identification of risks associated with interfacing to ARTS IIE sites, TAMR, ERAM and ATOP.
- Development of mitigation strategies for associated risks.

FY2012 – FY2015:
- N/A

System Implementation Schedule
All mitigations will need to be implemented to support the final ADS-B Operational Readiness Demonstration (ORD) in FY 2013.

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. Separation in oceanic airspace is handled by controllers using aircraft display screens to visualize trajectories and make prudent operational judgements. ATC is aware of overall air traffic and flight conditions, but currently lacks the tools to identify more efficient flight trajectories. In contrast, pilots and airlines have these tools to optimize individual flight trajectories, but lack the big picture showing potential conflicting traffic.

Initial Oceanic Trajectory Based Operations (TBO) initiatives include: Automatic Dependent Surveillance In-Trail Procedures (ADS-ITP), web-enabled Collaborative Trajectory Planning (CTP) and Four Dimensional Oceanic Trajectory Management (4D-OTM).

Based on initial results, future efforts will 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.

1) ADS-C Concept Development Plan (CDP): Data collected and the results from ADS-Contract (ADS-C) CDP operational trials completed in FY 2010 will be used to identify automation requirements for Ocean 21 (including the transition of Oceanic Separation Below 30/30) and possible expansion to other FAA-controlled airspaces. The ICAO approval process of ADS-C CDP adoption will be initiated as will the proposal of possible expansion to ICAO states. Outcome of work will assist in meeting FAA near term Operational Improvement #OI-0353.

2) Pre-departure 4D-OTM: Planning for FY 2012 operational trials will be initiated based on work completed in FY 2010. Engineering activities will be focused on prototype requirements development, identifying hardware and software components, and prototyping for Web-Enabled CTP. Work will also continue to enhance profile de-confliction analysis and develop preferred profile data source requirements.

3) In-Flight 4D-OTM: Operational trials will begin in mid FY 2011. Analysis work will include developing strategies and methodologies for data collection, baselining and modelling and simulation. Data collection and analysis performed during the operational trials will be used to support business case development efforts in FY 2012.

4) Oceanic Airspace Management – *Trajectory Managed, Autonomous and Mixed Classic Airspace*: Based on development of the near, mid and long-term operational concepts and an evolution plan for the Oceanic environment, a concept of operations for airspace structure will be developed. Engineering activities will include conducting Communication/Navigation/Surveillance (CNS), automation analysis and initiating prototype requirements.

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.

Program Plans FY 2011 – Performance Output Goals

- Begin process for ICAO approval and develop implementation plan for separation of aircraft that have Required Navigation Performance of RNP-4 30/30 or better.
- Submit petition to ICAO for adoption of ADS-C Concept Development Plan and Procedures.
- Conduct profile de-confliction analysis.
- Initiate preferred profile data source development.
- Initiate prototype requirements.
- Initiate planning for 2012 ops trials.
- Refine Web-Enabled CTP Prototype.

Program Plans FY 2012 – Performance Output Goals

<u>ADS-C ITP:</u>

- Begin technology transition to Service Unit.
- Complete documentation to support Service Unit.

<u>Pre-Departure 4D-OTM:</u>

- Initiate development of end-to-end oceanic optimization with adjacent Air Navigation Service Providers (ANSPs).
- Initiate ops trials using web-enabled CTP Prototype.
- Begin data collection, reduction and analysis.

<u>In-Flight 4D-OTM:</u>

- Continue operational prototype development and testing.
- Conduct human-in-the-loop simulation.
- Continue ops trials.
- Enhance data analysis.
- Initiate business case development.

Oceanic Airspace Management:

- Enhance ConOps.
- Develop concepts for transition from NextGen to non-NextGen international airspace.
- Initiate prototype development.

Program Plans FY 2013 – Performance Output Goals

- Continue development of end-to-end oceanic optimization with adjacent ANSPs.
- Continue business case development for 4D-OTM.
- Initiate submission process to Joint Resources Council (JRC) for 4D-OTM In Flight operations.
- Enhance ConOps and continue operational trials.

Program Plans FY 2014-2015 – Performance Output Goals

- Continue JRC process.
- Finalize ConOps.
- Complete data analysis report.

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

Program Description

This project provides the analysis, development and pre-implementation activities required to lower en route controller workload by assisting controller in determining conflict resolutions. It implements computer generated 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 connect via air-ground data communications that directly link to the flight management system, facilitating electronic data communications between the Air Traffic Control (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 initially prototype relatively basic resolution 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. As the research matures, more complex capabilities will be investigated for future implementation such as multiple horizontal segment maneuvers. The research will evaluate the role of the human versus automation in voice clearance, mixed voice and data communications environments, and eventually 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.

Program Plan FY 2011 – Performance Output Goals

- Continue engineering evaluations and prototyping of conflict resolutions for more basic aircraft maneuvers.
- Develop draft of TBO Conflict Resolution Advisories' in an Operational Concepts document.
- Conduct first set of human-in-the-loop experiments with initial approach for conflict resolutions to examine the feasibility and impact that basic conflict resolution advisories have on the CHI design and system performance including controller performance.
- Begin development of automation requirements for an iterative set of technology transfer packages to implement conflict advisory functionality.

Program Plan FY 2012-2015 – Performance Output Goals

- Refine TBO Conflict Resolution Advisories' Operational Concepts document into a series of automation builds.
- Continue to validate concept of use through additional human-in-the-loop experiments.
- Continue engineering evaluations and prototyping of approaches to implement aircraft conflict resolution advisories for more complex maneuvers with higher equipage and more data communications.
- Continue development of automation requirements and technology transfer of these same capabilities.
- Conduct Safety and Benefit Assessments of aircraft conflict resolution advisories automation.
- Software engineering and development for initial conflict resolution advisories.

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 available in accordance with the FAA's NextGen Implementation Plan - 2008. High Power 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 Very High Frequency (VHF) Omni-directional Range (VOR) network in accordance with the NAS Enterprise Architecture. This divestment is made possible by the transition to a 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 in conjunction with RNAV/RNP based Standard Instrument Departures (SIDs) and Standard Terminal Approach Routes (STARs).

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.

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 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. High power DME provides:

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

Program Plan FY 2011 – Performance Output Goals

- Procure 28 DME systems.
- Service Available (Establish) for approximately 23 DMEs in support of RNP.

Program Plan FY 2012 – Performance Output Goals

- Service Available (Establish) for approximately 5 DMEs in support of RNP.

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

FY 2011 Request $43.2M

- 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.

Weather plays a significant role in all NAS operations. RWI-Weather Observation Improvements is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. RWI-Weather Observation Improvements will address improvements in weather observation quality, while RWI-Weather Forecast Improvements will address improvements in forecasting techniques 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.

Program Plans FY 2011 – Performance Output Goals

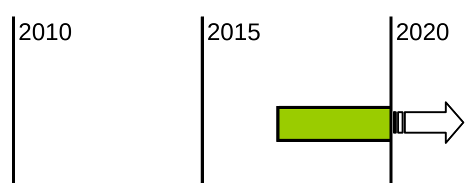
- Continue to develop NextGen strategy for right-sizing of ground and airborne sensor requirements and system engineering.
- Develop NextGen concept for automatic adaptive sensing to field a sensor network that automatically responds to weather conditions to generate the required observations, on-demand rather than on-schedule, resulting in savings to operations and maintenance.
- Explore strategy for optimization of volcanic ash sensing improvements impacting Alaska and Pacific routes.
- Initiate investment analysis activities for NextGen Surface Observing consolidation.

Program Plans FY 2012-2015– Performance Output Goals

- Develop NextGen right-sizing prototypes, and conduct demonstrations to enable improvement in weather observation quality and to inform future investment decisions.
- Begin prototyping activities for ATM to obtain, manipulate and ingest on-demand surface observation weather data to enable integration into DSTs.
- Continue prototyping concept for automatic adaptive sensing and begin implementation of new capabilities.
- Initiate prototyping for optimization of volcanic ash sensing improvements impacting Alaska and Pacific routes.
- Initiate prototyping concept for space weather in NextGen to enable efficient use of transpolar routes.
- Complete investment analysis activities for NextGen Surface Observing consolidation leading to an acquisition starting in FY 2015.

Implementation Schedule

NextGen Surface Obs Consolidation
First site IOC: January 2017-- Last site IOC: June 2022



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 RWI-Weather Forecast Improvements address the need to improve 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 the 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.

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.

Program Plans FY 2011 – Performance Output Goals

- Continue NextGen Weather Processor (NWP) work package one development and evaluation to include planning for operational demonstration of initial capability.
- Continue evaluation of NextGen segment one maturing aviation weather research products and applications including convection, icing, and turbulence (evaluations include human factors, safety, technical assessment, and operational suitability).
- Continue development and evaluation of 0-6hr convective weather forecast application to include probabilistic information and conduct operational evaluation.
- Continue weather integration prototyping activities for the ATM Integrated Departure Route Planner (IDRP) tool.
- Develop NextGen concept for weather impact translation to automate a weather-related ATM impact statement to be used directly by decision makers and Decision Support Tools (DSTs) to enable optimal use of airspace.
- Initiate activities for weather information integration into decision support tools (includes demonstrations, operational testing, evaluations).

Program Plans FY 2012-2015 – Performance Output Goals

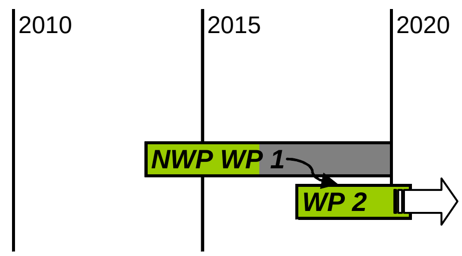
- Complete acquisition and implementation of NWP work package one.
- Complete segment one GFP for acquisition and implementation of convection, icing, and turbulence advanced applications (includes specifications, application code (Service Oriented Architecture (SOA)), documentation, statement of work, etc.).
- Complete weather integration prototyping activities for the ATM IDRP tool.
- Develop prototype NextGen weather impact translator, evaluate capability, and provide software for implementation as part of NWP work package two.
- Complete documentation for initial investment analysis of NextGen weather segment two (includes NWP work package two, advanced forecast applications matured since work package one, and additional legacy functionality).
- Initiate NWP work package two development and evaluation (includes specifications, application code (SOA), documentation, Statement of Work, legacy transition, etc.).
- Initiate evaluation of NextGen segment two maturing aviation weather research products and applications including convection, icing, and turbulence (evaluations include human factors, safety, technical assessment, and operational suitability).
- Continue activities for weather information integration into decision support tools (includes demonstrations, operational testing, evaluations).

System Implementation Schedules

NextGen Weather Processor (NWP) Work Package 1 and 2

WP 1 First site IOC: September 2013-- Last site IOC: July 2016

WP 2 First site IOC: December 2017-- Last site IOC: May 2020



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

FY 2011 Request $57.0M

- 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, Trajectory Mgmt – Tailored Arrivals Oceanic, G2A.01-04
- E, Trajectory Mgmt – Surface Traffic Data Sharing, G2A.01-05
- F, 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 guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This is required to safely improve the use of airport capacity which is necessary 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 and supporting automation systems, and collaboration between 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 Terminal Radar Approach Control (TRACON), the Air Route Traffic Control Center (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.

Program Plans FY 2011 – Performance Output Goals

- Continue support Tower Flight Data Manager (TFDM) program AMS effort.
- Continue technical transfer of mature surface capabilities to TFDM.
- Continue Surface Trajectory Based Operation (STBO) field evaluations at Memphis and Orlando.
- Conduct field evaluations of 2D Taxi Route Generations, Departure Runway Assignment, Airport Configuration and Collaborative Departure Scheduling.

Program Plans FY 2012-2015 – Performance Output Goals

- Continue evaluations of 2D Taxi Route Generations, Departure Runway Assignment, Airport Configuration and Collaborative Departure Scheduling.
- Begin evaluation of Deice tool.
- Conduct HITL simulations of Time-Based Taxi Route Generation and Collaborative Departure Scheduling.
- Continue STBO requirements development for Data Comm, Surveillance, Weather and NAS Data systems.

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, communicated to the aircraft via data link and conformance to the clearance monitored by automation in the 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 reduction in taxi time will support use of 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 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.

Program Plans FY 2011 – Performance Output Goals

- Conduct the third Human in the Loop (HITL) simulation of Surface Conformance Monitoring 2D
- Update Concept of Use.
- Update requirements document and ATC procedures.

Program Plans FY 2012-2015 – Performance Output Goals

- Conduct two HITLs on Time-Based Surface Conformance Monitoring (2D).
- Execute technical transfer of Concept of Use, requirements, ATC procedures to Tower Flight Data Manager (TFDM) program.

C, Trajectory Mgmt – Arrival Tactical Flow, G2A.01-03

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. Currently, TMA is in daily use throughout the NAS but sustaining the existing TMA system beyond April 2009 is necessary to continue the throughput benefits that TMA provides. Trajectory Management Arrival Tactical Flow 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 and the continuation and expansion of TMA.

TMA is the only NAS deployed 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 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

The Time Based Flow Management Program is divided into three (3) segments:

Segment I is sustaining TMA with agreed upon near-term enhancements and deployments. This segment was completed in April 2009. The program will prepare for proceeding to a Final Investment Decision that authorizes the next phase of TMA and the transition to implementation of Time Based Flow Management (TBFM).

Segment II is the TBFM Program. This is a continuation of TMA that will fulfill operational user needs and NextGen goals. TBFM will close the performance gap in transitioning from TMA to Trajectory Based Operations (TBO). The TBFM program will incorporate NextGen concepts such as RNP/RNAV route selections, weather integration, point-in-space metering or extended metering, and accelerated arrivals/flexible schedule.

Segment III (Integrated Enterprise Solution (IES)) will prepare for the follow-on phase of TBFM, which focuses upon the possible integration of the TMA/TBFM system into existing platforms, supporting the NextGen concept of one common trajectory or TBO environment. The program will continue the development and implementation of new capabilities that support NextGen concepts such as Continuous Descent Approach (CDA), integration of surface information, and terminal time based metering.

Each of the Segments contributes to the achievement of the following NextGen Operational Improvements.

- 104120 - Point in Space Metering.
- 104123 - Time-Based Metering using RNAV and RNP Route Assignments.
- DP 195 - Time Based Flow Management (TBFM) Final Investment Decision.
- DP 44 - Time Based Flow Management (TBFM)/Integrated Enterprise Solution (IES) initial investment decision.
- DP 57 - TBFM/IES final investment decision.

Segment II – Time Based Flow Management Strategy

The current TMA is an effective and well-tested decision support tool that allows air traffic management units to schedule and optimize the arrival load for major airports. That scheduling and optimization algorithm, however, generally is confined to the area within about 200 miles of the controlling center. Since TMA is installed at all the centers the algorithms that optimize traffic flows could be expanded, so schedule data can be exchanged and a larger planning horizon developed for more strategic planning.

The TBFM program will use the enhanced TMA system to begin 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 allow the use of the Operational Improvement (OI) “Point in Space Metering” with the further implementation of Coupled Scheduling. Coupled Scheduling expands the TMA capability by adding an additional scheduling point along the route of flight. This will push any arrival delay farther into the En-Route flow – therefore providing better fuel burn and predictability along the route of flight.

The following initiatives will begin development and testing in the FY 2011 timeframes: convective weather on the Plan-View Graphical User Interface (PGUI) improved wind data, accelerated arrivals/flexible scheduling, and Integrated Departure and Arrival Capability (IDAC) improvements. The initial design and development work will begin for Updating trajectory calculations for RNAV/RNP initiatives, TBFM data sharing – among external systems such as Traffic Flow Management Systems (TFMS), and accelerated arrivals. Additionally, concept engineering analysis and simulation will be underway for the partial slot reallocation, incorporating surface movement and utilizing convective weather for re-routing.

Segment III – Integrated Enterprise Solution
The Integrated Enterprise Solution Segment will prepare for the possible integration of the TMA system into other existing platforms, supporting the NextGen concepts of one common trajectory and one common automation platform. The TBFM program will be preparing for an Initial Investment Decision for IES in FY 2012 and a Final Investment Decision in FY 2013. Also, the concept engineering work that will be taking place during the TBFM timeframe (2010 – 2014) will be implemented within the IES timeframe (2015-2020).

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. This will increase daily airport capacity by reducing the last minute maneuvering of aircraft as they approach their destination airport, which will improve controller efficiency in organizing the arrival stream for maximum use of that airport capacity.

Program Plan FY 2011 – Performance Output Goals

- Design, develop and test extended metering functionality to enable static en route meter points (MP) to be connected to (1) other en route MPs and (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.
- Initiate the design of functions that integrate data into TMA from external systems such as TFMS and new weather systems. This will increase the efficiency of arrivals and departures by improving coordination between tactical and strategic flow management systems, enhancing scheduling operations by including international flight/surveillance data, and reducing the impact of convective weather during metering operations.
- Continue pre-implementation activities for TBFM's Integrated Enterprise Solution program, to include: concept engineering, maturity and integration assessment and initial investment analysis for integration of TMA into another NAS system. Specifically, the program will:
  - Perform concept development activities,
  - Develop and analyze operational implications through simulations and human in the loop exercises,
  - Develop and evaluate demonstration/prototype capability,
  - Analyze architectural changes necessary to integrate TMA functionality, and
  - Design additional enhancements necessary to evolve metering capabilities.

Program Plan FY 2012-2015 – Performance Output Goals

- Continue development, test and deployment of TBFM enhancements, such as extended metering, data integration and additional functionality needed to support point-in-space metering concepts.
- Continue activities necessary to obtain a final investment decision for the TBFM Integrated Enterprise Solution program in 2013.

D, TRAJECTORY MGMT – TAILORED ARRIVALS OCEANIC, G2A.01-04

Program Description

Oceanic Tailored Arrivals are procedures which takes advantage of existing ground and aircraft automation systems along with data link to enable optimized profile descents, reducing fuel usage and minimizing environmental impact.

Oceanic Tailored Arrivals, as they are performed today, are pre-planned fixed routes which are data linked from the Ocean 21 system (ATOP) to Future Air Navigation System-1A (FANS-1A) equipped aircraft that enable an optimized profile descent. There are multiple Area Navigation (RNAV) routes that air traffic controllers can select. The routes are selected and issued by controllers relative to the direction of the inbound arriving flight. The route contains speed and altitude restraints for efficiency and to account for airspace and traffic flows. Speed changes can be issued to maximize the possibility of an aircraft to fly a “full” tailored arrival from oceanic/en route airspace to the arrival runway. Because the trajectory is issued to the aircraft well before Top of Descent, the workload for both the flight crews and the air traffic controllers is minimized. The purpose of these routes is to reduce fuel consumption by allowing a continuous descent profile that avoids changes in aircraft power settings and headings to the extent possible

Consistent with RTCA Task Force 5 Recommendation 42a, this program will transition Oceanic Tailored Arrivals from concept development/validation to solution implementation. These activities include the expansion of Oceanic Tailored Arrivals beyond the field demonstration locations, which are San Francisco, Miami, and Los Angeles Airports. A cross-domain workgroup has been established to manage this transition process, identify what additional sites should receive this capability, and support the implementation of Oceanic Tailored Arrivals at these new sites.

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

Oceanic Tailored Arrivals will optimize the descent of aircraft into the arrival domain, thereby reducing fuel usage and environmental impact.

Program Plans – Performance Output Goals

FY 2011:

- Develop a business case that identifies the cost and benefits of implementing Oceanic Tailored Arrivals at additional coastal locations.
- Identify any changes needed to automation platforms necessary to optimize the use of Oceanic Tailored Arrivals.
- Develop and implement automation platform changes necessary to optimize the use of Oceanic Tailored Arrivals (will be iteratively implemented in FY 2011 and FY 2012).
- Initiate expansion of Oceanic Tailored Arrivals at sites where a positive cost/benefit ratio is predicted (will be implemented iteratively in FY 2011 and FY 2012).

FY 2012:

- Implement Oceanic Tailored Arrivals at sites where a positive cost/benefit ratio is predicted (will be executed iteratively in FY 2011 and FY 2012).
- Develop and implement automation platform changes necessary to optimize the use of Oceanic Tailored Arrivals (will be executed iteratively in FY 2011 and FY 2012).

Program Plan FY 2013-2015 – Performance Output Goals

- None

E, TRAJECTORY MGMT – SURFACE TRAFFIC DATA SHARING, G2A.01-05

Program Description

Surface Traffic Data Sharing will develop and implement the technical infrastructure, operational procedures, and data governance policies to facilitate the exchange of surface-related data needed to enhance system efficiency, reduce delays, and foster increased collaborative decision making between the Air Navigation Service Provider, the flying community, and other airport stakeholders. Through this common operational picture and the increased predictability of aircraft surface movement aircraft will be able to reduce taxiing time and there will be improved tactical and strategic decision making regarding both arrival and departure flows.

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

Surface Traffic Data Sharing will increase capacity by enhancing the common operational picture of key NAS stakeholders, increasing the accuracy and timeliness of decision making associated with the implementation of traffic management initiatives designed to optimize predicted demand and available capacity.

Program Plans – Performance Output Goals
FY 2011:
- Develop operational, system, and performance requirements needed to support surface data sharing.
- Design, develop, and test communications infrastructure and interface control documentation.
- Develop operational procedures designed to maximize the exchange of surface data.
- Develop/update data governance policies.

FY 2012:
- Implement the communications infrastructure needed to support data sharing.
- Implement operational procedures to facilitate effective data exchange and improve collaborative decision making.
- Establish data governance policies to manage the exchange of this data.

FY 2013-2015:
- None

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

Program Description

The program improves operational efficiencies in major metropolitan areas by expanding the lateral and vertical boundaries of arrival and departure airspace to add transition airspace. This would allow using 3-mile separation standards, diverging course procedures, implementing dynamic airspace reconfiguration to accommodate bi-directional arrival/departure routes, and improving traffic flow management throughout this expanded airspace area These operational changes will enable creation of additional area navigation arrival and departure routes that take advantage of improvements in aircraft navigation system accuracy, so airspace around an airport can be used more intensively. The program also calls for integrating arrival and departure airspace systems into one control service area under the control of one facility. This concept is a step toward the NextGen concept for Super Density 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

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 diverging course procedures in all arrival and departure airspace, as well as 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.

Program Plan FY 2011 – Performance Output Goals

- Conduct operational safety assessments to identify safety-related issues and recommended mitigation strategies.
- Develop and refine functional automation requirements needed to support the expansion of terminal separation standards, dynamic airspace reconfiguration, and improved traffic flow management, to include identifying possible changes to existing/planned surveillance, flight data, conflict probe, computer-human interface, and traffic flow capabilities and systems.
- Develop controller operational procedures, operational scenarios and Human-In-The-Loop simulations to refine operational procedures and identify/validate operational and technical requirements.

Program Plan FY 2012-2015 – Performance Output Goals

- Conduct software engineering analysis for automation system software changes including Surveillance Data Processing, Traffic Management Advisor, Conflict Probe and Flight Data Processing upgrades and Computer-Human-Interface changes to support Integrated Arrival/Departure operations.
- Conduct airspace analyses to support implementation of an integrated arrival/departure control service for major metropolitan areas.
- Develop transition plans and support the development of investment analysis documentation.

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

FY 2011 Request $75.5M

- 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, Flight & State Data Mgmt – Concept Dev for Integrated NAS Design and Procedure Planning, G5A.02-04
- G, Capacity Management – Dynamic Airspace, G5A.04-01
- H, Capacity Mgmt – Joint Network Enabled Operations (NEO), G5M.02-01

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 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.

Program Plan FY 2011 – 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 2012-2015 – 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 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 TMIs such as Ground Delay Programs, Airspace Flow Programs, Ground Stops, Reroutes, and Miles-In-Trail. 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.

Program Plan FY 2011 – Performance Output Goals

- Initial planning/exploration activities will be continued by developing a detailed concept exploration plan to examine the options/alternatives being pursued by various research groups.
- Identify at least two promising improvements and generate plans to mature the concept by surveying the existing research in this field

Program Plan FY 2012-2015 – 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 (CSSD) provides the information, systems and tools necessary to implement comprehensive NAS safety and capacity management. CSSD will achieve this by establishing the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange. When fully realized the FAA will have the ability to model how new procedures, new regulations and new airspace changes affect current and future NAS capacity.

Identifying the requirements and benefits of integrated flight planning and briefing (including flight constraint information) will lead to better flight planning and arrival/departure capacity plans by supporting preflight, during flight and post-operational aeronautical information for exchange and use by NAS automation systems. The resulting efficiency gains will enable the FAA to maximize use of 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.

Program Plan FY 2011 – Performance Output Goals

- Prototype the initial digital capture tools for leading operational constraint scenarios in CSSD resource lab.
- Identify the capabilities supporting consistent, integrated, and managed aeronautical and status information supporting tactical, strategic, and operational situational awareness.
- Support improvements for digitally managing, coordinating, and scheduling airspace for special use.
- Capture, archive, and provide storage and retrieval of aeronautical, constraint, and status information for use in preflight and post operational analysis to improve tactical and strategic air traffic planning and management.
- Deliver digital airport structure and configuration information to support situational awareness.
- Support the investment analysis decision that enables the implementation of airport, airspace and pilot briefing systems resulting from the pre-implementation work developed in this program.

Program Plan FY 2012-2015 – Performance Output Goals

- Complete data model and concept for digital capture of constraints and rules contained in facility standard procedures and letters of agreement.
- Provide prototype evaluative tools to assist facilities with managing constraint information.
- Provide common services for aeronautical data delivery and performance metrics calculations.
- Develop requirements for integration of common status and structure data into NAS systems.

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 enhance Traffic Flow Management (TFM) capabilities. This activity is structured into three parts – probabilistic 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). Probabilistic TFM will attempt to develop usable algorithms for predicting which aircraft are most likely to arrive at fixed points at their estimated times. Modeling and simulation of probabilistic TFM scenarios will support the development of high level requirements and an interface document for Decision Support Tool (DST).

The activity to integrate weather into the TFM decision support tools includes the assessment of existing and planned weather products. This will be followed by an assessment of how this data can be integrated into the TFM concepts of use 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 concept of use to support advanced TFM capabilities will examine how the increased amounts of data can be used to improve TFM. 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 and 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

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.

Program Plan FY 2011 – Performance Output Goals

<u>Probabilistic TFM – Area Flow Program</u>

- Analyze the benefit of area flow decision support tool using the simulation.
- Determine the Multi Sector Planner (MSP) capabilities that are used most frequently.
- Identify the integration possibility of MSP into the NextGen enabled functions such as TBFM.
- Plan demonstration of data-link connectivity.

<u>Integration of Weather into ATM</u>

- Build scenarios and demonstration capability using identified CATM decision support tools and weather information for CATM.
- Refine weather standard exchange formats for inclusion into CATM decision support tools.

<u>Unified Flight Planning Filing</u>

Prepare for initial demonstration of unified flight planning filing concept developed in FY 2010.
Conduct initial demonstration and report the results.

Advanced Planning

- List the high level common reference (3D/4D Hypercube) data object (i.e., airspace, flight object, weather, ground feature and notifications).
- Determine the initial phase of demonstration capability by identifying which data object attributes would be included and describe them.
- Describe the detail of data attributes that are identified as part of the initial phase of demonstration.
- Develop the plan for the capability demonstration platform.

Program Plan FY 2012-2015 – Performance Output Goals

Probabilistic TFM – Area Flow Program

- Incorporate shortfall findings into demonstration that addresses the shortfalls.
- Refine ConUse document of data-link usage and add/create other usage that integrate into NextGen enabled capabilities.
- Draft function requirements.

Integration of Weather into ATM

- Refine capabilities based on demonstration conducted as FY 2012 work and report.
- Prepare draft ConOps and draft ConUse documents.
- Solicit and incorporate comments on standard exchange formats from FAA and international organizations.

Unified Flight Planning Filing

- Revise ConUse document for the advanced flight planning and filing method.
- Draft functional requirements.
- Identify known issues and conduct simulation if necessary.

Advanced Planning

- Conduct the 2nd demonstration of 3D Hypercube by implementing the additional data attribute identified in FY 2012 work.
- Analyze the 2nd demonstration results and identify the area that should be improved.
- Identify known issues and identify additional attributes for incorporation into 3D Hypercube demonstration capability.
- Prepare draft ConUse and draft ConOps documents.

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

Program Description

The Flight Object is a string of information about an aircraft and its flight parameters. The flight object is intended to be the future medium for capturing and sharing the most up-to-date information on any flight. The flight object will serve as 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 declaration of the aircraft's flight capabilities, what the aircraft operator intends to do, and the operator's preferences and constraints that need 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

Both the users and the ATM service providers can benefit from the increased efficiency of well-coordinated capabilities that share common flight information elements.

Program Plan FY 2011 – Performance Output Goals

- Revise multi-year Flight Object (FO) work plan that focuses on the FAA's Acquisition Management System (AMS) process in an effort to transition to JRC and implementation.
- Prepare documentation supporting the AMS process for Investment Analysis Readiness Decision (IARD):
    - Draft System Requirement Document.
    - Revise Enterprise architecture products and amendments.
    - Draft Plan for Investment Analysis.
- Host Flight Object Industry Collaboration Workshop.
- Conduct the 2nd International FO Demonstration (Pacific) and prepare the report.
- Continue work with international stakeholders toward developing FO standard.
- Identify inter-agency policy issues in FO Security Attributes implementation.
- Develop Initial Flight Object Information Exchange Model.

Program Plan FY 2012-2015 – Performance Output Goals

- Conduct activities leading to an Investment Analysis Readiness Decision JRC.
- Conduct additional FO demonstrations.
- Continue work with international stakeholders toward developing FO standard.
- Continue development of Flight Object Information Exchange Model.
- Develop Draft NAS Flight Object standard.
- Develop Draft International Flight Object standard.
- Support activities leading to an Initial Investment Decision JRC.
- Support activities leading to a Final Investment Decision JRC.

F, FLIGHT & STATE DATA MGMT – CONCEPT DEV FOR INTEGRATED NAS DESIGN AND PROCEDURE PLANNING, G5A.02-04

Program Description

The program objective is to establish a systematic approach for NAS wide airspace procedure development to support NextGen's best equipped best serve concept of operations that provides enhanced services to those aircraft equipped with the avionics compatible with NextGen capabilities.

These pre-implementation activities may include development of a concept of use for airspace and the associated procedures in a mixed equipage environment when some aircraft are NextGen equipped and others are not.

Development activities will include enhancing existing fast time models and testing of alternative airspace and procedures changes using the simulators and models. Fast time modeling and human in the loop simulation of proposed airspace and procedures will be used to valid the proposed changes.

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 increase efficiency of well-coordinated airspace and procedures.

Program Plans – Performance Output Goals

FY 2011:

- Develop initial concepts of use for best equipped best served.
- Initiate analyses on airspace environment.
- Initiate analyses on procedure design.

FY 2012:

- Develop final concepts of use for best equipped best served.
- Continue analyses on airspace design to support concepts.
- Fast time modeling to validate concepts.

FY 2013:

- Develop procedures to develop concepts.
- Enhance fast time models to incorporate procedures.

FY 2014:

- Develop initial scenarios for Human in the Loop simulations.
- Conduct Human in the loop simulations.

FY 2015:

- Initiate data analyses.
- Document findings – functional requirements.

G, 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

In NextGen, Flexible/Dynamic Airspace and ARMS will allow traffic managers to optimize the airspace configuration across the NAS to maximize capacity of workload-constrained airspace while addressing weather and Special Use Airspace (SUA).

Program Plan FY 2011 – Performance Output Goals

- Perform case study of spectrum coverage and implementation analysis.

Program Plan FY 2012-2015 – Performance Output Goals

- Evaluate processes for moving sector boundaries and airspace configurations.
- Develop documentation for information loading of new airspace frequency plan into ERAM.
- Update requirements for radio spectrum coverage.
- Develop Concept of Use for Dynamic Airspace Management infrastructure.
- Develop initial interface requirements.
- Develop architecture artifacts.
- Develop final interface requirements.

H, CAPACITY MGMT – JOINT NETWORK ENABLED OPERATIONS – (NEO) PROGRAM, G5M.02-01

Program Description

The Department of Defense (DoD) and the Department of Homeland Security (DHS) recently engaged in the Joint Capability Technology Demonstration Command and Control (C2) Gap Filler DoD-led program to develop interagency information sharing and smart surveillance fusion capabilities. The NEO Program will collaborate with the C2 Gap Filler program to contribute to the research, development, prototyping, and demonstration of the information sharing infrastructure through Service Oriented Architecture (SOA) design principles.

NEO will investigate how information sharing and collaboration across multi-agency domains can be accomplished by leveraging existing technology and investments planned for NextGen transformation. DoD and DHS will not participate in NEO Spiral 3; however, FAA collaboration with the C2 Gap Filler program addresses the inter-agency common activities especially in the area of research, development, prototyping and demonstration of information sharing capabilities.

The scope of NEO Spiral 3 (SP3) for the near term encompasses 1) Continuing to provide subject matter expertise in interagency information sharing to fulfill the C2 Gap Filler program objective; and 2) Developing further application(s) and feasibility analysis associated with information sharing and interagency data exchange that would be beneficial to the FAA program. The program will apply lessons learned from NEO SP1 and 2 emerging capability demonstrations that are included in the NextGen Baseline Operational Improvement (OI) Roadmap. SP3 will explore net-centric capabilities and apply them to FAA program to enhance the NEO business case and validate JPDO-developed models/simulation for 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

With collaborative situational awareness tools available to these three agencies, decision making for flights will be done efficiently and with more precise timing. This will greatly enhance the communication needed to handle future Unmanned Aircraft flights and the projected increase in air travel.

Program Plan FY 2011 – Performance Output Goals

- Update Requirements Architecture document.
- Develop Unmanned Aircraft Systems 4D Trajectory Air Traffic Research Management Demo Plan.
- Develop Enterprise Architecture Human Factors assessment.

Program Plan FY 2012-2015 – Performance Output Goals

- Conduct Spiral 3 Flight Trials.
- Develop Integration of Spiral 1, 2, and 3 engineering and procedures documentation.
- Develop Spiral 3 Flight Trial planning documentation.
- Integrate development Spiral 3 deliverable(s) with Communities of Interests.
- Update Security Assessment.
- Update Transition Plan.

1A13, Next Generation Air Transportation System (NextGen) – Flexible Terminal Environment

FY 2011 Request $80.7M

- A, Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD), G6A.01-01
- B, Separation Mgmt – Wake Turbulence Mitigation for Arrivals (WTMA), G6A.01-02
- C, Surface/Tower/Terminal Systems Engineering, G6A.02-01
- D, Separation Mgmt – Approaches, Ground Based Augmentation System, G6N.01-01
- E, Separation Mgmt – Closely Spaced Parallel Runway Operations, G6N.01-02
- F, Separation Mgmt – Approaches, NextGen Navigation Initiatives, G6N.01-03
- G, Separation Mgmt – Approaches, Optimized Navigation Technology, G6N.01-04
- H, Separation Mgmt – Enhancing Terminals & Airports – Terminal Enhancements for RNAV ATC (TERA), G6N.01-05
- I, Trajectory Mgmt – Arrivals, G6N.02-01
- J, 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 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 ATCTs. WTMD equipment applies NASA research using Massachusetts Institute of Technology 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 ATC supervisors when these favorable meteorological conditions might allow reduced departure spacing. The ATC supervisors use WTMD inputs and other operational decision aids, when deciding 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 OEP airports are candidates for WTMD. Benefits range between 2 to 11 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.

B, SEPARATION MGMT – WAKE TURBULENCE MITIGATION FOR ARRIVALS (WTMA), G6A.01-02

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.

Evaluation of the prototype Wake Turbulence Mitigation for Arrivals (WTMA) decision support tool will continue and requirements for implementing the WTMA capability will be developed. The WTMA 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. An evaluation of that capability will be accomplished by this program in future years.

This program's work in FY 2011 on WTMA will lead to an FAA acquisition in FY 2013 to transform the capabilities of the prototype into a functioning decision support tool for use by the FAA air traffic controllers. First operational benefit will be realized during FY 2015 when the initial WTMA controller decision support system is used in an airport's operation.

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

Implementing the WTMA controller decision support system in airport operations will allow the reduction of the required diagonal wake turbulence separation distance of aircraft landing behind a Boeing 757 or heavier aircraft to be reduced to 1.5 NM or potentially less when the aircraft are conducting instrument approaches 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 Boeing 757 and heavier aircraft traffic.

Program Plans FY 2011 – Performance Output Goals

- Continue WTMA prototype system evaluation in an airport environment and initiate drafting of system level performance requirements need for acquisition.

Program Plans FY 2012-2015 – Performance Output Goals

- Program work after FY 2011 will be determined as part of the FAA FY 2012 CIP formulation.

C, SURFACE/TOWER/TERMINAL SYSTEMS ENGINEERING, G6A.02-01

Program Description

This project will provide engineering analyses, evaluations and assessments to develop concepts for using integrated electronic flight data management, clearance delivery, coded taxi instructions, conformance monitoring, and automated transfer of flight information between air navigation service providers and airspace users to enable more efficient and safer movement and control of air traffic in the terminal airport arena. These concepts will be designed to ensure smoother transition into and out of operational airspace in support of the NextGen Concept of Operations. Initial efforts will:

- Refine the Tower Flight Data Management (TFDM) Engineering Development Model, to include Arrival/Departure Management Tool (A/DMT) functionality.
- Refine, validate and integrate Terminal Trajectory model into TFDM platform.
- Complete testing and demonstration of conformance modeling algorithms integrated into TFDM.
- Analyze test/demo/validation results to determine whether to modify TFDM requirements/functionality.
- Perform testing of SWIM Segment 2 standards as they apply to TFDM and Terminal requirements for NextGen.
- Analyze and further define SWIM data exchange integration into Terminal platforms to include the TFDM platform.
- Integrate Terminal Surface Collaborative Decision Making (CDM) support tools into TFDM.
- Establish Terminal enterprise architecture products to describe the terminal environment both today and as it will be in the future.

Enabling technologies and information flows will be assessed to identify and simulate methods of integrating information (Flight data object, clearance (taxi/takeoff) information, surveillance information, and how it will impact 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,
- Conformance monitoring of surface traffic movement, and
- ConOps Support.

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 supports greater capacity by analyzing and evaluating concepts and methodologies that will provide more efficient and safer movement on the surface and control of air traffic in the terminal airport arena. This project will also ensure smoother transition into and out of the NAS operational airspace in support of the Surface Traffic Management Initiative and NextGen goals. It will enable improved surface movement efficiency, reduce carbon footprint by reducing or eliminating taxi-way queuing, and consolidate tower displays to reduce controller workload. In conjunction with decision support tools, it enables 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. This project supports CDM by enhancing exchange of information between the FAA and the user community.

Program Plan FY 2011 – Performance Output Goals

- Pre-Production Field Operational Evaluation.
- Refine functional/operational requirements.
- Refine a Concept of Operations and the required procedures.
- Identify and refine operational Benefits.
- Develop Concept Requirements and Investment Analysis to obtain an Investment Analysis Readiness Decision (IARD) and Initial investment Decision (IID).
- Integrate Terminal capabilities in support of Surface CDM goals.
- Establish and refine Terminal enterprise architecture and products.
- Further define SWIM data exchange performance.

Program Plan FY 2012-2015 – Performance Output Goals

- Continue the development, installation, test, and operation of a pre-production unit of A/DMT with appropriate interfaces with ERAM/TMA, TFM/ Integrated Departure Arrival Capability (IDAC)), TRACON, Route Availability Planning Tool (RAPT), and coordinate with an airport authority, and aircraft/airlines at an operational site to support analysis and assessment of near term benefits available from the A/DMT including:
    - Departure Route Assurance to reduce departure delays,
    - Reduce Departure Queue Lengths to reduce emissions/fuel burn,
    - Taxi Conformance Monitoring to improve airport operations, and
    - Enhanced Situational Awareness to enhance airport safety.
    - Develop Concept Requirements and Investment Analysis to obtain Final Investment Decision (FID).
- 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.

D, 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).

GBAS augments the current Global Positioning System (GPS) service for terminal, non-precision, and precision approaches in the NAS. GBAS 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 GBAS as an "Enabler" for the 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 system that uses the existing GPS single civil frequency to provide Category-I service and improve this architecture when additional civil frequencies become available 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 GBAS 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 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

GBAS will allow for increased flexibility in the Terminal Area by eliminating the capacity constraint due to ILS coverage. Future enhancements to GBAS when combined with surveillance, may allow for reduced aircraft separation in all weather conditions. Similarly, once the capability has been validated, GBAS will eventually be able to provide the capability to use continuous descent approaches and curved-segmented approaches in extremely low visibility conditions.

Program Plan FY 2011 – Performance Output Goals

- Complete CAT-III Validation Report.
- Complete Business Case Analysis Report.

Program Plan FY 2012-2015 – Performance Output Goals

- Complete JRC FID decision.
- Finalize CAT III Ground facility specification.
- Complete validation of CAT III avionics standards and interoperability.

E, 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 operations to airports with closely spaced parallel runways in all weather conditions. This initiative will enhance procedures that allow dependent operations to closely spaced parallel runways or converging approaches to runways closer than 2500 feet, as well as supporting independent operations to parallel runways between 2500 ft and 4300 ft.

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.

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 simultaneous Instrument Meteorological Conditions (IMC) operations to closely spaced parallel runways.

Program Plan FY 2011 – Performance Output Goals

- Conduct two Human-in-the-Loop (HITL) tests for TCAS and RNAV/RNP to evaluate operational application for Dual ILS/RNAV/ Precision Runway Monitor (PRM).
- Deliver final test report for FY 2011 HITLs.

Program Plan FY 2012-2015 – Performance Output Goals

- Perform HITL Test for Performance Based Navigation (PBN) approaches at reduced separation standards in runway spacing.
- Develop Surface Management System requirement for PBN approaches at reduced separation standards.
- Refine No Transgression Zone, Normal Operating Zone, and other blunder assumptions via modeling and analyses.
- Develop performance requirements for independent and paired approaches.

F, 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 (IMC), and focuses on improvements supporting both the terminal and approach phases of flight as well as improving situational awareness on the airport surface. There are three main program elements addressing each of these areas.

The first program element (P1) supports low visibility enhanced operations by lowering required Runway Visual Range (RVR)-defined minimums during IMC, and is a collaborative effort between Flight Standards and Navigation Services. This work allows a greater number of takeoffs and landings when visibility is limited. Lower takeoff minimums could achieve a 17% increase in throughput for San Francisco International Airport (SFO), for example. This effort is in the implementation phase and will have near-term NextGen operational benefits by increasing NAS capacity and throughput. For this program element, work is ongoing to develop the benefit-cost analysis to propose this as a NAS-wide implementation, scheduled in the FY 2011 timeframe. If successful, this program element will be broken out into its own program. The initial program element achieved use of Category I runway procedures using RVR minimums of 1800 feet, a 25% improvement for these runways over the prior 2400-foot requirement.

Another program element (P2) 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). Implementation of performance-based navigation is a NextGen goal. The success of this work will allow fuller implementation of RNAV including aircraft other than air carriers and high end business jets. Current research and testing may lead to significant changes to the National Standard for DME usage within the United States, last updated in 1982. Today, to implement DME-DME RNAV requires the spectrum office to perform case-by-case work on each runway to plan out expanded service volumes. The results of this work could allow each DME to have an expanded service volume over what is possible today, greatly enhancing the NAS capability. Research and testing is focused on determination of what technical issues are required to allow for DME-DME RNAV without IRU. Work with Systems Operations may lead to a better definition of airspace, with the potential to increase the airspace volume around certain airports. A test and demonstration of results is planned for FY 2011. Testing and equipment necessary for that demonstration will be procured in FY 2010.

The third program element (P3) is focused on improving situational awareness on the airport surface. Improving situational awareness for aircraft on the taxiways and runways will increase traffic flow and 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 i.e. the Local Area Augmentation System (LAAS) and Wide Area Augmentation System (WAAS), and other systems providing RNAV and RNP. This program element will also coordinate with existing efforts by the surface movement working group.

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

This program supports the increased capacity goal by enabling an:

- Increased number of arrivals and/or departures at high density airports;
- Decreased number of flight delays, cancellations, and/or diversions under IMC;
- Increased capacity and fuel savings for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan);
- Increased flexibility within the NAS for traffic flow resulting in increased capacity;
- Alternate airports being able to provide an increased level of service, helping NAS throughput;
- Increased ability to utilize alternate airports (airlines have indicated this would be useful if more of the alternates had increased capability);
- Capability for airports to more efficiently use infrastructure to aid in maintaining VFR-like capacity during IFR conditions, increasing the throughput of the NAS;
- Moving performance-based navigation (PBN) into the NAS;
- Greater number of users to utilize PBN; and
- Greater throughput through increased surface navigation capability and situational awareness.

Program Plan FY 2011 – Performance Output Goals

- P1: Implementation of lower RVR minimums at 4 OEP airports.
- P2: Finalize selection of site(s) for RNAV improvements and develop implementation schedule for NAS-wide implementation with emphasis on top OEP airports.
- P2: Procure necessary subsystems such as DMEs for testing and other test equipment to support RNAV approaches.
- P2: Complete test and demonstration for RNAV DME-DME in terminal area.
- P3: Perform integration research for surface navigation and ties to NextGen Operational Improvements (OIs) through follow on tests and demonstrations as needed.
- P3: Provide a work plan tied to NextGen OIs requiring surface navigation and increased situational awareness with a path toward achieving these in the mid- and far-term.

Program Plan FY 2012-2015 – Performance Output Goals

- P1: In coordination with Flight Standards, determine NAS-wide schedule for implementation of lower RVR minimums. Ongoing sites initiated in FY 2009 include Philadelphia, San Francisco, and Detroit.
- P2: Based on the Flight Standards NAS-wide implementation schedule for terminal RNAV, devise the roll out schedule for navigation systems required

- P3: Define current arrival variability, runway occupancy times (day/light, clear/low-visibility) as a baseline to improving exiting from the runway.
- P3: 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.

G, 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 4 – 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;
  - 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 system and the break-even point will be achieved in 2.4 years. 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.

Program Plan – Performance Output Goals
FY 2011:
- Continue initial development and design of MALSR LED Lamp Solution.
- Continue initial development and design of LED PAPI System Solution.
- Start initial development and design of Solid-State LED based MALSR Solution.

FY 2012:
- Continue initial development and design of Solid-State LED based MALSR Solution.
- Start initial development and design of approach lighting system with sequenced flashing light model 2 (ALSF-2) LED Lamp Solution.

FY 2013 – FY 2015:
- Continue initial development and design of Solid-State LED based MALSR Solution.
- Continue initial development and design of ALSF-2 LED Lamp Solution.

H, SEPARATION MGMT – ENHANCING TERMINALS & AIRPORTS – TERMINAL ENHANCEMENTS FOR RNAV ATC (TERA), G6N.01-05

Program Description

This program provides ATC with new tools to ensure efficient use of Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures during the transition phase of flight (arrival/departure). The tools feature display aids for the controller to determine conformance to static and dynamic procedural trajectories, and for spacing and sequencing other aircraft on or near the assigned trajectories or at merge points. These tools will be integrated during spiral development, with trajectory and Time-Based Flow Management (TBFM) across the terminal (ground), transition (arrival/departure) and en route domains of ATC. These capabilities will be developed to complement development of aircraft RNP and Flight Management Systems, and will support use of Data Comm to allow separation through ground/air automation interactions. These capabilities will fill a critical gap in implementing Trajectory Based Operations (TBO) for transition domain operations and enhance terminal capacity, safety and flight efficiency.

An early version of the Terminal Enhancements for RNAV ATC (TERA) tool has been developed and demonstrated. TERA is a ghosting tool for display of flights beginning a RNAV procedure, and it aids controllers in determining the aircraft arrival time at the merge points to allow aircraft to maintain user-preferred profiles with minimum vectoring during approach and landing. As part of TERA, conformance monitoring and flight-data based aids will be spirally developed to attain the full capability to manage separation with dynamic procedures that adapt to terminal configuration changes, contingencies within the transition airspace (e.g., weather), while negotiating efficient handoffs to en route ATC. The tools will be implemented in the existing Terminal Automation Modernization and Replacement (TAMR) platforms and the planned TAMR Phase 3 system, with interfaces to en route and tower automation. These capabilities will support mid-term NextGen operational improvements (OIs) across the domains.

The tools support continuous coordination of sequencing and spacing across the ATC domains. Coordinated time-based control minimizes tactical vectoring and allows aircraft to fly ATC preferred three dimensional (3D) paths (e.g., the RNAV procedures and eventually dynamic flow "tubes"). These 3D profiles can be maintained as user-preferred profiles for descent and climb. Initial use of the tools within the transition ATC domain will be beneficial, and the spiral development will expand these coordination tools to the terminal and en route domains. The tools start with static procedures, but will be enhanced to allow dynamic adaptation of procedures.

Spiral 1 will achieve early deployment of the TERA tool once it completes the field demonstration phase and has been evaluated in simulation for use on the Future Terminal Workstation. The Terminal Service Unit is cooperating with field sites to fast-track demonstration results into baseline automation builds. Spiral 1 will deploy the TERA tool for arrival sequencing/spacing regulation at adapted RNAV merges at selected demonstration terminals.

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 program increases capacity to meet projected demand and reduce congestion. It achieves these benefits by improving conformance to RNAV procedures within the arrival/departure ATC domain, minimizing deviations from user-optimal profiles, and achieving maximum utilization of procedures by coordinated spacing and timing with en route and terminal (surface) ATC.

Program Plans FY2011 – Performance Output Goals

- Based on initial field demos (standalone, non-operational systems) and evaluation in FY 2010, conduct prototype operational demonstrations using field staff in labs containing Research and Development (R&D) configurations of operational systems.
- The earliest possible build-to-delivery cycle for operational systems (Common-Automated Radar Tracking System (CARTS) and Standard Terminal Automation Replacement System (STARS)) will be completed by the end of FY 2011, and the Spiral 1 build will be ready for limited deployment at the field demo sites in FY 2012. This build is based on the earliest possible transition to TAMR Phase 3.

Program Plans FY2012-2015 – Performance Output Goals

- Complete Operation Test and Evaluation (OT&E) for the Spiral 1 build delivery and achieve IOC at the demonstration sites.
- Conduct operational evaluation at the deployment sites.

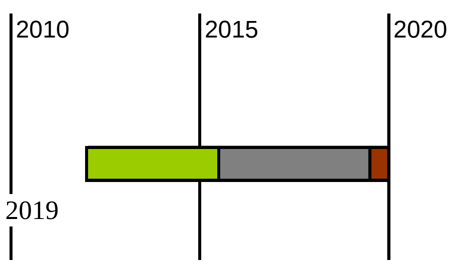
System Implementation Schedule

Enhancing Terminals and Airports (Terminal Enhancements for RNAV ATC)

First site IOC: April 2012 (Spiral 1)

First Site Decom: December 2019 -- Last Site Decom: December 2019

Replacement System: NextGen Far-Term Work Package



I, TRAJECTORY MGMT – ARRIVALS, G6N.02-01

Program Description

The enablers for Trajectory Management which are – RNAV/RNP with 3D and Required Time of Arrival 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 such as RNAV/RNP procedures with vertical constraints and required time of arrival will greatly improve the precision of the transition. Metered 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) systems. For this type of operation, an aircraft's meter point time (MPT) is assigned to determine when it enters into the TRACON airspace so it can be efficiently routed to the assigned runway. Metering will take into account runway load balancing and will serve to reduce (not eliminate) the need for delay absorption needed for aircraft inside the TRACON airspace.

As the FAA transitions to NextGen, aircraft will increasingly be assigned to RNP/RNAV routes and have modern avionics that include Flight Management Systems (FMS) capable of executing Required Time of Arrival (RTA) instructions. The RTA capability provides a time-based control mechanism that supports the trajectory-based operations concept. In particular, RTAs will be used for the management of arrival traffic to an airport. Time-based metering can be used for managing arrivals at an arrival-oriented waypoint (such waypoints could be established for top-of-descent, an arrival fix during the descent, or arrival at the runway threshold). The use of RTAs will take advantage of existing capabilities expected to become more widespread throughout the fleet. The FMS in the aircraft computes the most efficient change to the original trajectory to meet the RTA. In addition, the FMS can "independently self deliver" to the RTA, thus reducing significantly the coordination needed between the user and ATC. Finally, since the FMS actively and directly "controls" the aircraft to meet the RTA, very accurate arrival is possible with minimal human intervention.

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 104,338 arrivals and departures per day by FY 2011 and maintain through FY 2013.

Relationship to Performance Target

Using RNAV/RNP with 3D and RTA procedures provides for energy managed arrivals with a lower vertical restraint than Continuous Descent Approach (CDA). RTA supports effective management of low altitude airspace and results in a more efficient flow of aircraft to arrival runways.

Program Plan FY 2011 – Performance Output Goals

- Continue cultivating integration of 4-D Trajectory and RTA into FAA tools and procedures.
- Prepare final Human-in-the-Loop Report.
- Prepare final business case.
- Update safety analysis.
- Draft plan for limited implementation (includes new RNAV/RNP route requirements if needed).
- Conduct Industry Technical Interchange Meetings.

Program Plan FY 2012-2015 – Performance Output Goals

- Develop final implementation plan
- Approve Safety Analysis.
- Approve new RNAV routes (needed to support implementation).
- Develop operational ground metering tool (build on Traffic Management Advisor tool using downlink of FMS 4-D Trajectory and precision Radar Transfer Accept capability aircraft)
- Begin limited implementation of 4D FMS Trajectory Based Operations using new ground automation support if available.

J, FLIGHT & STATE DATA MGMT – AVIONICS, G6N.03-01

Program Description

This project develops the initial requirements, a concept of operations, and certification standards for cockpit moving map avionics that support automated taxi delivery, conformance monitoring and surface separation management. This capability is the cockpit component of the Trajectory Management - Surface Conformance Monitoring project. It determines the requirements for a stand-alone capability to support surface separation in NextGen Flexible Terminal operations.

This project expands on the development that was initiated by the NASA Surface Management System (SMS) project to improve surface management capability in multiple phases (spirals) leading to trajectory based operations on the surface It will also develop the analysis and documentation required by the Acquisition Management System to support an FAA initial investment decision. 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 will show the potential safety and workload benefits that can be achieved through a comprehensive taxi route management and conformance monitoring capability which will support 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 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 104,338 arrivals and departures per day by FY 2011 and maintain through FY 2012.

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.

Program Plans FY 2011 – Performance Output Goals

- Develop initial Cockpit Display of Taxi Clearance and Instructions CONOPS for input into draft RTCA Minimum Operational Performance Standards (MOPS).
- Conduct Cockpit Display of Taxi Clearance and Instructions (2D) Simulation.
- Complete initial Safety Analysis.

Program Plans FY 2012-2015 – Performance Output Goals

- Develop refined Cockpit Display of Taxi Clearance and Instructions (2D), CONOPS and support development of draft RTCA MOPS.
- Develop High Fidelity Cockpit Display of Taxi Clearance and Instructions (2D), CONOPS and support development of draft RTCA MOPS.
- Conduct final Safety Analysis.
- Conduct Cockpit Display of Taxi Clearance and Instructions (2D) Field Demonstrations.
- Develop final Cockpit Display of Taxi Clearance and Instructions (2D) CONOPS and support development of final draft RTCA MOPS.
- Support development of Cockpit Display of Taxi Clearance and Instructions (2D) Technical Standard Order (TSO).

1A14, Next Generation Air Transportation System (NextGen) – Safety, Security, and Environment

FY 2011 Request $8.0M

- Security Integrated Tool Set (SITS), G7A.01-01

Program Description

The Security Integrated Tool Set (SITS) is part of the NextGen. It is an automated system used to identify airborne security threats in the 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 4 – 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.

Program Plan FY 2011 – 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.

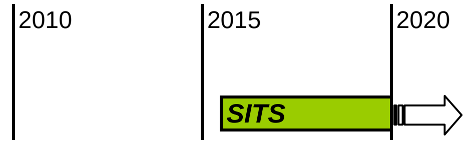
Program Plan FY 2012-2015 – Performance Output Goals

- Complete the design, development, and deployment of the SITS system.

System Implementation Schedule

Security Integrated Tool Set (SITS)

First site IOC: August 2015 -- Last site IOC: TBD



1A15, Next Generation Air Transportation System (NextGen) – Networked Facilities

FY 2011 Request $35.0M

- A, Future Facilities Investment Planning, G3F.01-01
- B, Integration, Development, & Operations Analysis Capability, G3M.02-01
- C, Test Bed Demonstration, G3M.03-01

A, Future Facilities Investment Planning, G3F.01-01

Program Description

The 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. 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 component of NextGen focuses on optimization of Air Navigation Service Provider (ANSP) resources and providing more flexible and resilient services. This includes optimal alignment 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; improve service resilience; 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 service 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 2015 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, 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, and the operators have more flexibility to plan and execute under off-nominal conditions.

Program Plan FY 2011 – Performance Output Goals

- Investigate the optimization of the size and location of ANSP facilities in order to maximize NextGen benefits.
- Continue engineering analysis support for the implementation of NextGen facilities.
- Continue enhancement of network-enabled operations and infrastructure management services to improve system resilience and provide continuity of operations in the event of a major outage.
- Develop NextGen facilities segment 1 objectives.

Program Plan FY 2012-2015 – 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 NextGen tower services.
- Continue to align facilities to support robust service continuity operations when failure occurs.
- Develop/finalize business case for NextGen facilities segment 1.

B, INTEGRATION, DEVELOPMENT, & OPERATIONS ANALYSIS CAPABILITY, G3M.02-01

Program Description

The primary goal of the NextGen is to address and meet the rapidly changing needs of the United States aviation industry. For example, NextGen 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 is a real-time and flexible environment required to validate the broad framework of concepts, technologies, and systems introduced by NextGen. This capability provides the platform to assess NextGen technologies and concepts in an integrated environment.

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 platform to independently assess NextGen in a simulated environment and to also connect with NAS systems in a non-operational environment to conduct transition studies. Key characteristics of the subject capability include:

- A collocated display area to support Human-in-the-Loop simulations;
- A real-time rapid prototyping and simulation environment that simulates the NAS while integrating NextGen enabling components;
- A low-to-medium fidelity simulation environment; and
- An integrated federal and external laboratory capability to support high fidelity simulations.

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, development, and operational analysis capability provides the means to mature and validate concepts, reduce risks, and improve operational performance across all NextGen solution sets resulting in increased capacity that will meet demand and reduce congestion in the NAS.

Program Plan FY 2011 – Performance Output Goals

- Enhance and sustain the NextGen Integration and Evaluation Capability (NIEC) at the Technical Center.
- Focus on integrating new technologies into existing NIEC capabilities that will enable the customer to:
  - Validate iterative designs to evaluate concepts and alternatives;
  - Determine quantitative metrics to define and validate human performance, usability, workload, and safety indications; and
  - Design and conduct experiments to assess software, hardware, and prototypes for research, system analyses, and/or definition and refinement of requirements.
- Provide interfacility capabilities.
- Enhance NIEC data collection capabilities.

Program Plan FY 2012-2015 – Performance Output Goals

- Continue development of the integration, development, and operations analysis capability.

C, TEST BED DEMONSTRATION, G3M.03-01

Program Description

The NextGen Test Bed program will provide three real-world test and demonstration environments to integrate testing of operational improvements during all phases of flight to allow multi-domain, end-to-end NextGen demonstrations and evaluations. The Test Bed sites will allow the integration of new and emerging technologies or applications into existing or planned NAS enhancements and foster partnerships with users and other government agencies. One of the main purposes of the Test Bed is to provide open access for industry users and vendors such that new capabilities can be more rapidly harnessed. The Test Bed will also support and validate large scale modeling and simulation.

Demonstration sites will be at two East Coast locations and one Texas location for faster and more reliable tests to begin the integration of multiple systems into NextGen. We will emphasize multi-domain demonstration and testing. These sites will allow immediate integration of new emerging technologies, or applications into existing or planned demonstrations. NAS customers will see these sites as a visible, near-term step toward initiating new capabilities that support efforts of government / industry partnerships. NextGen demonstrations will be conducted in close cooperation with both internal FAA and JPDO offices. This common platform – or Test Bed – would allow the FAA to investigate further information sharing capabilities that may give way to future potential NextGen enhancements.

The NextGen Test Bed has its own CIP number in FY 2011. The NextGen Test Bed program previously was part of the "NextGen Demonstration and Infrastructure Development" Solution Set. In FY 2011, the Test Bed project is transferred to the "NextGen Facilities" Solution Set.

New technologies, as they are developed, will be tested and demonstrated to meet the NextGen mid-term goals and objectives.

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

- **FAA Strategic Goal 4 – 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% savings for strategic sourcing for selected products and services.

Relationship to Performance Target

Demonstrations of individual programs and projects at diverse locations fail to provide the synergies and cohesiveness available in a multi-domain demonstration and test bed site. Developing many test bed locations will only add to the overhead cost of needed demonstrations. Emerging technologies from R&D, aviation partners and industry do not make their way into operational implementation and use without "real-world" integrated demonstrations. By facilitating these "real world" multi-domain demonstrations in a single location, the cost of R&D demonstrations will decrease.

Program Plan FY 2011 – Performance Output Goals

- Continue to establish telecommunication circuits for initial live data capability.
- Perform technology site refresh and maintenance at the Florida site.
- Perform arising NextGen technology integration and demonstration activities in Florida.
- Initiate initial NextGen interactivity between Florida and WJHTC.
- Perform site installation and maintenance activities.
- Conduct planning activities to initiate NextGen demonstration capability to NASA North Texas Research Station.

Program Plan FY 2012-2015 – Performance Output Goals

- Technology site refresh and maintenance at all three Test Bed sites.
- Expand telecommunication infrastructure to allow improved live data capabilities.
- Expand site integration capabilities among all three sites.
- Expand initial NextGen test bed among Florida, WJHTC and Texas with NASA.
- Continue site equipment installation and maintenance.
- Establish telecommunication circuits for initial live data capability.

ACTIVITY 2. PROCUREMENT AND MODERNIZATION OF AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. EN ROUTE PROGRAMS

2A01, EN ROUTE AUTOMATION MODERNIZATION (ERAM)
FY 2011 Request $132.3M

- 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. The next segment, ERIDS 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. ERIDS 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 began in FY 2009 and concludes in FY 2011.

ERAM Release 2/3 – These ERAM system releases are planned to be developed and implemented from 2009 through 2011. These releases are required for ERAM maintenance and will include incremental functional enhancements not available in ERAM Release 1 including interfaces to other NAS systems such as System Wide Information Management (SWIM) and Automatic Dependent Surveillance – Broadcast (ADS-B). Release 2 development was initiated in 2009.

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 address capacity needs, resolve equipment end-of-life issues, and provide increased functionality 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.

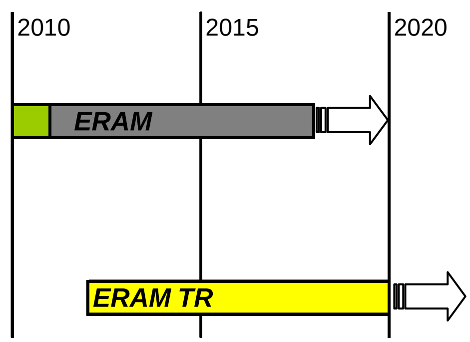
Program Plans FY 2011 – Performance Output Goals
- ERAM Last Site Operational Readiness Demonstration (ORD).
- ERAM Release 3 implemented.
- Initiate planning for Tech Refresh.

Program Plans FY 2012-2015 – Performance Output Goals
- Tech Refresh activities baselined and execution started.

System Implementation Schedule

En Route Automation Modernization (ERAM)
First site ORD: January 2010 -- 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 2011 Request $6.0M

- 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 En Route Automation Modernization (ERAM), Host Computer System (HCS) 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, such as ADS-B and WAM. ECG introduces new interface standards and data formats—which are required for compatibility with International Civil Aviation Organization (ICAO) standards—and it increases capacity, above that of the system it replaces, to process data from additional remote equipment such as radars. The ECG provides the system capacity and expandability to support anticipated increases in air traffic and changes in the operational environment. The ECG was a prerequisite to deploying 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 Sustainment and Technology Evolution Plan (STEP) provides the strategy to sustain the viability of hardware, software, and firmware 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 (EOL), End-of-Service (EOS), 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.

Program Plans FY 2011 – Performance Output Goals
- Perform engineering analysis for software, hardware, and firmware components that have been identified through the ECG STEP and Operational Analysis (OA) process for consideration for a technical refresh.
- Procure technical refresh items for engineering studies and test.

Program Plans FY 2012-2015 – Performance Output Goals
- Deploy software, hardware and firmware changes nationally.
- Deploy software changes in support of ERAM and other emerging programs at all ARTCC's.
- Identify opportunities for purposeful evolution.
- Continue to monitor and assess ECG operations to ensure that all approved changes to the ECG system either software, hardware, or firmware have no adverse impact on the NAS.

2A03, NEXT GENERATION WEATHER RADAR (NEXRAD)
FY 2011 Request $6.7M

- NEXRAD – Legacy, Icing & Hail Algorithms (NLIHA), 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 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.

The NWS awarded a $43M contract in 2007 to acquire a dual polarization capability for the full complement of NEXRADs. Through NEXRAD product improvements FAA will 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.

The NEXRAD Legacy, Icing, and Hail Algorithm (NLIHA) Program (CIP Project W02.02-01) has two main purposes:

1. Along with the Department of Commerce (DOC) and the U. S. Air Force (DoD), the FAA will continue providing support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). In addition to annual cost-share requirements for NEXRAD Product Improvements Science, Evolution and NWS infrastructure support, the Tri-Agency team is currently acquiring a Dual Polarization capability for the NEXRAD platform via a five-year contract that is managed by the NWS. Each year, the FAA is required to pay its pro-rata share of Dual Pol acquisition costs, along with allocated Tech Refresh costs.
2. In parallel with the acquisition of dual polarization technology for their NEXRAD platforms, the FAA will continue its investment into the development of FAA-specific algorithms that will be used to discern and display in real time, incidences of in-flight icing and hail.

The NEXRAD Tech Refresh Program (CIP Project W02.02-02) will begin in FY 2014, immediately following the conclusion of the NLIHA program. This program will continue to meet the FAA's cost share requirements for NEXRAD under the terms of the aforementioned MOA. These include annual costs for NEXRAD Product Improvements Science Evolution and NWS infrastructure support, plus assigned costs to procure and implement hardware Tech Refresh elements onto the twelve FAA-owned NEXRAD platforms.

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.

Program Plans FY 2011 – Performance Output Goals

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (1 yr).
- Provide funding to the DOC/NWS (Lead Agency) to procure NEXRAD Dual Polarization Hardware for remaining 7 of 12 (100%) FAA NEXRAD Platforms.
- Complete development of In-flight Icing and Hail Detection algorithms.
- Implement Dual Polarization hardware and software modifications onto 5 of 12 (42%) FAA NEXRAD Platforms procured in FY 2010.

Program Plans FY 2012-2015 – Performance Output Goals

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (4 yrs).
- Implement Dual Polarization hardware and software modifications onto the 7 of 12 (100%) remaining FAA NEXRAD Platforms in FY 2012.
- Implement FAA-developed Icing and Hail detection algorithms onto all NEXRAD platforms in FY 2013.
- Support roll-out of operationally suitable in-flight icing dissemination capabilities onto existing FAA display platforms (FY 2013 – FY 2015).

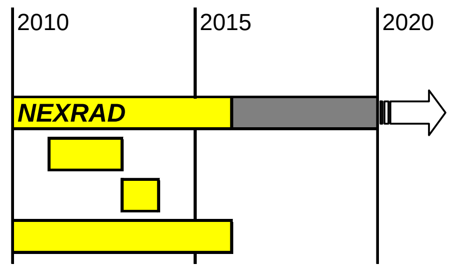
System implementation schedule

Next Generation Weather Radar (NEXRAD)

Dual Pol Upgrade : 2011--2012

Legacy, Icing & Hail Algorithms (NLIHA) : 2013

Tech Refresh : 2010--2015



2A04, AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER (ATCSCC) RELOCATION

FY 2011 Request $2.1M

- ATCSCC – Relocation, F28.01-01

Program Description

The Air Traffic Control System Command Center (ATCSCC) Relocation program will plan and finance the relocation of the command center from its present location in Herndon, VA. For the past sixteen 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 is set to expire in May 2011. The FAA must have a permanent location for this critical NAS function that continues to meet and stay ahead of evolving FAA security standards. In addition, there are 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 these new TFM equipment deployments.

The new facility construction is currently on schedule. The building will be completed by the 2nd Quarter of FY 2010. The Partial Building Occupancy Date is set for May 3, 2010. Full Building Occupancy Date will be on July 1, 2010.

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 4 – 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;
  - 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, cable and utility systems. The FAA will achieve cost avoidance benefits projected at $121.4 million from fiscal year 2011 through 2031.

Program Plans FY 2011 – Performance Output Goals

- Complete Installation and Checkout at new ATCSCC (January 2011).
- ATCSCC Facility Commissioning (March 2011).
- Begin disposing of Equipment/Property at leased ATCSCC Facility (April 2011).
- Initiate planning for Telco costs (July 2011).

Program Plans FY 2012-2015 – Performance Output Goals

- Final Disposition of Equipment/Property at leased ATCSCC facility (April 2012).
- Telco cost activities baselined and execution started (July 2012).

2A05, ARTCC Building Improvements/Plant Improvements

FY 2011 Request $36.9M

- 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 upgrading 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 space requirements for new air traffic control equipment. It also renovates and upgrades en route center infrastructure 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 projects, such as electrical wiring, heating and ventilation systems, reduces the chances of outages, which can cause air traffic delays.

Program Plans FY 2011 – Performance Output Goals

- Fund Combination M-1/Automation Wing Rehabilitation Build out Phase II project at Memphis.
- Fund Automation Wing Abatement, Demolition and Construction project at Atlanta.
- Fund Automation Wing Rehabilitation Build out Phase II project at Albuquerque.
- Provide $400,000 per ARTCC for mission critical failure mode mitigation, repairs and upgrades.
- Conduct facility condition assessments at five ARTCCs.
- Update the national Facility Condition Assessment database.

Program Plans FY 2012-2015 – Performance Output Goals

- Fund Host/Control Wing Basement projects at New York, Indianapolis, Salt Lake, Leesburg, Houston, Kansas City Oakland, Chicago, Boston, Memphis, Cleveland, Los Angeles, Atlanta, Denver, Seattle, and Fort Worth.
- Chillers replacement project at San Juan.
- Provide $400,000 per year per ARTCC for critical mission failure mode mitigations, repairs and upgrades.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

2A06, AIR TRAFFIC MANAGEMENT (ATM)

FY 2011 Request $16.5M

- TFM Infrastructure – Infrastructure Modernization, A05.01-06
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1, A05.01-10

BLI 2A16 – Collaborative Air Traffic Management Technologies (CATMT)

- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G5A.05-01
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G5A.05-02

Program Write ups for 2A16 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 dynamically balance growing flight demands with NAS capacity. The FAA uses the information from this system to collaborate with aviation customers to develop and implement airspace management 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 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 Ground Delay Program 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); and
- Collaborative Information Exchange (CIX), Manages information exchange between the TFM system and external systems through software interfaces.

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 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.

Program Plans FY 2011 – Performance Output Goals

- Close out of WP 1 activities.

Program Plans FY 2012-2015 – Performance Output Goals

- Deploy CATMT WP 2 performance enhancements.

System Implementation Schedule

Traffic Flow Management - Infrastructure Modernization (TFM-M)

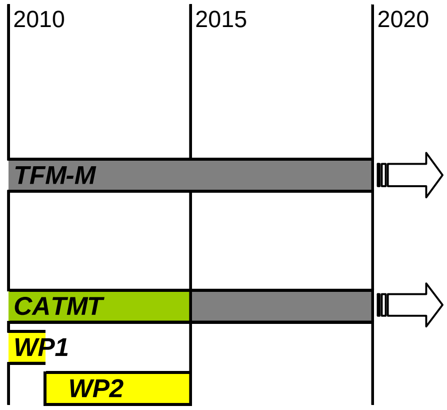
First Operational Capability (OC): 2005 -- Last OC: Sept 2010

Collaborative Air Traffic Management Technologies (CATMT) Work Packages 1 and 2

First OC: June 2008 -- Last OC: 2014

WP1 First Software Enhancement: 2006 -- Last: 2010

WP2 First Software Enhancement: 2011 -- Last: 2014



2A07, AIR/GROUND COMMUNICATIONS INFRASTRUCTURE
FY 2011 Request $7.6M

- 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 A/G 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

CFE and RCE projects enable additional capacity by providing new communications sites to conform to new air traffic patterns. These projects also reduce the number of outages by replacing aging and increasingly unreliable communications equipment with modern equipment. In addition, CFE and RCE improves and provides upgrades needed at A/G Communication sites and facilities.

Program Plans FY 2011 – Performance Output Goals

- Service Available (Establish/Replace/Upgrade) for four (4) CFE sites.
- Complete investment analysis for new RCE procurement.

Program Plans FY 2012-2015 – Performance Output Goals

- Provide support to 20 ARTCC CFE critical sites.
- Install RCE units for sustainment as required.

2A08, AIR TRAFFIC CONTROL EN ROUTE RADAR FACILITIES IMPROVEMENTS
FY 2011 Request $5.3M

- LRR Improvements – Infrastructure Upgrades/Sustain, S04.02-03

Program Description

The Long Range Radar (LRR) Infrastructure Upgrades program sustains and upgrades the radar facilities that provide aircraft position information to FAA En Route control centers and to other users (e.g., Department of Defense and Homeland Security). These planned upgrades also support the installation and lifecycle maintenance 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. These facilities have reached their design life. They are in unsatisfactory condition and require upgrades. Some En Route secondary radar service outages were due to leaking roofs and antiquated air conditioning systems. Major projects include upgrades to the antenna drive systems and facility infrastructure, such as power panels; engine generators; environmental control systems; electrical systems; and lightning protection, grounding, bonding, and shielding (LPGBS).

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, lightning protection, grounding, bonding, and shielding systems, and structural upgrades to support Air Traffic Control Beacon Interrogator model 6 (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 assessment is completed.

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 LRR program supports the FAA's Greater Capacity Goal by providing renovation of existing FAA-owned surveillance facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance equipment. Repairs, improvements, and modernization to existing infrastructure will enable facilities to meet current operational, environmental, and safety needs economically, extend the service life of facilities, and reduce the chance of outages that cause air traffic delays. Infrastructure failure will result in surveillance equipment failures directly reducing the capacity of the NAS.

Program Plans FY 2011 – Performance Output Goals

- Upgrade LPGBS in accordance with FAA-STD-19E at ten (10) sites.
- Prioritize infrastructure sustainment using the LRR project priority system.
- Upgrade the existing Heating, Ventilation, and Air Conditioning (HVAC) systems and Uninterruptible Power Sources (UPS) at two (2) sites.
- Continue Phase II – Long-term upgrades to facility infrastructure at eight (8) sites.
- Mitigate assessment deficiencies found at Air Route Surveillance Radar (ARSR) Model 3 and 4 sites.

Program Plans FY 2012-2015 – Performance Output Goals

- Continue Phase II – Long Term Upgrades to Facility Infrastructure at ten (10) sites per year and a total of 44 sites to completion.
- Perform site condition assessments on ARSR Model 1s and 2 & Air Force long-range radars (FPS) at 15 sites per year.
- Prioritize and continue to manage upgrades identified by the condition assessments.
- Upgrade the existing HVAC systems and UPSs at two (2) sites per year.

2A09, VOICE SWITCHING AND CONTROL SYSTEM (VSCS)

FY 2011 Request $15.6M

- Voice Switching and Control System (VSCS) – Tech Refresh – Phase 2, C01.02-03

Program Description

The Voice Switching and Control System (VSCS) controls the switching mechanisms that allows controllers to select the communication channel they need to communicate with pilots, other controllers, other air traffic facilities, and commercial telephone contacts. It is essential that controllers be able to select the proper channel so they can communicate with pilots, coordinate with other controllers and/or contact emergency services as necessary. These large switches handle communication connections for 40 to 60 active air traffic control workstations at each en route center.

The VSCS Technology Refresh program will replace and upgrade hardware and software components for the voice switching systems in all 21 en route 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.

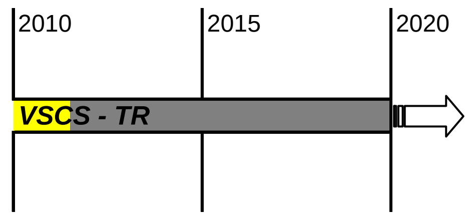
Program Plans FY 2011 – Performance Output Goals
- Continue PECO Inc. power supply redesign.
- Continue Repeater/LAN modification.
- Continue PLM to C software conversion for ground-to-ground (G/G) Switch, VSCS Common Equipment and initiate conversion for A/G Switch.
- Continue modification of the Training and Backup System (VTABS) Test Controller.
- Continue development of replacement depot test equipment.
- Continue Power Supply refurbishment.
- Enhance technician's diagnostic capabilities.

Program Plans FY 2012-2015 – 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)



2A10, OCEANIC AUTOMATION SYSTEM
FY 2011 Request $4.0M

- 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. Now that ATOP is in operational use, the program office is gathering and documenting performance data and metrics to measure productivity, efficiency, user satisfaction, and project future system benefits.

A planned technology refresh for the automation system is nearing completion for all three operational sites and the system installed at the William J, Hughes Technical Center (WJHTC). This technology refresh activity will increase system performance, capacity, and usability, and will make improvements to software functionality. The ATOP program will continue to deliver Preplanned Product Improvements through FY 2014 to enhance safety, provide operational efficiency improvements, and support FAA and International Civil Aviation Organization (ICAO) mandated system changes.

ATOP allows the FAA to reduce the use of the difficult communications systems and the intensively manual processes that limited controller flexibility in handling airline requests for more efficient tracks over long oceanic routes. The program provides automated displays, 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. The system performance data has been analyzed, a baseline has been established, and a fuel savings performance model has been developed. Further development of the fuel burn model through the use of a comprehensive oceanic analysis, simulation and modeling capability, will be used to further measure 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 allows 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 enables 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 provides space for additional routes between current locations or new direct markets. Reduced longitudinal (nose-to-tail) separation provides more opportunities to add flights without delays (e.g., climbs, descents, reroutes, or speed penalties). By reducing the potential for delays (i.e. increasing the number of available routes, increasing airspace capacity, enhancing the interfacility coordination of air traffic, reducing flight times, etc.), ATOP facilitates an increase in the on-time performance of scheduled air carriers.

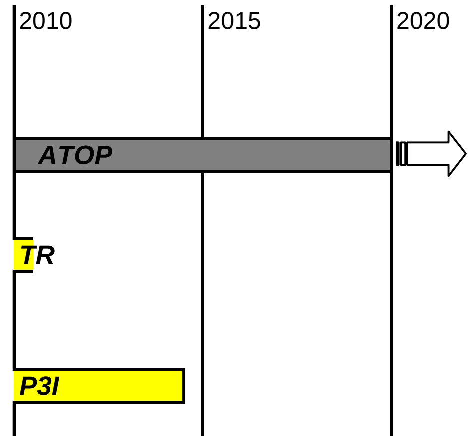
Program Plans FY 2011 – Performance Output Goals

- Complete hardware/software technology refresh cycle to all sites.
- Integrate information from radar sensors to procedural ATOP sectors at New York and Oakland Centers.
- Transfer Bermuda airspace from New York ERAM to New York ATOP.
- Complete Phase B of facility modifications at Oakland Center.
- Support transition between original ATOP contract and new follow on ATOP contract in FY 2011 (Follow-on contract required to support facilities and equipment (F&E) system enhancements through FY2014 and Ops baseline elements through 2017).
- Continue quarterly software releases of Preplanned Product Improvements (P3I) to ATOP sites, including software changes that increase the overall system functionality and usability.

Program Plans FY 2012-2015 – Performance Output Goals

- 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

ATOP Tech Refresh (TR)

First site Acceptance: February 2009
Last site Acceptance: February 2010

ATOP P3I

First Release: February 2006
Last Release: February 2015

2A11 Next Generation VHF Air-to-Ground Communications System (NEXCOM)

FY 2011 Request $49.9M

- 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 2 will be prepared for a JRC Decision in the December 2009 to January 2010 timeframe.

Segment 1a will replace all en route radios with Multimode Digital Radios (MDRs) by the end of FY 2013. The first installation was in 2004. The program has been designed for growth and flexibility. Segment 2 will implement new radios that will service the high-density terminal areas and the flight service operations from FY 2010 to FY 2022. The NEXCOM procurement for Segment 2 will have a combined contract to deliver Very High Frequency (VHF) radios for civil aviation and Ultrahigh Frequency (UHF) radios for military aviation. 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. 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 or it could provide the link directly. To support another NexGen program (NAS Voice systems (NVS)) voice over Internet Protocol (VOIP) will be integrated into these new radios.

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. Replacement of existing radios avoids outages that decrease capacity.

Program Plans FY 2011 – 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 assuming Segment 2 is approved by 2011.

Program Plans FY 2012-2015 – Performance Output Goals

- Segment 1a: Install 1,700 additional MDRs in En Route facilities by September 30, 2013.
- Segment 2: Continue procurement and implementation of new VHF and UHF radios.
- Segment 2: Procure 4,800 MDRs and install 2380 in the high-density terminal areas and the flight service operations.
- Segment 2: Evaluate future plans for purchasing new radios and Tranceivers.

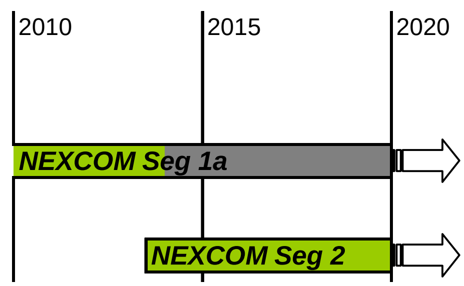
System Implementation Schedule

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: Augeust 2024



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

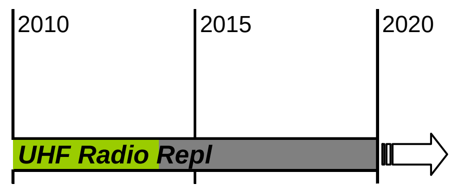
This UHF radio replacement program replaces communications infrastructure used for communicating with military aircraft. It will reduce the number of outages and enhance communications capacity by replacing aging and increasingly unreliable communications equipment with modern equipment. This program also improves and upgrades associated sites and facilities.

Program Plans FY 2011 – Performance Output Goals
- Procure and install 1,582 UHF Radios.

Program Plans FY 2012-2015 – Performance Output Goals
- Transition program to NEXCOM Segment 2.

System Implementation Schedule

Communications Facilities Enhancement – Ultra High Frequency (UHF) Radio Replacement
First ORD: June 2004 -- Last ORD: September 2013



2A12, SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM)
FY 2011 Request $92.0M

- System Wide Information Management (SWIM) – Segment 1, G5C.01-01
- System Wide Information Management (SWIM) – Segment 2, G5C.01-04

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.

SWIM will reduce the number and types of unique interfaces, reduce 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 4 – 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;
  - 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 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, which will reduce 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 the risk for using inconsistent information) and will facilitate information-sharing internal and external to the FAA. SWIM will provide standards/guidance to publish data, retrieve it, secure its integrity, and control its access and use to NAS programs that provide the capabilities that comprise Segment 1. The implementing programs (En Route Automation Modernization (ERAM), Traffic Flow Management Systems (TFMS), Corridor Integrated Weather System (CIWS), National Airspace System Resources (NASR), Special use Airspace Management System (SAMS), Terminal Data Distribution System (TDDS), Weather Message Switching Center Replacement (WMSCR), and Integrated Terminal Weather System (ITWS)) will host the SWIM-provided core services commercial software as part of their planned future releases, and will develop application software to interface to the core services software to implement the SWIM capabilities.

Program Performance Target – Reduce cost for developing an application-to-application interface by an additional 5% over FY2010 cost.

Program Plans FY 2011 – Performance Output Goals

- Begin deployment of Integrated Terminal Weather System Publication capability.

Program Plans FY 2012-2015 – Performance Output Goals

- Achieve initial standardized SWIM segment 1 capability in traffic flow and flight management between the TFMS and ERAM.
  - FY 2014: TFM Runway Visual Range (RVR) capability key site test.
  - FY 2015: Phase 4 ERAM capability key site test.

2A13, AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) – NATIONAL AIRSPACE SYSTEM (NAS) WIDE IMPLEMENTATION

FY 2011 Request $176.1M

- Automatic Dependent Surveillance Broadcast (ADS-B) NAS-Wide Implementation – Segments 1 and 2, G2S.01-01
- X, Automatic Dependent Surveillance Broadcast (ADS-B) – Future Segment, G2S.01-02

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. The frequencies utilized by all 3 of the broadcast services will be 1090 Mhz and 978 Mhz (Universal Access Transceiver (UAT)). The minimum operating performance standards that govern the aircraft avionics are DO-260B for 1090 MHz and DO-282B for 978 MHz.

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 inertial 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 multifunction 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.

Below are additional services provided as part of the ADS-B system implementation:

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; 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.

The ADS-B NAS-Wide Implementation: Future Segment covers service fees to pay for ADS-B infrastructure owned and operated by the prime contractor, continued implementation of Multilateration activities at airports, and continued future application 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 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.

Program Plans FY 2011 – Performance Output Goals

- Continue NAS-Wide deployment of ADS-B, TIS-B and FIS-B.
- Commission weather and communications at 25 airports in Alaska.
- Continue Future Applications Development.

Program Plans FY 2012-2015 – Performance Output Goals

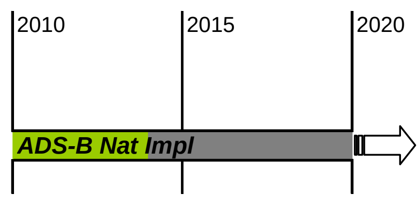
- Complete NAS-Wide deployment of ADS-B, TIS-B and FIS-B.
- Commission ASDE-X at 9 ASDE Sites.
- Commission upgrade of ASDE-X Multilateration to DO-260B (1090) and DO-282B (UAT) compliance.
- Continue Future Applications Development.
- Develop plan for removal of legacy surveillance systems.
- Achieve Initial Operating Capability (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



2A14, Windshear Detection Services

FY 2011 Request $1.0M

- Windshear Detection Services, W05.03-01

Program Description

Wind Shear Detection Services (WSDS) program uses a portfolio approach to windshear detection service. WSDS encompasses a family of wind shear technologies currently present within the NAS; which are the Weather Systems Processor (WSP), Terminal Doppler Weather Radar (TDWR), Low Level Wind Shear Alert System (LLWAS) and Light Detection and Ranging (LIDAR). The goal of WSDS is to maintain existing windshear detection performance levels, optimize windshear detection through modernization and rightsizing and become net-centric. The FY 2011 funds will be used to continue development of the WSDS business case through Final Investment Decision (FID) scheduled for FY 2012. The business case will accomplish several objectives. It will analyze alternatives to address pressing LLWAS supportability and obsolescence issues required to maintain LLWAS performance levels. Other technologies such as LIDAR will be analyzed to determine if they can add new capability, or supplement existing systems in detecting wind shear. WSP, TDWR and NEXRAD will also be analyzed to determine if benefits can be realized by unprotected or underprotected sites by leveraging these existing systems and technologies, to provided windshear detection.

Additionally, replacing old systems and adding new capabilities for existing runways, requires that the FAA examine the numbers and types of systems needed to serve new runways that qualify for windshear detection service. The business case will 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 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, TDWR, and WSP generate windshear alerts and warnings during the most critical phase of flight under tower control. New Technology such as LIDAR, and modified NEXRAD systems can contribute to maintaining, and optimizing windshear detection service.

Program Plan FY 2011 – Performance Output Goals

- Initiate business case alternatives and tech refresh activities.

Program Plan FY 2012-2015 – Performance Output Goals

- If funding becomes available tech refresh activities will continue.

2A15, WEATHER AND RADAR PROCESSOR (WARP)
FY 2011 Request $2.1M

- Weather and Radar Processor (WARP) – WARP Sustain, W04.03-01

Program Description

The Weather and Radar Processor (WARP) system addresses the need to provide accurate, reliable, current 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 sustain safe and efficient air travel. The WARP Program provides accurate weather data to critical NAS systems such as the En Route Automation Modernization (ERAM) and Advanced Technologies and Oceanic Procedures (ATOP). The current WARP system:

- Processes weather radar data so it can be integrated and portrayed on air-traffic controllers' displays,
- Provides access to radar mosaics and other key weather information for Area Supervisors and Traffic Management Personnel,
- Accepts data from advanced weather sensors,
- Plots and processes forecasted upper air wind and temperature gridded data, and
- Provides weather data to other NAS systems.

WARP Benefits include:

- Reduced delays and the resulting savings in passenger time and airline direct operating costs;
- Increased safety due to weather advisories that improve pilot awareness of adverse weather conditions and help aircraft without onboard radar avoid accidents in convective weather;
- Decreased need for deviations which result from more precise information about severe weather; and
- Cost Avoidance that result from the elimination of commercial weather service.

The system became fully operational in December 2002 and provides weather information on controller displays. The WARP Maintenance and Sustainment Services (WMSS) Contract was awarded in April 2005. WARP systems are operational at all 21 ARTCCs and at the ATCSCC, and 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. The WMSS contract continues the upgrading of hardware and software necessary to keep this system operational.

Due to the WARP Program's aging hardware and software infrastructure (unsupported operating system and hardware 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 at FAA's en route and oceanic centers (ARTCCs).

Some current activities include data format changes and selectable layer for improved stratification of weather information. Data format adaptation changes are associated with the weather information WARP acquires through its interfaces. WARP's interfaces to the Weather Message Switching Center Replacement (WMSCR) and Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) systems are transitioned from the National Airspace Data Interchange Network II to the FAA Telecommunications Infrastructure (FTI). This task also incorporates National Weather Service (NWS) changes of gridded model data from GRIB1 to GRIB2 (bit-oriented data exchange format). This task ensures WARP doesn't lose weather information for air traffic operations due to a format change and removes WARP as a risk in National Airspace Data Interchange Network (NADIN) II being decommissioned. The selectable layer task will continue addressing the stratification of weather information on controller's displays. It will provide weather information that is better correlated with the altitude responsibilities of a controller's sector, and the weather information will have a greater granularity (e.g. 1,000 ft. increments. This task will reduce controller workload by eliminating the need to report weather information which is not applicable to aircraft at its altitudes.

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

Accurate weather information presented in an integrated manner in the En route environment gives air traffic controllers a comprehensive picture of where aircraft can safely fly while making the most efficient use of airspace. Sustainment of WARP is required in order to meet the 0.9996 system availability specified for the WARP system.

Program Plans FY 2011 – Performance Output Goals

- Continue WMSS activities.
- Start NADIN II interface(s) transition from NADIN II to FTI.
- Start data format adaptation activities.
- Continue removal of Commercial Weather Service.
- Start selectable layer for improved stratification activities.
- Address hardware refresh for obsolete subsystems.

Program Plans FY 2012-2015 – Performance Output Goals

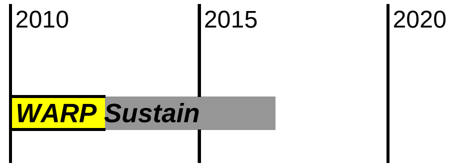
- Continue WMSS activities.
- Complete data format adaptation activities.
- Complete removal of Commercial Weather Service.
- Complete selectable layer for improved stratification activities.
- Complete NADIN II interface(s) transition from NADIN II to FTI.

- Complete development and Implementation for WINS development to satisfy the NextGen Network Enabled Weather (NNEW) 4-D Weather Data Cube strategy of providing weather information suitable for Decision Support Systems Integration as a Single Authoritative Source using standardized formats and access methods.
- Integrate WARP Radar Acquisition and Mosaic Processor into the NextGen Weather Processor (NWP).
- WARP subsystems not subsumed by the NextGen Weather Portfolio will begin decommissioning.

System Implementation Schedule

WARP Sustain

First site ORD: Post 2009 EC/JRC -- Last site ORD: July 2012



2A16, COLLABORATIVE AIR TRAFFIC MANAGEMENT TECHNOLOGIES (CATMT)

FY 2011 Request $35.9M

- 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

Program Write ups for CATMT WP2, WP3, and WP4 are combined with BLI 2A06 Air Traffic Management (ATM)

2A17, EN ROUTE AUTOMATION MODERNIZATION (ERAM) – POST RELEASE 3

FY 2011 Request $5.0M

- En Route Automation Modernization (ERAM) – Post R-3, A01.10-04

Program Description

The En Route Automation Modernization (ERAM) Post (software) Release 3 ("ERAM Post R3") Work Package effort appears on the NAS automation roadmap between the "ERAM Program Baseline" and the future evolutionary enhancements of the "En Route Automation NextGen Mid-Term Work Package".

The ERAM Post R3 effort will continue to improve on the increased efficiency and capacity benefits established by the baseline ERAM program, while also building the foundation for NextGen as those technologies mature in the ERAM Post R3 timeframe.

The baseline ERAM program has four segments: Enhanced Backup Surveillance (EBUS), En Route Information Display System (ERIDS), ERAM Release 1, and ERAM Releases 2 and 3. The first segment, EBUS was completed during FY2006. The second, ERIDS, was completed in FY2008.

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. ERAM Release 1 national deployment began in FY 2009 and concludes in FY2011.

ERAM Releases 2 and 3 contain maintenance upgrade software releases, that are required for ERAM maintenance and will include incremental functional enhancements to ERAM Release 1. Notably, Releases 2 and 3 will also begin to incorporate NextGen transformational program infrastructure into ERAM including ADS-B and Segment 1 of SWIM.

These ERAM Post R3 efforts will include:

1. Implementation of ERAM "extensible" requirements not completed in Release 2 or Release 3. ERAM extensible requirements are a necessary set of functional capabilities and performance enhancements required to

harness ERAM's full potential for operational effectiveness. These requirements may complement NextGen initiatives, but are also uniquely critical to ERAM and are not contingent on the maturing of external NextGen concepts.

2. The implementation of mature NextGen requirements into ERAM, and/or building the specific ERAM application(s) from NextGen infrastructure. These are mature NextGen requirements whose pre-implementation efforts (such as generating concept of operations, concepts of use, requirements analyses, business case development, prototyping, human-in-the-loop simulations, infrastructure implementation etc.) are complete and whose pre-implementation efforts were provided by NextGen capital funding.

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 ERAM Post R3 effort will continue to improve on the increased efficiency and capacity benefits established by the baseline ERAM program. These benefits will be captured in the Business Case Analysis Report which will form a part of the analysis required for a JRC decision targeted for May 2010.

Program Plans – Performance Output Goals

FY 2011:
- Pre-coding and pre-implementation activities such as system engineering analysis, definition, and allocation to lower level specifications.

FY 2012:
- Release 4 coding: Flight Management Computer Offset, Trajectory enhancements, Pre-probed Menus, and begin D-side enhancements.

FY 2013:
- Release 5 coding: Common Status and Structure Data (CSSD), R-side conflict probe, Trajectory enhancements, Digital and ICAO Notice to Airmen (NOTAM) processing, complete D-side redesign.
- Release 4 Test and Implementation.

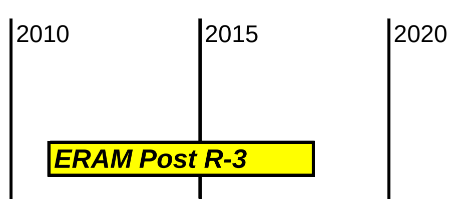
FY 2014:
- Release 6 coding: Pointout enhancements, Handoff enhancements, problem analysis capabilities, and software development environment modernization.
- Release 5 Test and Implementation.

FY 2015:
- Release 7 coding: Automated replan capability, weather data enhancements.
- Release 6 Test and Implementation.

System Implementation Schedule

En Route Automation Modernization (ERAM) – Post R-3

Start Post R-3 Activities 2011 -- Complete Activities 2017



B. TERMINAL PROGRAMS

2B01, AIRPORT SURFACE DETECTION EQUIPMENT – MODEL X (ASDE-X)
FY 2011 Request $4.2M

- 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 January 20, 2010, ASDE-X systems are operational at 27 airports. The ASDE-X Program is concentrating all efforts on meeting the FAA's 2007 commitment to accelerate the deployment of ASDE-X to 2010 instead of the planned 2011. Three of the remaining 8 ASDE-X system deployments are not included in the accelerated schedule. The LaGuardia and Memphis ASDE-X schedules are dependent on their new airport traffic control tower completion dates. The Las Vegas ASDE-X schedule was changed due to their plans to build a new airport traffic control tower. The FAA is now implementing an ASDE-X surface movement radar on a remote tower at Las Vegas.

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 2013. Planning for the Tech Refresh will be funded 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 to 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.

Program Plans – Performance Output Goals
FY 2011:
- 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.

FY 2012:
- Complete tech refresh analysis.

FY 2013:
- Begin tech refresh effort.

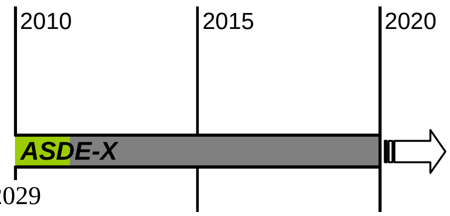
FY 2014 – FY 2015:
- Continue tech refresh effort.

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 2011 Request $8.6M

- 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 zones. 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 assemblies 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 assemblies 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 2015. Subsequent phases of the SLEP 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). The TDWR detects weather hazards near airports so pilots can be informed about the weather they will encounter as they land or takeoff.

Program Plans – Performance Output Goals

FY 2011:

- Modify 12 more sites with Radar Data Acquisition (RDA) mod kits.
- Modify the last four (4) sites with new elevation bearings and lube stations for the antennas.
- Procure the brushless antenna motor drive systems and the transmitter sustainment mod kits.
- Procure first article for the Radar Product Generator (RPG) computer tech refresh and rehost its software.
- Install the RPG uninterruptible power system (UPS) at 15 sites.
- Replace the air conditioners at 20 more sites and install 15 new radomes.

FY 2012:

- Modify 12 more sites with RDA mod kits.
- Modify all 47 sites with transmitter sustainment mod kits.
- Install 14 more antenna motor drive systems and 15 more Radomes.
- Install the RPG UPS at 20 more sites.
- Acquire the production RPG tech refresh computers.
- Acquire the first lot of the production radio-frequency filter amplifier (RFFA) modification kits.
- Complete the installation of new air conditioner systems.

FY 2013:

- Install 14 more antenna drive systems and 15 more radomes.
- Install RDA mod kits at 12 more sites.
- Install the RPG tech refresh computers at 25 sites.
- Acquire the last of the RFFA mod kits and install 30 of them.
- Complete the installation of the RPG UPS units.

FY 2014:

- Install the antenna motor drive systems at 14 more sites.
- Complete the installation of the RDA modification.
- Complete installation of the RPG tech refresh computers.
- Complete the RFFA installations and replace the last radomes.

FY 2015:

- Complete the installation of the antenna motor drive systems at the remaining sites.

System Implementation Schedule

- RDA Retrofit: Complete last modification in FY 2014.
- Elevation Drive Enhancement: Complete last modification in FY 2011.
- Brushless Drive Motors: Complete last modification in FY 2015.

2B03, STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS) (TAMR PHASE 1)

FY 2011 Request $22.0M

- 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 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.

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. At the end of FY 2008, 46 of the 47 baselined STARS sites were operational within the NAS. The final site is still pending completion of a new tower facility scheduled for completion in FY 2010.

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.

Terminal Enhancements 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 and Conflict Alert) 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.

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 overall system availability (software/hardware) 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.

Program Plans FY 2011 – Performance Output Goals

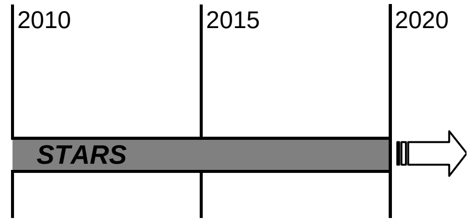
- Continue procurement and initiate installation of system processor procurement.
- Complete qualification of newly discovered end of life hardware items.
- Develop STARS software enhancements to improve system performance, efficiency, ease of use, and support.

Program Plans FY 2012-2015 – 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 2011 Request $20.0M

- 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 TRACON facilities and their associated ATCT throughout the NAS.

TAMR Phase 3 begins planning for the modernization/replacement of automation systems within the terminal domain. 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 sites while monitoring system performance to identify any deterioration in service. Planning and business case development for TAMR Phase 3 began in 2009 with future activities pending an anticipated JRC Final Investment decision 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

By providing state-of-the-art equipment, reliability, maintainability and availability are increased, thereby reducing delays across all Terminal operational facilities.

Program Plans FY 2011 – Performance Output Goals
- Implement Phase 3 JRC decision to address functionality shortfalls at Common ARTS IIE sites as well as STARS/Common ARTS platforms into a single family of platforms.
- Continue the necessary improvements to the automation platforms at critical risk-to-service TRACONs.

Program Plans FY 2012-2015 – Performance Output Goals
- Continue development and implementation of JRC preferred solution.

2B05, TERMINAL AUTOMATION PROGRAM
FY 2011 Request $3.9M

- A, Flight Data Input/Output (FDIO) Replacement, A01.11-01
- B, 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, weather information, safety related data, and other information to air traffic controllers at more than 650 NAS facilities. Controllers input flight data to the Host Computer System (HOST) at ARTCC facilities. The FDIO system electronically retrieves the flight data from the HOST and prints this information on paper strips provided to the controllers at the (TRACON, ATCT, and Radar Approach Control (RAPCON) facilities. This information assists controllers in tracking aircraft and anticipating the arrival of aircraft in the sector under their control. The FDIO system also receives data from the TRACON, ATCT, and RAPCON facilities and relays this data back to the HOST.

The FDIO Replacement program replaces the end-of–life/obsolete FDIO equipment with fully compatible (form/fit/function) 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

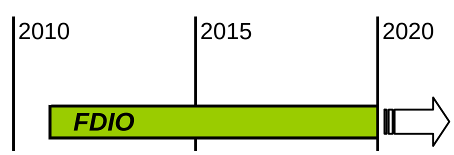
The FDIO program replaces end-of–life, obsolete FDIO equipment with modern COTS equipment, thereby reducing potential outages and delays.

Program Plans FY 2011 – Performance Output Goals
- Procure replacement hardware and software necessary to replace equipment in the field for continued FDIO operation.
- Install replacement hardware and software to replace/modernize end of life/obsolete components in the field for continued FDIO operation.

Program Plans FY 2012-2015 – Performance Output Goals
- Continue procurement of replacement equipment.
- Install replacement hardware and software to replace/modernize end of-life/obsolete components for continued FDIO operation.

System Implementation Schedule

Flight Data Input/Output (FDIO)
First site IOC: February 2011 -- Last site IOC: September 2025



B, Terminal Flight Data Management System, A33.01-01

Program Description

The NAS currently relies on several automated systems in the ATCTs to provide flight data and traffic management tools to air traffic controllers in order to safely manage air traffic. These systems may 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 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 data as well as provide traffic management tools on an integrated display; and, allow controllers to quickly access critical flight information and utilize decision support tools in managing air traffic.

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.

Program Plan FY 2011 – Performance Output Goals

- Conduct an Investment Analysis and develop the business case for conducting an Acquisition.
- Obtain an Initial Investment Decision.

Program Plan FY 2012-2015 – Performance Output Goals

- Complete Investment Analysis and business case development.
- Obtain a Final Investment Decision.
- Award a contract for the design, development, testing, and implementation of the selected solution.
- Complete the design, development, and operational testing of the solution.
- Begin deployment of the solution.

2B06, Terminal Air Traffic Control Facilities – Replace
FY 2011 Request $114.6M

- 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.

Program Plans FY 2011 – Performance Output Goals

- Design starts at four sites (Phase I/II).
- Start construction at one site (Phase III).
- Equipment installation at twelve sites and planned commissioning at four sites (Phase IV/V).

Program Plans FY 2012-2015 – 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 it is advantageous for the FAA to have an airport sponsor construct 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.]

2B07, ATCT/TERMINAL RADAR APPROACH CONTROL (TRACON) FACILITIES – IMPROVE
FY 2011 Request $45.6M

- 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.

Program Plans FY 2011 – Performance Output Goals

- Conduct planning projects (e.g., Life Cycle Assessments, Conditions Assessments, etc.) to determine requirements.
- Initiate an average of 60 new projects to improve, repair, and sustain infrastructure at ATCT/TRACON facilities.
- Conduct analysis on the longer-term plans for facilities.

Program Plans FY 2012-2015 – Performance Output Goals

- Continue facility sustainment, repair, and modernization work within available funding.
- Initiate an average of 60 modernization related projects per year.

2B08, TERMINAL VOICE SWITCH REPLACEMENT (TVSR)
FY 2011 Request $11.5M

- 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 (ATCT) and Terminal Radar Approach Control facilities (TRACON). 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 System at the Air Traffic Control System Command Center (ATCSCC). To date, this program has replaced 398 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

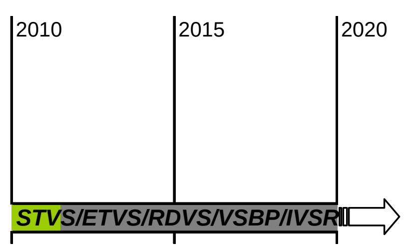
The TVSR program supports the greater capacity goal by improving system reliability of terminal voice communications by replacing aging electronic switches with modern digital equipment. This reduces outages and prevents delays.

Program Plans FY 2011 – 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 2012-2015 – 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 where switches 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 2011 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 programs provide comprehensive ATO-wide environmental, occupational safety and health management initiatives to meet Federal, state, and local legal requirements in addition to negotiated agreements with employees. Environment and 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 policy guidance, technical assistance, employee training, compliance monitoring, and corrective actions, EOSH Services designs and manages national 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.

The Fire Life Safety program manages the implementation of projects to upgrade Airport Traffic Control Towers (ATCTs) and other critical NAS facilities to meet current regulatory and industry standards for employee evacuation and fire suppression consistent with the requirements of negotiated agreements. To date the program has completed projects in more than 150 of the approximately 350 towers requiring upgrades. In addition to physical infrastructure upgrading, the program is responsible for developing policy and guidance, fire prevention and emergency action plans, and for training tower occupants, resident engineers, maintenance technicians, and employees on maintenance requirements for new systems. Effective support and protection of the air traffic control environment is essential to limiting the impacts of fire, explosion, or related events on NAS operations and facilities that also affect the flying public and FAA's employees.

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

- **FAA Strategic Goal 4 – 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:

- Conduct EOSH program management evaluations in each service area using such measures as safety mishap investigation and recordkeeping, safety training, and safety inspections by July 27, 2011.
- Ensure 100% of all ATO workplaces are inspected by September 30, 2011.
- Work with bargaining units to conduct Job Hazard Analysis at remote facilities in each Service Area by September 30, 2011.

Program Plans FY 2011 – Performance Output Goals

- Continue fire life safety upgrades to 20 ATCTs initiated in FY 2010.
- Initiate fire life safety upgrades for 20 ATCTs.
- Continue implementation of the ATO Fall Protection Action Plan.
- Complete the FAA acceptance process for 100% of mold remediation projects identified through the Agency identification process and planned for completion in 2011.
- Continue to conduct arc flash analyses through the Electrical Safety Program.
- Continue to develop and deploy lockout/tagout procedures for ATO facilities and equipment through the Lockout/Tagout Program.

- Continue to conduct job hazard analyses on NAS equipment through the Job Hazard Analysis Program.
- Continue the development and implementation of written safety and environmental programs, and the development and deployment of associated training and guidance.
- Continue to implement the Environmental Management System (EMS) at ATO Service Areas.
- Conduct internal EMS audits and management reviews and report status to Aviation Policy, Planning & Environment (AEE) office.
- Calculate performance baseline(s) developed in FY 2009/2010 and set performance targets established in the EMS.

Program Plans FY 2012-2015 – Performance Output Goals
- Initiate fire life safety upgrades for 80 ATCTs.
- 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 to conduct arc flash analyses through the Electrical Safety Program.
- Continue to develop and deploy lockout/tagout procedures for ATO facilities and equipment through the Lockout/Tagout Program.
- 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 conduct job hazard analyses on NAS equipment through the Job Hazard Analysis Program.
- Continue the development and implementation of written safety and environmental programs, and the development and deployment of associated training and guidance.
- 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) Service Life Extension Program (SLEP)
FY 2011 Request $3.0M

- ASR-9 / Mode S SLEP, Phase 2, S03.01-06
- MODE S SLEP, Phase 2, S03.01-08.

2B21, Mode S SLEP Phase 2, S03.01-08 is also addressed in this BLI write up.

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 for these radars would increase, as well as the mean time to restore service. Modification is also required to implement Internet Protocol (IP) and All Purpose Structured Eurocontrol Surveillance Information Exchange (ASTERIX) data format to support Surveillance Interface Management (SIM) and support other NextGen capabilities.

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 addressed critical, near-term sustainment issues, identified as those elements that represent immediate, serious risk to this service (Phase 1) and identified the next highest set of major impact risks to develop an affordable long-term solution to ensure continued surveillance services at ASR-9/Mode-S sites (Phase 2).

The first phase was further separated into two segments: Segments A and 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, will implement additional modifications to the ASR-9 radar and Mode S systems to sustain primary and secondary surveillance in terminal airspace through 2025. The sustainment of the ASR-9 and Mode S aligns with the National Airspace System Architecture 6, and the Surveillance and Broadcast Services (SBS) Automatic Dependent Surveillance - Broadcast (ADS-B) back-up 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-9 and Mode S programs contribute to the goal of greater capacity by reducing the probability of system outages which would reduce existing airport capacity and diminish the capability to meet future air traffic demands. The ASR-9 and Mode S serve airports with high activity levels and these radars are projected to remain in service until at least 2023. The SLEP projects being performed will address the most critical performance issues in order to improve system reliability and thereby reduce unscheduled outages.

Program Plans FY 2011 – Performance Output Goals

<u>Phase 1B:</u>

- Complete installation of the ASR-9 transmitter modifications at operational sites.

<u>ASR-9/Mode S SLEP, Phase 2:</u>

- Obtain JRC approval for the Initial Investment Decision.
- Begin engineering to address sustainability issues.

Program Plans FY 2012-2015 – Performance Output Goals

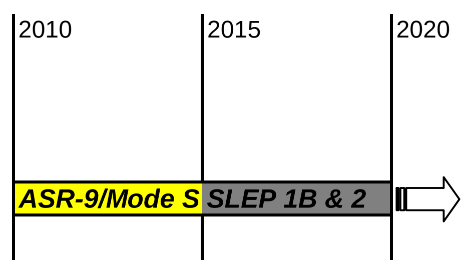
<u>ASR-9/Mode S SLEP, Phase 2:</u>

- Obtain JRC approval for the Final Investment Decision.
- Contract Award for Phase 2 modification kits for testing.

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 ORD: March 2008 -- Last ORD: February 2011
Phase 2: JRC FID planned for December 2011



2B11, TERMINAL DIGITAL RADAR (ASR-11) TECHNOLOGY REFRESH

FY 2011 Request $4.1M

- ASR-11 – Tech Refresh – Segment 1, S03.02-04
- X, ASR-11 – Tech Refresh – Segment 2, S03.02-05

Program Description

The ASR-11 Technology Refresh Segment 1 program replaces and upgrades obsolete ASR-11 Commercial Off-The-Shelf (COTS) hardware and software to ensure the continued reliable operation of the radar system through its designated lifecycle. Segment 1 of the 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.

The Low Overhead Array Processors, which are used in the signal processor cabinet, are 1980's technology and are no longer in production. Current utilization of these processor and memory cards is 80-90%. There is no possibility for expanding the capacity of 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, but the best solution was to replace the existing Signal Data Processor (SDP) with an Advanced Signal Data Processor (ASDP). The ASDP will be installed by the vendor in the production systems that are available in FY 2010 and beyond. Systems already deployed will be retrofitted to provide additional major benefits.

The Tech Refresh Segment 1 provides increased functionality by coupling the ASDP modification with software improvements, and it resolves four ASR-11 program in-service decision open action items which include development of three incremental software builds. The software development is expected to be completed in 2012.

The funding planned for FY 2008 through FY 2015 for Tech Refresh Segment 1 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 ASR-11 system 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 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 Operation and Maintenance (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.

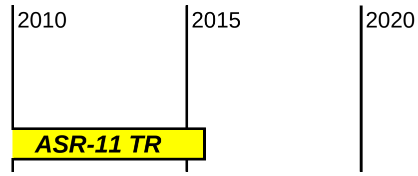
Program Plans FY 2011 – Performance Output Goals
- Procure 15 out of 68 ASDPs.
- Deliver 12 out of 68 ASDPs.
- Install 12 out of 68 ASDPs.

Program Plans FY 2012-2015 – Performance Output Goals
- Procure 12 out of 68 ASDPs.
- Deliver 18 out of 68 ASDPs.
- Install 44 out of 68 ASDPs.

System Implementation Schedule

Airport Surveillance Radar - Model 11 (ASR-11) Tech Refresh

First site Delivery: September 2009 -- Last site Delivery: June 2015



2B12, Precision Runway Monitors (PRM)

FY 2011 Request $1.0M

- Precision Runway Monitor Alternative (PRMA) - Multilateration Technology – Upgrade, S08.01-02

Program Description

The Precision Runway Monitor (PRM) allows simultaneous independent approaches on closely-spaced, parallel runways less than 4300 feet apart. The PRM system is a highly accurate electronic scan (e-scan) radar that tracks and processes aircraft targets at a one second update rate (compared to 4.8 seconds for conventional radars). PRM provides the controllers with automatic alerts and high resolution displays that, in conjunction with specific procedures, enable pilots to fly simultaneous, independent approaches to parallel runways.

In FY 2005, as directed by Congressional language, the use of multilateration technology at the Detroit Wayne County airport was initiated as a replacement for the e-scan system originally planned. This Multilateration system, known as the Precision Runway Monitor-Alternate (PRM-A), will provide accurate position and identification information on transponder-equipped aircraft and surface vehicles by "multilaterating" on signals transmitted by the transponder.

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 PRM-A program supports the FAA goal of greater capacity by allowing more aircraft to land during Instrument Meteorological Conditions and Marginal Visual Meteorological Conditions at airports with closely-spaced parallel runways. Normally, the capacity of an airport to handle arriving aircraft is reduced when visibility is restricted, which results in delays. PRM-A feeds a high resolution display of respective aircraft positions, enabling controllers to ensure that simultaneous independent approaches to closely-spaced parallel runways are safe during low visibility conditions.

Program Plans FY2011 – Performance Output Goals

- Develop a business case to convert the existing e-scan PRM systems to the PRM-A multilateration configuration, with a Final Investment Decision being sought in FY 2010.
- Develop documentation in support of the contract award process for the conversion to PRM-A.
- Develop the final Requirements Document, Statement of Work and Screening Information Request.

Program Plans FY 2012-2015 – Performance Output Goals

- None

2B13, RUNWAY STATUS LIGHTS (RWSL)

FY 2011 Request $55.0M

- Runway Status Lights (RWSL) – Segment 1, S11.01-02

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 (ASDE-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 23 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

Runway incursions are a significant safety issue, and the FAA will continue to give reduction programs a high priority. Additional installations of RWSL will make a significant contribution toward reducing the rate of runway incursions.

Program Plans FY 2011 – Performance Output Goals

- Start construction at 2 of 23 sites.
- Complete remainder of site survey's for a total of 23.
- Finish construction at 6 of 23 sites.
- Complete installation of 5 of 23 operational sites.
- Procure systems for deployment to 4 out of 23 operational sites.
- First Operational Readiness Demonstration (ORD) in FY 2011 and a total of 1 out of 23.

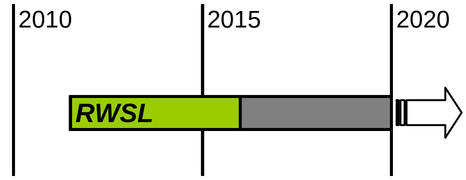
Program Plan FY 2012 -2015 – Performance Output Goals

- Start construction at remaining 15 of 23 sites.
- Procure systems for deployment of the remaining 10 out of 23 operational sites.
- Finish construction at remaining 17 of 23 sites.
- Complete installation at remaining 17 of 23 operational sites.
- Complete ORD of 22 of 23 operational sites.

System Implementation Schedule

Runway Status Lights (RWSL)

First site IOC: August 2011 -- Last site IOC: December 2015



2B14, NATIONAL AIRSPACE SYSTEM VOICE SWITCH (NVS)
FY 2011 Request $30.2M

- 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 replacing obsolete hardware and software and providing an architecture that supports future growth and load-sharing within a flexible network. The NVS program will also improve system reliability by replacing obsolete hardware and software while supporting business continuity planning in the event of short and long-term outage. It will complement data communications in both the terminal and en-route environments to provide a comprehensive communications service.

Program Plans FY 2011 – Performance Output Goals

- Achieve initial Joint Resources Counsel (JRC) decision to proceed with program.
- Release Screening Information Request (SIR) package.

Program Plans FY 2012-2015 – 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.

2B15, VOICE RECORDER REPLACEMENT PROGRAM (VRRP)
FY 2011 Request $9.4M

- 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 ATCT, TRACON facilities, ARTCC, AFSS, and the FAA's ATCSCC. 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.

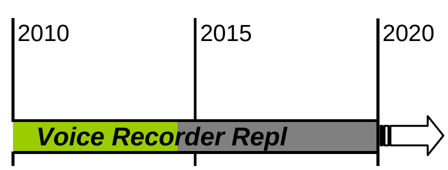
Program Plans FY 2011– Performance Output Goals
- Deliver and install 87 voice recorders.

Program Plans FY 2012-2015 – Performance Output Goals
- Deliver and install 51 voice recorders.

System implementation schedule

Voice Recorder Replacement

First site IOC: 2007 -- Last site IOC: 2014



2B16, INTEGRATED DISPLAY SYSTEM (IDS)
FY 2011 Request $8.7M

- Integrated Display System (IDS) – Replacement, 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

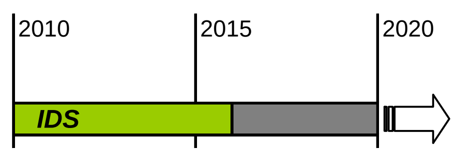
By replacing the legacy IDS-4 systems with state-of-the-art equipment, outages are reduced, thereby reducing delays at the 390 FAA facilities nationwide, including 24 OEP airports.

Program Plans FY 2011 – Performance Output Goals
- Continue production and system installation at 52 operational facilities.

Program Plans FY 2012-2015 – Performance Output Goals
- Complete production.
- Complete system deployment.
- Perform an operational analysis of in-service systems to identify any hardware requiring a technical refresh.
- Develop a solution for any hardware requiring technical refresh; procure necessary components, and begin technical refresh in the field.

System Implementation Schedule

Integrated Display System (IDS)
First site IOC: February 2010 -- Last site IOC: September 2015



2B17, AIRPORT SURVEILLANCE RADAR (ASR-8) SERVICE LIFE EXTENSION PROGRAM (SLEP)
FY 2011 Request $2.6M

- ASR-8 SLEP, S03.05-01

Program Description

The Airport Surveillance Radar, Model-8 (ASR-8) was procured in the mid-1970s and fielded between 1975 and 1980 to provide primary surveillance radar data to air traffic controllers at low and medium activity airports. 41 ASR-8 systems (38 operational systems, 3 support systems) will remain in use in the NAS after the Airport Surveillance Radar Model-11 (ASR-11) program implementation is complete. The NAS Architecture Surveillance

Roadmap retains the ASR-8 systems through the year 2025. The NAS Architecture identifies Automatic Dependent Surveillance-Broadcast (ADS-B) as the primary means of surveillance for the future, but the approved ADS-B backup strategy assumes primary radar services will remain in all terminal areas covered by primary radar today. Having this backup will serve to mitigate the consequences of single-aircraft avionics failures that result from the aircraft's loss of the ADS-B positioning source.

The ASR-8 systems need modifications to contain operating costs and ensure the systems are able to operate reliably within the NAS. The ASR-8 was designed using technology that is now obsolete and some repair parts are no longer available. In addition, the ASR-8 analog data output is incompatible with newer digital air traffic control automation systems. Currently the analog radar data transmitted from 5 ASR-8 systems is converted to digital format to feed existing FAA automation systems. Data from an additional 5 ASR-8 systems is converted to feed the DoD Air Defense Sectors. The current Automation Roadmap indicates that all terminal automation systems will require digital radar input in the future. The Surveillance Roadmap includes a decision point for implementation of Internet Protocol (IP) addressing at radar facilities which will also require digital radar data. The Surveillance Roadmap retains the Secondary Surveillance Radar (SSR) after the requirement to provide digital radar input to the automation systems; this will require digitization of the SSR as well to maintain consistency for primary and secondary target processing.

When consolidated TRACON facilities are established the supporting ASR-8 systems will require a digital target output as well as a 6-level weather output. Providing a digital weather output will allow the agency to meet the recent National Transportation Safety Board (NTSB) recommendation for standardized 4-level weather reporting. The program office is preparing the business case to determine the most cost beneficial SLEP solution to address obsolescence and the new requirements (e.g. 6-level weather). The program expects to receive initial investment approval from the JRC in first quarter of FY 2011.

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 Surveillance Radar Model 8 SLEP program contributes to the FAA's greater capacity goal, specifically, the sustain adjusted operational availability target by extending the life of the equipment and providing radar and weather data in digital format in order to maintain radar service at 38 operational ASR-8 systems in the NAS through 2025.

Program Plans – Performance Output Goals
FY 2011:
- Obtain JRC approval for the Initial Investment Decision.
- Begin engineering to address obsolescence issues.

FY 2012:
- Obtain JRC approval for the Final Investment Decision.
- Contract award for First Article operational and support ASR-8 SLEP equipment (2 of 41 systems) to address new requirements of digital output, IP addressing, and weather.
- Procure initial ASR-8 SLEP modification kits (21 of 41) to address obsolescence.

FY 2013:
- Deliver equipment to address new requirements to key site.
- Complete key site testing.
- Prepare for In-Service Decision and production procurement of equipment for new requirements.
- Procure final ASR-8 SLEP modification kits (18 of 41) to address obsolescence.

FY 2014:

- Achieve ASR-8 SLEP In-Service Decision.
- Execute initial production procurement for equipment to address new requirements (20 of 41 systems).
- Begin installation activities at 9 operational sites and 2 support sites.

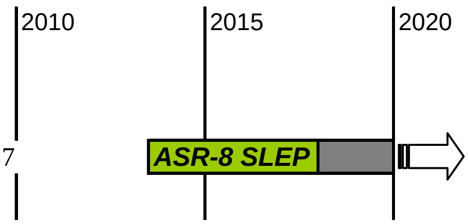
FY 2015:

- Continue implementation at ASR-8 SLEP sites.
- Execute production procurement for remaining 19 of 41 (100%) systems.

System Implementation Schedule

Airport Surveillance Radar - Model 8 (ASR-8) Service Life Extension Program (SLEP)

First site ORD: November 2013 -- Last site ORD: December 2017



2B18, INTEGRATED TERMINAL WEATHER SYSTEM (ITWS)

FY 2011 Request $5.5M

- ITWS – Development/Procurement/Pre-Planned Product Improvement (P3I) – Segments 1,2,3, W07.01-00
- X, ITWS – Technical Refresh and Disposition, W07.01-02

Program Description

The Integrated Terminal Weather System (ITWS) is an air traffic management tool that provides air traffic managers with 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 the current weather and short-term forecasts 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, including system modifications which were originally identified as pre-planned product improvements (P3I) items. The P3I items which have been incorporated into the baseline system to date include: Terminal Convective Weather Forecast, other improvements to ITWS algorithms (e.g. Dry Microburst, Vertically Integrated Liquid), addition of External Users via Volpe Center, support for NEXRAD Open Build enhancements and upgrades, support for TDWR 360 degree scan strategy, development of Low-Level Wind shear Alert System-II (LLWAS-II) Wind Measuring Equipment (WME) interface, and development of Airport Surveillance Radar model 11 (ASR-11) interface. Other major improvements to capabilities and architecture include: the multi-TRACON capability, transition from National Airspace Data Interchange Network (NADIN) to FAA Telecommunications Infrastructure (FTI) for remote Situation Displays, and transition of NEXRAD interfaces to TCP/IP. P3I items which are planned for development and deployment in the near term future include: Development of ITWS that doesn't need input from a Terminal Doppler Weather Radar (TDWR) - the so called "mini-ITWS" in the P3I documentation, the FAA Bulk Weather Telecommunications Gateway higher resolution upgrade from 40km Rapid Update Cycle (RUC) to 13km RUC which is part of the Terminal Winds improvement, and transitioning all remaining NADIN-II connections to FTI. 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).

Technology Refreshment of ITWS will include the periodic replacement of the ITWS Commercial Off-The-Shelf (COTS) system components; e.g., processors, displays, computer operating systems, and commercially available software, to assure continued supportability over the service life of the system. Without technology refreshment, FAA will be unable to provide satisfactory supportability, and it will not be able to interconnect ITWS with systems of other NAS users (airlines, etc.) to permit seamless interoperability.

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.

Program Plans FY 2011 – Performance Output Goals

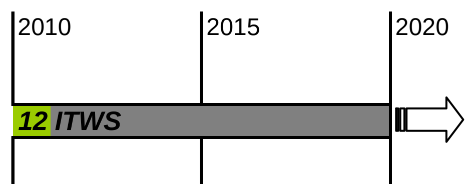
- Complete installation of displays and communications to provide remote service at 10 remaining ITWS secondary/reliever airports out of 16 sites (100%).
- Provide support for recently commissioned systems.
- Continue studies, concept definition demonstrations, and acquisition preparations for NextGen weather system integration and transition of legacy systems into NextGen architectures.
- Continue activities to evolve ITWS telecommunications to SWIM.

Program Plans FY 2012-2015 – Performance Output Goals

- Demonstrate SWIM and NextGen-compatible ITWS capabilities.
- Prepare for and begin tech refresh activities.

System Implementation Schedule

Integrated Terminal Weather System (ITWS)
First ORD: April 2003 -- Last ORD: 2010 (34th Unit)



2B19, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 2)

FY 2011 Request $3.1M

- 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 TRACON facilities and their associated 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 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.

Program Plans FY 2011 – Performance Output Goals

- Initiate contractual activities to begin technology refresh.

Program Plans FY 2012-2015 – Performance Output Goals

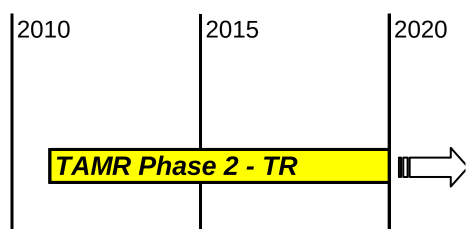
- Complete contractual activities to design/develop solutions for accomplishing a technology refreshment of the terminal system hardware and software.
- Complete design/development of technology refreshment solutions and deploy to all nine sites.
- Technology refreshment will be accomplished in several 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: 2011 -- Last site IOC: 2024*

*Note: Tech Refresh will be cyclical



2B20, REMOTE MAINTENANCE MONITORING

FY 2011 Request $6.5M

- Remote Maintenance and Monitoring System (RMMS) Technology Refreshment, M07.04-01
- X, Remote Monitoring and Logging System (RMLS) Technology Refreshment, M07.04-02

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) (RMM 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 successfully developed a prototype design for RMLS NRN. The prototype design for RMLS NRN will be implemented and deployed starting in FY 2010.

The RMLS technology refresh project covers future technology refreshment activities required to extend the service life of RMLS hardware located at the Operational Control Centers and ARTCCs. Technology refreshment is scheduled to begin in FY 2015.

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.

Program Plans – Performance Output Goals
FY 2011:
- RMLS NRN installed at Southern California TRACON (SCT), Los Angeles Center (ZLA), Oakland Center (ZOA), Denver Center (ZDV) and Salt Lake City Center (ZLC).

FY 2012:
- RMLS NRN installed at Seattle Center (ZSE), Honolulu Center (ZHN), Atlanta Center (ZTL), Boston Center (ZBW), Washington Center (ZDC), New York Center (ZNY), Memphis Center (ZME), Jacksonville Center (ZJX) and Miami Center (ZMA).
- RMLS NRN operational at SCT, ZLA, ZOA, ZDV, ZLC, ZSE, ZHN, ZTL and ZBW.
- Tech refresh RMLS NLN hardware at National Operations Control Center (NOCC) and Pacific Operations Control Center (POCC).
- RMLS NRN Western Service Area Operational May 2012.

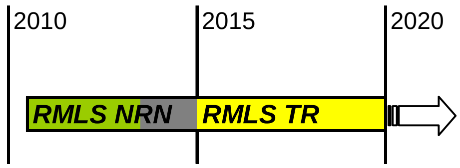
FY 2013:
- RMLS NRN installed at Kansas City Center (ZKC), Houston Center (ZHU), Ft. Worth Center (ZFW), Albuquerque Center (ZAB), Indianapolis Center (ZID), Cleveland Center (ZOB), Chicago Center (ZAU) and Minneapolis Center (ZMP).
- RMLS NRN operational at ZDC, ZNY, ZME, ZJX, ZMA, ZKC, ZHU, ZFW, ZAB, ZID, ZOB, ZAU and ZMP.
- Tech refresh RMLS NLN hardware at Atlantic Operations Control Center (AOCC) and Midstates Operations Control Center (MOCC).
- RMLS NRN Eastern Service Area Operational January 2013.
- RMLS NRN Central Service Area Operational (FOC) March 2013.

FY 2014:
- No activities.

FY 2015:
- Tech refresh RMLS NLN hardware at NOCC and POCC.
- Tech refresh RMLS NRN hardware at POCC and AOCC.

System Implementation Schedule

Remote Monitoring Logging System (RMLS)
RMLS NRN Key Site Operational (IOC): Septemer 2010
RMLS NRN Final Operational Capability: March 2013
RMLS Tech Refresh: FY15 and beyond



2B21, MODE S SERVICE LIFE EXTENSION PROGRAM (SLEP)
FY 2011 Request $1.5M

- MODE S SLEP, Phase 2, S03.01-08.

See program description under BLI 2B10.

C. FLIGHT SERVICE PROGRAMS

2C01, AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)
FY 2011 Request $6.7M

- 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.

Program Plans FY 2011 – Performance Output Goals
<u>Ceilometer:</u>
- Continue deployment (deploy 200 ceilometers).

<u>EPI sensor:</u>
- Complete EPI sensor development and testing.
- Begin procurement (procure 350 EPI sensors).
- Begin deployment (deploy 20 EPI sensors).

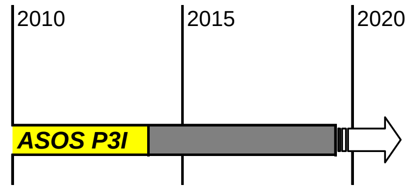
Program Plans FY 2012-2015 – Performance Output Goals
FY 2012:
<u>Ceilometer:</u>
- Complete deployment (deploy last 91 sensors).

<u>EPI sensor:</u>
- Complete EPI sensor procurement (procure 221 EPI sensors).
- Continue deployment (deploy 300 EPI sensors).

FY 2013:
EPI sensor:
- Complete deployment (deploy last 251 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 2011 Request $21.4M

- Alaska Flight Services Modernization, F05.04-01

Program Description

The Alaska Flight Service Modernization (AFSM) program will replace the automation system and the voice switches in the Automated Flight Service Stations (AFSS). It will also modernize the other Flight Service facilities in Alaska, and develop the infrastructure for continuity of operations. Flight Services in Alaska provide pilots with weather graphics, text based weather, and aeronautical information integrated with Notice-to-Airmen (NOTAM), and flight planning databases. A web-portal will make data available to both FAA personnel and pilots, eliminate single point-of-failure, and increase access to Flight Service information, in even the most remote locations. The replacement of voice switches at each of the three AFSSs will increase operational flexibility by allowing frequencies to be shifted to other AFSSs to meet productivity demands. The Flight Service buildings will be updated to meet Occupational Safety and Health Administration (OSHA), and Americans with Disabilities Act (ADA) requirements, and the electrical and safety systems will be upgraded to ensure they meet standards. Due to information security and data integrity issues experienced with the previous automation system which was unique to Alaska, the Operational and Supportability Implementation System (OASIS), is currently being used as the automation system. However, the OASIS contract can only be continued through August 2011, so we must develop a replacement system.

The AFSM program has been segmented into two parts. Segment 1 is Automation and Segment 2 includes the voice switch, Flight Service facilities, and Flight Service delivery. Continuity of operations during natural disasters or other disturbances will be addressed during both segments 1 and 2 through elimination of single-points-of-failure. Segment 1, automation, is underway and the first step is to develop a core set of requirements that must be satisfied before initial implementation, plus additional functional requirements (i.e., web-portal, remote briefing terminals, remote airport advisories) that must be delivered no later than 21 months after contract award.

Segment 2, Flight Service facilities and Flight Service delivery, will analyze facility locations, areas of service demand, conditions of existing facilities and quality of life issues, and identify the most cost effective and efficient means of delivering Flight Services. In particular, segment 2 will examine the following alternatives:
1) Retaining the current facilities;
2) Relocating facilities to best meet customer demand; and
3) Relying on a centralized architecture (with at least 2 facilities to address continuity of operations).

Segment 2 will begin investment analysis process during fiscal year 2010.

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** – 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 AFSM program will directly contribute to the FAA's increased safety goal by increasing the availability and capabilities for providing route and weather briefings and accepting flight plans. The automation and facilities upgrades 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 services and remote briefing terminals. This will increase pilot aeronautical information awareness by giving them access to the same products used by the Flight Service specialists.

Program Plans FY 2011 – Performance Output Goals

- Deliver AFSM system to AFSS (Tier 0).
- Conduct tests of AFSM system at WJHTC (Tier 0).
- Conduct Flight Service Specialist and Technical Operations training for AFSM system (Tier 0).
- Conduct AFSM site acceptance test at key site.
- Plan to achieve Initial Operating Capability (IOC) at key site.
- Plan to complete installation and implementation of AFSM system at all AFSSs.
- Plan to initiate installation and implementation of AFSM at Flight Service Stations.
- Continue sustainment of Alaska Flight Services Facilities.

Program Plans – Performance Output Goals

FY 2012:

- Continue sustainment of Alaska Flight Services Facilities.
- Plan to complete design and development of AFSM system (Tier 1).
- Plan to conduct test of AFSM system (Tier 1) at WJHTC.
- Plan to conduct Flight Service Specialist and Technical Operations training for AFSM system (Tier 1).
- Plan to conduct AFSM system (Tier 1) site acceptance tests at key site.
- Plan conduct of Initial Investment Analysis and preparation of Screening Information Request (SIR) for AFSM Segment 2 (Voice Switch Service delivery).
- Plan delivery of draft OMB Exhibit 300 for AFSM Segment 2.

FY 2013:

- Plan to conduct analysis of Alaska facilities configuration.
- Plan to deliver final OMB Exhibit 300 for AFSM Segment 2.
- Plan to conduct Final Investment Analysis for AFSM Segment 2.
- Plan to award contract for AFSM Segment 2.

FY 2014:

- Plan initial deployment and implementation of AFSM Segment 2.
- Plan Initial Operational Capability for AFSM Voice Switch.
- Plan implementation of updated Flight Services delivery.

FY 2015:

- TBD

2C03, WEATHER CAMERA PROGRAM
FY 2011 Request $3.2M

- Weather Camera Program – Segment 1, M08.31-01
- X, Weather Camera Program – Future segments, M08.31-02

Program Description

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 can result in 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 Weather Camera Program improves safety and efficiency by providing weather visibility information to aviation users that is obtained from near real-time camera images. These images, from airports and strategic en route locations, are provided to pilots and flight service station specialists to enhance 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 –** 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 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 36%, and 2) Improve operator efficiency by reducing unnecessary flight time by 49%.

Program Plans FY 2011 – Performance Output Goals
- 24 new weather camera facilities operational.

Program Plans FY 2012-2015 – 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 2011 Request $5.0M

- Very High Frequency Omni-Directional Range (VOR) Collocated with Tactical Air Navigation (VORTAC), N06.00-00

Program Description

There are over 1,000 VORTACs or VORs with DME currently operating in the United States. These radio aids to navigation help pilots accurately determine their location in all weather conditions. They are used by many pilots as a primary navigation aid, and direct lines between VORs are used to define established air routes. They may be replaced by satellite navigation or other existing systems in the future, but until they are decommissioned, they will be an important aid to navigation and must be maintained.

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 that 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 serve as a backup to satellite navigation and continue to define VOR routes and procedures for legacy users. VORTAC supports the transition to both RNAV and the 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

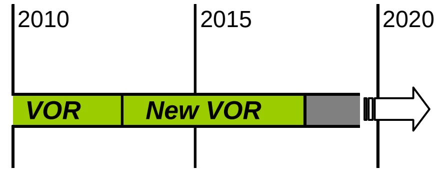
Replacing, relocating, or converting VOR and VORTAC facilities increases NAS system efficiency. These facilities are experiencing signal deterioration due to various environmental factors and parts obsolescence, and they must be sustained to avoid deterioration in operational availability.

Program Plans FY 2011 – Performance Output Goals
- Procure approximately one (1) Doppler Kit
- Convert one (1) VOR system to Doppler VOR.
- Relocate one (1) VOR Antenna System.

Program Plans FY 2012-2015 – Performance Output Goals
- Procure approximately eight (8) Doppler Kits
- Convert approximately eight (8) VOR systems to Doppler VOR.
- Relocate approximately four (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 2011 Request $7.8M

- 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 precipitation 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.

Program Plans FY 2011 – Performance Output Goals
- Procure approximately five (5) ILS Systems.
- Service Available (Establish/Replace/Upgrade) for three (3) ILS locations.
- Service Available (Establish) for two (2) ALSF-2 locations.

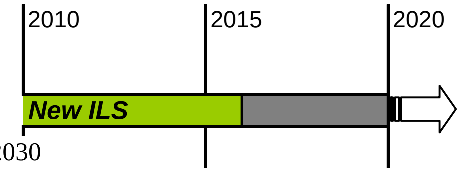
Program Plans FY 2012-2015 – Performance Output Goals
- Procure 37 ILS Systems.
- Service Available (Establish/Replace/Upgrade) for 42 ILS locations.

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 2011 Request $95.0M

- 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 provides precise navigation and landing guidance to equipped aircraft in any weather. WAAS provides coverage to the entire U.S. It also overcomes the limitations ground-based navigation systems that become unusable because of signal blockage by mountainous terrain. WAAS results in safety and capacity improvements in the national airspace and can 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 provides guidance to a runway end. This segment involves development, modernization, technology refresh and enhancement of WAAS

In 2009, WAAS will have two remaining segments:
1) Phase III – Development, Modernization, and Enhancement of WAAS from 2009 – 2013, and
2) Phase IV – Dual Frequency Operations 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 earth orbiting (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,
- Lack of stable vertical guidance for approaches to airports not equipped with ILS, and
- Need to replace aging navigation systems that are expensive to maintain.

WAAS is a critical enabling technology for NextGen and supports the following solution sets: Initiate Trajectory Based Operations, Increase Arrivals/Departures at High Density Airports, and Increase Flexibility in the Terminal Environment.

In addition to hardware and software improvements, the WAAS program is developing 500 LPV/LP procedures per year enabling more efficient aircraft trajectories WAAS will also support the redesign of airspace to establish RNAV T and Q routes. These more direct routes will increase efficiency and capacity to support 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, because there is no radar coverage. The WAAS enabled routes improve operator efficiency, access and safety. This expansion of services supports the solution sets of Initiate Trajectory Based Operations and Increase Flexibility in the Terminal Environment.

WAAS will support the near-term demonstrations/validations of operational improvements for vertical flight aircraft, business/regional jets, and legacy air carriers that are made possible by airspace redesign and WAAS LPV approaches. These projects are tied to NextGen initiatives for the implementation of WAAS navigation and landing services. The business/regional jet portion of the project will develop RNAV/RNP routes to transition from the en route environment to the terminal environment using minimal fuel descent profiles called Optimized Profile Descents (OPDs). The descent profiles can also serve to avoid environmentally sensitive areas. The next phase of this project will be to develop clear air departures and provide for air space separation 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 helicopter traffic from commercial jet traffic and provide 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. They rely on increased training for use of instrument operations and increased use of WAAS technology, and they will also minimize the reliance on ground based infrastructures. Improved approach and departure procedures will help to resolve airspace control issues between airports that are very closely spaced that now require capacity limitations because their operations currently negatively affect each other.

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 equipped aircraft 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 which enhances 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 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 1,231 of the nations 19,000 runway ends

Program Plans FY 2011 – Performance Output Goals

- Expand accuracy and availability of WAAS LPV-200 service.
- Add 500 LPVs or Localizer Performance (LP) approach procedures to runways.
- Continue integration of new GEO in WAAS to increase continuity and availability.

Program Plans FY 2012-2015 – Performance Output Goals

- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 300 at Non-ILS runway ends.
- Add additional countries cooperating with the United States on the use of GNSS.
- Complete integration of new GEO in WAAS to provide increased continuity and availability.
- Complete prototype of L1/L5 architecture

System Implementation Schedule

Implementation schedule for Hardware and Software upgrades:

- FY12 Hardware Upgrade #3 - Obsolescence Upgrade I
- FY13 Hardware Upgrade #4 - Safety Computer Upgrade
- FY14 Hardware Upgrade #5 - Obsolescence Upgrade II
- FY14 Hardware Upgrade #6 – G-III Implementation
- FY15 Hardware Upgrade #7 – Dual Frequency I

- FY11 Software Upgrade #3 - GEO Interface
- FY14 Software Upgrade #4 - Compiler Operating System Upgrade and Ionosphere Correction Robustness
- FY14 Software Upgrade #5 - Availability and Continuity Enhancement III
- FY15 Software Upgrade #6 – Dual Frequency/Algorithm I
- FY15 Software Upgrade #7 – New GEO Interface and Dual Frequency/Algorithm II

Implementation schedule for new GEO:

- Test and integrate GAP filler GEO (FY10-11)
- Initiate new GEO Services (FY10-15)
- Install Ground Uplink Station (FY13-14)
- Develop Satellite Payload (FY12-14)
- GEO System Integration & Test (FY13-14)
- GEO Operational (FY15)

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 initiative calls for development of 500 new procedures in FY 2009, and that initiative will likely continue in future years. 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.

Program Plans FY 2011 – Performance Output Goals

- Complete sufficient quantity of airport obstruction surveys to develop 500 LPV/LP procedures.
- Procure surveys under the new Advisory Circular (AC-150/5300) standard to support accelerated procedure development at additional runway ends.

Program Plans FY 2012-2015 – Performance Output Goals

- Complete sufficient quantity of airport obstruction surveys to develop 500 LPV/LP procedures for each of the subsequent years.
- Procure 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 2011 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 the RVRs are located along the runway, 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.

Program Plans FY 2011 – Performance Output Goals

- Procure ten (10) RVR systems.
- Complete on-going RVR installation projects.
- Start the implementation of ten (10) new RVR installation projects.

Program Plans FY 2012-2015 – Performance Output Goals

- Procure twenty-five (25) RVR systems.
- Start the implementation of twenty –four (24) RVR projects.

2D05, APPROACH LIGHTING SYSTEM IMPROVEMENT PROGRAM (ALSIP)

FY 2011 Request $5.0M

- 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 potential 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.

Program Plans FY 2011 – Performance Output Goals

- Complete the implementation one (1) ALSF-2 project.
- Start the implementation of three (3) new MALSR replacement projects.
- Procure approximately five (5) MALSR Systems.

Program Plans FY 2012-2015 – 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 2011 Request $4.1M

- 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 location. 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

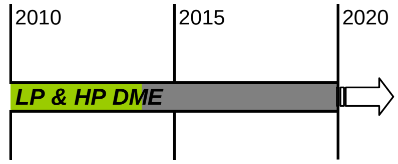
The new DME can provide distance information to more than 200 aircraft simultaneously, compared to less than 50 aircraft for the existing older systems, thus increasing the number of aircraft that can simultaneously use the DME. Availability of the new DME is greater than 99.95%.

Program Plans FY 2011 – Performance Output Goals
- Service Available (Establish) for approximately 40 LPDME locations.
- Service Available (Sustain) for approximately eight (8) LPDME locations.

Program Plans FY 2012-2015 – Performance Output Goals
- Procure approximately 52 High and Low Power DME Systems.
- Service Available (Establish) for approximately 26 DME locations.
- Service Available (Sustain) for approximately 26 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 2011 Request $3.8M

- 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 or not they are on the glide slope and how to correct their glide slope. 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 a Controlled Flight into Terrain accident during approach and landing. Installing the REIL system will reduce accidents because the system clearly identifies the approach end of runway to the pilot.

Program Plans FY 2011 – 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 2012-2013 – Performance Output Goals

- Procure 20 PAPI systems.
- Complete the implementation of 35 PAPI projects.
- Start the implementation of 26 PAPI projects.

2D08, INSTRUMENT FLIGHT PROCEDURES AUTOMATION (IFPA)

FY 2011 Request $0.6M

- Instrument Flight Procedures Automation (IFPA), A14.02-01
- 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 Instrument 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 (IFP) database, 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 late 2012.

High-end COTS workstations were deployed in early FY 2008 to all procedure developers to run the IPDS software tool. Every four years these workstations are eligible for Tech Refresh. AVN will be evaluating the workstations and if justification is found a request for the Tech Refresh funding will occur in FY 2012.

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

- **FAA Strategic Goal 4 – 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;
  - 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%. It improves the 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.

Program Plans FY 2011 – Performance Output Goals

- Complete IPDS Module 2 which contributes to maintaining both new IFP development time and IFP amendment time.
    - Maintain IFP production cycle time at 149 days.
    - Maintain new IFP development time at 104 hours.
    - Maintain IFP amendment time at 27 hours.
    - Maintain obstacle evaluation time at 22.5 minutes.

Program Plans FY 2012-2015 – Performance Output Goals

- Maintain final IFP production cycle time of 149 days.
- Maintain 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 (Mike Monroney Aeronautical Center (MMAC)), last site installation by September 2014 (WJHTC).

System Implementation Schedules

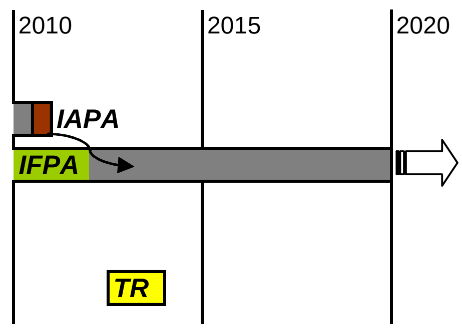
Instrument Flight Procedures Automation (IFPA)

Last site Decom: January 2012

First site IOC: June 2007 -- Last site IOC: January 2012

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 2011 Request $6.0M

- Navaids – Sustain, Replace, Relocate, N04.04-00

Program Description

This program renovates or replaces NAVAIDS at sites where there is a high risk for failure of these systems and failure would result in denying use of the primary precision approach capability during outages of these systems. NAVAIDS include:

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) for 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 supports Instrument Landing Systems (ILS) sustain and replace efforts at non-OEP sites where primary precision approach capability outages are most likely. 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 lower activity 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, recable 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.

Service life extension for Godfrey and Airflow ALSF-2 (CAT II/III systems) is accomplished 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 components. Ongoing efforts include:

- Improve approach lighting system semi-flush fixture
- Replace existing MALSR green threshold and white steady 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.

Program Plans FY 2011 – Performance Output Goals

- Replace ten (10) REIL systems.
- 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.
- Replace two (2) MALSR systems.
- Leap-frog five (5) ILS MK-1F.

Program Plans FY 2012-2015 – Performance Output Goals

- Install six (6) MALSRs.
- Extend the service life of nine (9) ALSF-2 at OEP airports by replacing the constant current regulators and installing a monitor for category II/III approaches.
- Procure and/or install 140 REILS.
- Leap-frog seven (7) ILSs.
- Re-cable NAVAID.

2D10, VASI REPLACEMENT – REPLACE WITH PRECISION APPROACH PATH INDICATOR

FY 2011 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.

Program Plans FY 2011– Performance Output Goals

- Procure 12 PAPIs for replacement projects.
- Complete on-going replace VASI with PAPI projects.
- Start the implementation of 12 new replace VASI with PAPI projects.

Program Plans FY 2012-2015 – Performance Output Goals

- Procure 53 PAPI systems.
- Complete the implementation of 74 PAPI projects.
- Start the implementation of 71 PAPI projects.

2D11, GLOBAL POSITIONING SYSTEM (GPS) CIVIL REQUIREMENTS

FY 2011 Request $58.5M

- 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 for use by the U.S. government and world-wide users with no direct user charges. GPS provides two PNT services; the Precise Positioning Service (PPS), using the dual L1-C/A (L band signal - Coarse Acquisition) and L2 signals, and the Standard Positioning Service (SPS), using the single L1-C/A signal. Only the 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). The GPS program is entering into a period of transition from GPS-II to the third generation (GPS-III) and the modernized operational control segment (OCX).

The National Space-based PNT policy (NSPD-39) requires civil agencies to fund new and unique civil GPS capabilities beyond the civil signals already contained in the current GPS, which includes the L1C signal and civil signal monitoring. DOT is serving as the lead civil agency. FAA will include the funding to implement L1C and civil signal monitoring in its budget request for FY2009-2013 and will provide technical oversight and National Coordination Office (NCO) support costs to serve as DOT's 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

This project has been directed by the Department of Transportation (DOT) to fulfill responsibilities to fund civil unique capabilities (L1C and Civil Signal Monitoring) under the National PNT Policy NSPD-39, December 2004.

Program Plans FY 2011 – Performance Output Goals

- Provide funding to the Air Force GPS Wing to implement; 1) Civil Signal Monitoring 2) L1C signal, and 3) program oversight and technical support.

Program Plans FY 2012-2015 – Performance Output Goals

- Provide funding to the Air Force GPS Wing to continue to implement; 1) Civil Signal Monitoring, 2) L1C signal and 3) program oversight and technical support (2009-2013).

2D12, RUNWAY SAFETY AREAS – NAVIGATION MITIGATION

FY 2011 Request $20.0M

- Runway Safety Areas – Navigation Mitigation, N17.01-01

Program Description

The FAA's runway safety program includes numerous programmatic elements intended to improve the overall safety of the Runways and Runway Safety Areas (RSA). The Runway Safety Area must be free of all objects that are 3 inches above the grade and are not frangible. The relocation or removal of existing rigid objects will decrease the potential for damage to aircraft and therefore minimize injuries or fatalities to aircraft passengers and crew members.

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

Improving RSAs to comply with the current airport standards will increase safety by reducing hazards to aircraft that accidentally exit the runway paved surface.

Program Plans – Performance Output Goals
FY 2011 – FY 2015:

- Take corrective action on those Navigation systems that are not in compliance with the Runway Safety Area requirements. PL-109-115 requires the FAA to complete RSA compliance with 14 CFR 139 not later than 12/31/2015, which is the regulation that requires removal of navigation aids that don’t meet safety criteria.

E. OTHER ATC FACILITIES PROGRAMS

2E01, FUEL STORAGE TANK REPLACEMENT AND MONITORING
FY 2011 Request $6.3M

- 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.

Implementation is amortized against a 20 year system service lifecycle. An average of 150 full fuel system replacements are required annually to sustain operational integrity. Components have differing lifecycles so component sustainment requirements continue to accrue within full system replacement lifecycles.

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 FST Replacement and Monitoring program reduces the potential for delays by ensuring the proper functioning of navigation aids, automation systems and other air traffic control systems. Fuel system component replacements are selected based on a successful application which evaluates the system's critical operation requirements to assure operational availability is sustained. Fuel systems are electronically monitored to assure system integrity and to minimize adverse impacts to personal and environmental safety.

Program Plans FY 2011 – Performance Output Goals
- Implement 2 ARTCC fuel system upgrades.
- Replace 250 electronic monitoring systems.
- Implement 2 Prime Power fuel system upgrades.
- Remedy integrity failures as identified.
- Respond to regulatory enforcement actions.

Program Plans FY 2012-2015 – Performance Output Goals
- Implement 2 ARTCC fuel system upgrades.
- Replace 250 electronic monitoring systems.
- Implement 2 Prime Power fuel system upgrades.
- Remedy integrity failures as identified.
- Respond to regulatory enforcement actions.

2E02 Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)
FY 2011 Request $14.1M

- 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 both major repairs 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, helicopter landing pads, marine structures, security gates, 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, lighting, and
- Replacement or renovation of NAS Towers supporting antennas and 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 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.

Program Plans FY 2011 – Performance Output Goals

- Prioritize sustainment to the infrastructure using a passenger focused impact model.
- Establish national contracts for HVAC and Navigational and Communication 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 2012-2015 – Performance Output Goals.

- 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 2011 Request $9.0M

- A, Aircraft Related Equipment Program, M12.00-00
- 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's worldwide flight inspection (FI) mission is to evaluate and certify instrument flight procedures and to evaluate and certify both ground-based and space based navigational equipment including facilities for Federal, State, Department of Defense (DoD), private and international customers. This mission requires aircraft equipped with specialized test equipment (Automatic Flight Inspection System (AFIS), and NextGen Automatic Flight Inspection system (NAFIS)). The Aircraft Related Equipment (ARE) program ensures the FAA's flight inspection aircraft fleet is equipped with systems required for inspecting, certifying, modernizing and sustaining the NAS and evolving NextGen requirements.

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.

Program Plans – Performance Output Goals

FY 2011:

- Continue Beech 300 FI aircraft enhancement with the installation of Pro Line 21 navigation flight management systems.
- Continue NAFIS Phase I implementation in the Beech aircraft fleet.
- Begin installation of NAFIS Phase I on the Challenger 605 aircraft.
- Complete systems requirement specification for NAFIS Flight Inspection Airborne Processor Application (FIAPA).
- Continue NextGen Surveillance and Broadcast Services equipage.

FY 2012:
- Begin installation of NAFIS Phase I in the Challenger 601 fleet.
- Continue NAFIS Phase I installation in the Beech fleet.
- Begin installation of NAFIS Phase I in the Learjet fleet.
- Sustain AFIS to comply with NextGen NAS requirements.
- Continue to support and update Flight Inspection Operations Management System/Flight Inspection Report Processing System.
- Continue Beech 300 FI aircraft enhancement with the installation of the Pro Line 21 navigation flight management system and other improvements.
- Complete NAFIS FIAPA Block 1 development.
- Continue NextGen Surveillance and Broadcast Services equipage.
- Begin flight deck navigation updates for the Challenger 601 fleet.

FY 2013:
- Continue NAFIS Phase I installation in the Beech fleet.
- Complete installation of NAFIS Phase I in the Learjet fleet.
- Complete installation of NAFIS Phase I in the Challenger 601 fleet.
- Continue Beech 300 FI aircraft enhancement with the installation of the Pro Line 21 navigation flight management system and other improvements.
- Complete NAFIS FIAPA Block 2 development and integration.
- Continue and complete flight deck navigation updates for the Challenger 601 fleet.
- Sustain AFIS to comply with NextGen NAS requirements.
- Continue NextGen Surveillance and Broadcast Services equipage.

FY 2014:
- Begin NAFIS Phase II installation in all FI aircraft.
- Complete Beech 300 FI aircraft flight deck navigation upgrade with the Pro Line 21 Navigation flight management system.
- Begin flight deck navigation updates for Learjet fleet.
- Sustain AFIS to comply with NextGen NAS requirements.
- Complete NextGen Surveillance and Broadcast Services equipage.

FY 2015:
- Continue and Complete NAFIS Phase II installation in the FI fleet.
- Sustain NAFIS to comply with NextGen NAS requirements.
- Complete flight deck navigation updates for Learjet fleet.

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 aircraft with two jet engines (A330) or four jet engines (A340), which are 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. Final investment decision for the Airbus simulator Technical Refresh program is planned for June of 2010. 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 simulator during vital research, engineering, and development (RE&D) projects and realistic high fidelity operational evaluation activities. Such activities include Closely Spaced Parallel Runway Operations (CSPO), Required Navigational Performance (RNP), and Human-in-the-Loop (HITL) pilot/controller/aircraft terminal operations performance during introduction of new NextGen technology initiatives such as Automatic Dependent Surveillance-Broadcast (ADS-B), Electronic Flight Bags, Heads-Up Displays with Enhanced Flight Vision Technology and data communications capabilities. 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 capabilities 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 and enhanced computer simulation models. 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 HITL data across all areas of safety.

Program Plans FY 2011 – Performance Output Goals

- None.

Program Plans FY 2012-2015 – Performance Output Goals

- Replace the Heads-Up-Display (HUD) with advanced digital HUD for both seats.
- Upgrade the avionic displays to include data linking and self-separation technologies.
- Install Synthetic Vision System technology integrated with Enhanced Flight Vision System to display a fully integrated Enhanced Vision System.
- Install A350 and A380 simulator aerodynamic models.

2E04, AIRPORT CABLE LOOP SYSTEMS – SUSTAINED SUPPORT
FY 2011 Request $7.0M

- 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 2015.

Relationship to Performance Target

The Airport Cable Loop Systems will reduce the number of unplanned outages due to degrading copper cables by replacing existing unsupportable communications equipment, and end of life underground cable. The program improves signaling and communications which allows for greater capacity and increased operational availability of infrastructure systems.

Program Plans FY 2011– Performance Output Goals

- Complete system cutover at Charlotte-Douglas, Jacksonville, and Seattle International Airports.
- Complete equipment installation at Boston-Logan (Phase II) and La Guardia Airports.
- Complete construction at Denver International Airport and Ronald Reagan Washington National Airport.
- Complete development of engineering packages for Austin, Baltimore-Washington, Cleveland, Dallas-Ft. Worth, Ft Lauderdale, John F Kennedy, Los Angeles, Newark, Oakland, Ontario, Philadelphia, and Van Nuys, CA, Airports.
- Begin Planning and Design Phase for Honolulu, San Diego, and Tampa International Airports.

Program Plans FY 2012-2015 – Performance Output Goals

- Complete system cutover at Boston-Logan (Phase II), Denver, La Guardia, and Ronald Reagan Washington National Airports.
- Complete equipment installation for Austin, Baltimore-Washington, Cleveland, Dallas-Ft. Worth, Ft Lauderdale, John F Kennedy, Los Angeles, Newark, Oakland, Ontario, Philadelphia, and Van Nuys, CA, Honolulu, San Diego, and Tampa Airports.
- Begin Planning and Design Phase for Anchorage, Andrews Air Force Base, Burbank, CA, Pittsburgh, Windsor Locks, CT, Airports.

2E05, ALASKAN NAS INTERFACILITY COMMUNICATIONS SYSTEM (ANICS)

FY 2011 Request $12.1M

- 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 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 –** 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.

Program Plans FY 2011 – Performance Output Goals

- Upgrade satellite communications equipment at the training and test facility.
- Install network monitoring and control system.
- Begin upgrading satellite communications equipment at 64 facilities.

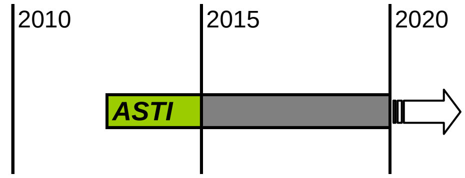
Program Plans FY 2012-2015– Performance Output Goals

- Continue satellite communications equipment upgrades.
- Complete upgrades at 64 facilities by January 2015.

System Implementation Schedule

- Estimated contract award date is 2nd quarter of FY 2010.

Alaskan Satellite Telecommunications Infrastructure
First site ORD: October 2012 -- Last site ORD: January 2015



2E06, Facilities Decommissioning
FY 2011 Request $6.4M

- Decommissioning, F26.01-01

Program Description

Plan, and implement real property infrastructure dispositions and site restorations at legacy sites operational before April 1, 1996, that are now decommissioned and have no supporting program office including:

- Infrastructure dispositions and real property site restorations;
- Hazardous materials abatement and/or remediation, and disposition;
- Termination phase one Environmental Due Diligence Audits; and
- Cultural historic preservation and natural resource protection locations.

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

- **FAA Strategic Goal 4 – 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;
  - 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.

- **FAA Initiative 4 – Improve management of FAA's real property assets by optimizing maintenance costs and disposing of excess assets.**

Relationship to Performance Target

Cost avoidance is derived following the disposition of legacy real properties which are no longer required.

2E07, Electrical Power Systems – Sustain/Support
FY 2011 Request $95.0M

- 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 new equipment/facilities have been commissioned, the Power program replaces, refurbishes and renews components of their 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, passenger value of time, and other specific expert information.

The Power program is critical to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS 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 being re-routed to other airports. The Power program also prevents expensive damage to critical air traffic control electronic equipment.

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 electric 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.

Program Plans FY 2011 – 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 Engineering study for the Critical Power Distribution System Training Facility (CPDSTF).

Program Plans FY 2012-2015 – Performance Output Goals

- Sustain existing NAS power systems by completing 476+ projects (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.
  - Implement new EPA emission standards for 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.
  - Complete Construction of the Critical Power Distribution System Training Facility (CPDSTF).

2E08X, AIRCRAFT FLEET MODERNIZATION

FY 2011 Request $0.0M

- 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 with a more modern configuration than the current fleet of aircraft. Procurement contract was placed for four (4) aircraft in FY 2009. This has been accomplished using both FY 2008 and FY 2009 funds. The remaining two (2) aircraft will be purchased in FY 2010. All six (6) aircraft are scheduled for delivery in FY2010. 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 2011 – 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.

Program Plans FY 2012-2015 – Performance Output Goals

- Procure additional aircraft if justified by the evaluation.

ACTIVITY 3. NON-AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. SUPPORT EQUIPMENT

3A01, HAZARDOUS MATERIALS MANAGEMENT
FY 2011 Request $20.0M

- Environmental Cleanup/HAZMAT, F13.02-00

Program Description

The FAA has identified approximately 800 contaminated sites at approximately 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 including: 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., a 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.

Annually in September the Environmental Site Cleanup Report is created. This document contains current and expected future cleanup activities for the 800 contaminated sites mentioned above. An estimate of out year Environmental Remediation (ER) Liabilities is also included in this report. The current ER Liability is estimated at $555M un-inflated, and with contingency the un-inflated ER Liability is estimated at $757M. The program receives annual funding of around $20M, and the current estimated end year date is 2049. We continue to make good progress toward remediating site, approximately 5% of the existing site are closed each year; however, additional sites are also added each year and some of the higher cost sites are expected to remain open for many years or decades.

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 of 1976, the Comprehensive Environmental Response, Compensation and Liability Act 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.

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

- **FAA Strategic Goal 4 – 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;

- 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 HAZMAT program supports the FAA's organizational excellence goal by continuing to improve financial management of cleanup activities for contaminated sites within existing NAS land and structures. The program achieves this objective through continued refinement of project cost estimating as well as progress tracking of 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.

Program Plans FY 2011 – Performance Output Goals

- Evaluate the FY 2010 project cost estimates produced in the Remedial Action Cost Estimating Requirements tool, and refine their use during the development of the FY 2012 cost estimates.
- Complete activities at five percent (5%) of the total sites listed in the FY 2010 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.
- Evaluate and implement as appropriate expedited remediation methods that would result in reducing the time to closure for select sites, and overall project costs.
- Evaluate the FY 2010 site prioritization model results, and refine its use during the development of the FY 2012 project prioritization effort, resulting in a greater impact on environmental liability reduction.
- Continue to support the Decommissioning Program (F26.01-01) with technical assistance that should yield a reduction in funding requests for remediation of environmental contamination found at these sites.
- Continue to investigate potentially responsible parties (e.g. DoD) who may hold the environmental liability at FAA's sites.

Program Plans FY 2012-2015 – Performance Output Goals

- Continue optimization of environmental risk reduction in concert with overall program resource requirements using the site prioritization model.
- Complete activities at five percent (5%) of the total sites listed in the previous years Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.
- Continue to evaluate and implement expedited remediation methods, and investigation of potentially responsible parties.

3A02, AVIATION SAFETY ANALYSIS SYSTEM (ASAS) – REGULATION AND CERTIFICATION INFRASTRUCTURE FOR SYSTEM SAFETY (RCISS)

FY 2011 Request $14.6M

- 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 addresses disaster recovery requirements, improves management of the infrastructure and application systems through advancements in IT technologies and provides enterprise wide solutions for economical development of future software applications. RCISS' enterprise infrastructure will provide the access methods to all AVS national safety applications developed by Safety Approach for Safety Oversight (SASO), Aviation Safety Knowledge Management Environment (ASKME) and all other national safety programs developed or currently deployed within AVS.

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 2011 – Performance Output Goals

- Complete the first technical refreshment deployment and support of mobile toolkits (includes tablet, aircard, flash drive, camera, and accessories) with enhanced telecommunications services to 25% of the AVS safety workforce.
- Complete the transition to centralized data storage and processing environment.
- Complete first technical refreshment cycle of legacy AVS infrastructure components in support of AVS national safety applications.
- 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.

Program Plans FY 2012 --2015 – Performance Output Goals

- Begin second technology refreshment cycle of mobile devices to the AVS safety workforce; starts FY 2012.
- Begin first technology refreshment of centralized data storage and processing environment; starts FY 2012.
- .Begin first technology refreshment of disaster recovery facility; starts FY 2012.
- Begin second technology refreshment of legacy AVS infrastructure components in support of AVS national safety applications; starts FY 2012.

3A03, LOGISTICS SUPPORT SYSTEMS AND FACILITIES (LSSF)

FY 2011 Request $11.5M

- Logistics Center Support System (LCSS), M21.04-01

Program Description

To support the NAS mission and public aviation safety, the FAA operates an internal supply chain and logistics division. The Air Traffic Organization (ATO) is responsible for maintaining the operational capability of the NAS through maintenance and repair of field equipment (i.e. radars, antennas, etc.). ATO provides routine and emergency services to 41,000 facilities and 28,000 sites within the NAS.

The FAA Logistics Center (FAALC) is an ISO 9001:2000 certified distribution, warehousing and repair facility, as well as certified for the design, implementation and maintenance of software systems in support of the NAS. It is responsible for acquiring replacement spares through contract support, supplying stocked serviceable spares to replace those consumed during field maintenance, providing maintenance activities to return repairable spares to serviceable condition, fabricating replacement spares not available through procurement and providing services required to support the NAS. It supports approximately 8,000 customers and provides approximately 100,000 parts annually to the ATO, Department of Defense (DoD), state agencies and foreign countries. The FAALC accounts for $760 million in assets.

The Mike Monroney Aeronautical Center (MMAC), in conjunction with FAA Headquarters, identified the need to acquire a software package to manage the supply chain within the FAA. To meet this demand, The FAALC Information Systems Group developed the Logistics and Inventory System (LIS) as a Natural and COBOL mainframe application. LIS is comprised of several independent software modules required to support various supply chain functions of Regions and Center Operations (ARC) and Air Traffic Organization (ATO).

LIS supports 100,000 orders annually (valued at $350 million) and tracks approximately 1 million assets (valued at $760 million) within the agency. To maintain this level of activity and support the changing needs of the agency, the LIS program has been modified over 37,000 times since its inception and currently contains over 3 million lines of code. The system is currently hosted at the United States Department of Agriculture (USDA) facility in Kansas City, Missouri.

In order to handle the projected demand increases with the same level of operational availability, the FAALC has made the decision to update and/or replace several key features of the existing supply chain. One initiative to facilitate this change is the replacement of the legacy LIS program. This new system is intended to be a Commercial Off-The-Shelf (COTS) acquisition that provides the agency with increased Enterprise Asset Management, Enterprise Resource Planning, Advanced Planning and Scheduling functionality and the implementation of industry best practices for supply chain and maintenance activities. This system will be referred to as the Logistics Center Support System (LCSS).

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 LCSS program supports the flight plan Greater Capacity goal with enhanced capability to accurately manage NAS spares and repair requirements in a centralized and automated manner enabling the agency to:

1) Provide 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) Provide 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) Provide services that meet or exceed customer expectations. Metric: Customer satisfaction surveys: Target goal is 86% customer satisfaction.
4) Deliver parts and services on time and defect-free reducing potential air traffic system outages and avoiding the cost of duplicate shipping and handling.

Program Plans FY 2011 – Performance Output Goals

- Develop logistics business process blueprint and assemble LCSS software solution prototype.
- Identify in a business case the quantitative cost and efficiency benefits of an automated, centralized agency supply chain system that has the capability to accurately project and manage NAS spares and repair requirements.
- Receive Final Investment Decision II.

Program Plans FY 2012-2015 – 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 2011 Request $15.0M

- Command and Control Communications (C3), C18.00-00

Program Description

The RCOM program supports the FAA emergency Command and Control Communications (C3) system that gives FAA the capability to directly manage and operate the NAS during local, regional and national emergencies when normal common-carrier communications are interrupted. C3 provides and enhances a variety of fixed-position, portable, and transportable emergency communications systems that support crisis management. These C3 systems enable the FAA and other Federal agencies to exchange classified and unclassified communications to protect 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. C3 capabilities and related systems include the following:

- Very High Frequency/Frequency Modulation (VHF/FM) Program
- High Frequency/Single Sideband Radio System (HF/SSB) Program
- Fixed Satellite Telephone Network (STN)
- Automated Notification System (EMERGIN)
- Emergency Operations Network (EON)
- Defense Messaging System (DMS)
- Secure Message Room (SMR)
- Secure Telephone Equipment (STE)
- Secure Facsimile (SECFAC)
- Secure Conferencing System (SCS)
- Communications Support Team (CST)
- OMNI Crypto Equipment
- Sectera Secure Global System for Mobile (GSM) Cell Phones
- Secure Mobile Environment Portable Electronic Device (SMEPED) (Secure Blackberry)
- Secure Iridium Satellite Phones

In addition to the above, there are highly classified systems, facilities and projects that C3 either manages or supports that are not named or described in this document. These support both intra and interagency agreements and initiatives.

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

- **FAA Strategic Goal 4 – 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

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 2011 – Performance Output Goals

- Procure and install VHF/FM equipment for the Seattle (ZSE) District, Atlanta (A80) District and Southern New England (A90) District Offices.
- Engineer VHF/FM system requirements for Dallas/Fort Worth (DFW), Denver (DEN), Phoenix (PHX), Philadelphia (PHL), Pittsburgh (PIT) and Saint Louis (STL) Airports.
- Install and commission 9 remaining National Communications System (NCS) 3-10 compliant HF radio facilities.
- Procure and field at least 50% of the new STN including Guam, Saipan, and American Samoa.
- Procure and implement a replacement system for the Automated Notification System (ANS).
- Perform major Tech Refresh to EON system and upgrade software to Microsoft SharePoint 2010.
- Perform Crypto Device Tech Refresh on STE.
- Continue to provide maintenance support for the deployed secure fax machines.
- Perform Tech Refresh on non-secure bridge for SCS.
- Deploy SMEPED capability to FAA Executives and other designated personnel.
- Deploy CST to meet mission requirements.
- 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 2012-2015 – Performance Output Goals

- Engineer VHF/FM system requirements, procure and install VHF/FM equipment for: Dallas/Fort Worth (DFW), Denver (DEN), Phoenix (PHX), Philadelphia (PHL), Pittsburgh (PIT), Saint Louis (STL), Portland (PDX), Minneapolis (MSP), Memphis (MEM), Detroit (DTW), Cincinnati (CVG), Cleveland (CLE) and Charlotte (CLT) Airport; ZAU District, NCT District, Philadelphia District, Jacksonville ZJX District and Northern New England ZBW District.

3A05, FACILITY SECURITY RISK MANAGEMENT
FY 2011 Request $17.0M

- 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 superseded 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.

The FSRM Program also supports the FAA's response to HSPD-12, *Policy for a Common Identification Standard for Federal Employees and Contractors*; Public Law 106-528, *Airport Security Improvement Act of 2000.*

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 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. As a result operational availability is maintained because enhanced security prevents loss of NAS service.

Program Plans FY 2011 – Performance Output Goals

- Upgrade 45 facilities so they can be accredited as meeting Federal security standards.

Program Plans FY 2012-2015 – Performance Output Goals

- Complete upgrades at remaining facilities in support of accreditation.

3A06, INFORMATION SECURITY

FY 2011 Request $15.2M

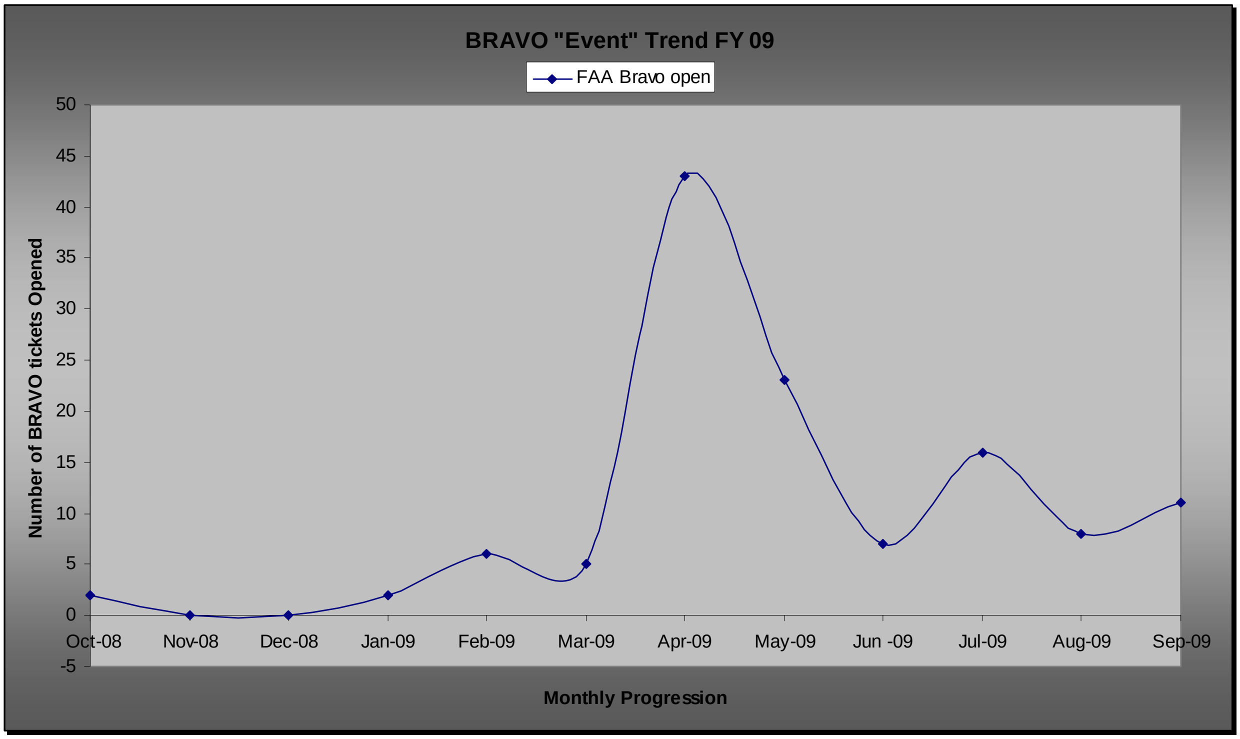
- NAS Information Security – Information Systems Security, M31.00-00

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 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 2008 thru September 2009.



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 FAA Strategic Goal, Objective, and Performance Target

- **FAA Strategic Goal 4 – Organizational Excellence.**
- **FAA Objective 4** – Make decisions based on reliable data to improve our overall performance and customer Satisfaction.
- **Performance Target 4 –** Achieve zero cyber security events that disable or significantly degrade FAA services.

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 2011 – 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.
- Complete the Logical Access & Authorization Control Service (LAACS) Operational Capabilities Demonstration (OCD)/Pilot and accomplish the following critical components:

- Implement the LAACS capability and infrastructure within the operational environment of FAA and potentially within the DOT.
- Validate the proposed costs and benefits derived from the LAACS implementation during the Pilot.
- Develop an approved costing model for “charge-back” for the products and support services of the LAACS solution to FAA and potential external FAA customers.
- Develop a funding structure necessary for supporting the development, Interface and Integration (I&I) system deployment and implementation, and system operations and maintenance of the LAACS infrastructure.

- Receive approval from the FAA Joint Resource Council (JRC) for transitioning the LAACS project through the Final Investment Decision (FID) milestone establishing an FAA approved LAACS Enterprise Solution baseline.
- Submit the first LAACS Acquisition Council Investment Plan and Business Case, Exhibit 300 to the Office of Management and Budget (OMB) with the approved LAACS baseline from the FAA Independent Review Board.

Program Plans FY 2012-2015 – 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.
- Begin development of the LAACS component of the Enterprise-defined Services Oriented Architecture (SOA) and begin to implement the SOA through the I&I with existing FAA systems and applications.
- Expand the established LAACS infrastructure to scale to the project customer base both inside FAA and to potential external customers like the Department of Transportation.
- Continue LAACS I&I with identified FAA systems and applications and with external FAA customers meeting the deployment numbers and percentages defined by overall LAACS Enterprise Solution strategy that have yet to be defined.

3A07, SYSTEM APPROACH FOR SAFETY OVERSIGHT (SASO)
FY 2011 Request $23.4M

- 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

The purpose of the SASO Program is to transform the FAA Flight Standards Service (AFS) and the aviation industry to a national standard of system safety based upon International Civil Aviation Organization (ICAO) Safety Management System (SMS) principles. SASO Phase I is complete. SASO Phase I extended system safety to all CFR Part 121 air carriers and demonstrated the benefits of system safety to AFS and the aviation community.

SASO Phase II is the second phase of the program. The purpose of Phase II is to extend system safety to the CFR Part 135 air taxi and air commuter community and CFR Part 145 repair station community. Alpha is the first segment of SASO Phase II covering the years FY 2010 thru FY 2013. Alpha will develop the AFS Safety Assurance System (SAS), one of four components of the SMS. SASO Phase II Beta is an overlapping segment covering the years FY 2011 thru FY 2016 during which the remaining three components of the SMS will be implemented (safety risk management, safety policy, and safety promotion).

The FAA SMS is FAA's response to a mandate from ICAO that requires its member states to institute regulations that require aviation entities under their purview to implement SMSs. The SMS concept is recognized as the most effective and efficient way of preventing accidents.

The deployment of SMSs by aviation entities will require FAA to implement a complementary safety program that provides oversight of those aviation entity SMSs. One of the first steps in the implementation of this safety program is the development of the Flight Standards Service (AFS) Safety Assurance System (AFS SAS) by SASO.

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 26 independent AFS safety systems into one AFS enterprise system. This will provide easier and quicker access to safety information for FAA employees that certificate and surveil the aviation industry.

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 is expected to result in a 20% reduction in fatal accident rates over the period FY 2003 through FY 2022, from a baseline rate of 0.05 fatal accidents per 100,000 departures to 0.04 fatal accidents per 100,000 departures. SASO proposes to achieve these results by implementing the safety assurance component of SMS functions.

SASO Phase II Alpha FY 2011 – Performance Output Goals

- Complete AFS SAS system design.
- Complete AFS SAS software design.
- Initiate AFS SAS software development.
- Initiate AFS SAS test and integration.
- Continue an AFS SAS outreach program to promote AFS SAS and prepare for change.
- Complete development of common service applications.

SASO Phase II Alpha FY 2012 – 2013 Performance Output Goals

- Complete AFS SAS software development, integration, 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 Beta FY2012 – 2015 – Performance Output Goals

- Reengineer oversight business processes of all AFS Services/Offices to accommodate the remaining three components of SMS: safety risk management, safety promotion, and safety policy.
- Design, develop, test, and implement remaining three components of the AFS SMS.
- Develop AFS SMS training curriculum and training materials.
- Complete training for AFS SMS key site implementation.
- Complete AFS SMS implementation throughout AFS.
- Integrate the four components of the AFS SMS into the AVS enterprise architecture.

3A08, AVIATION SAFETY KNOWLEDGE MANAGEMENT ENVIRONMENT (ASKME)

FY 2011 Request $14.8M

- 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
- 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 2011 – Performance Output Goals

- Electronic Filing Service – Conduct Historical scanning activities - Second year. The AIR Alternative Methods of Compliance (AMOC) documents are being scanned into the Electronic filing system.
- Work Tracking Software - Risk Based Resource Targeting (WTS-RBRT) – Evaluation of solution for the RBRT Sub-Function.

    [RBRT is the software which supports the process which establishes risk thresholds that will provide a consistent approach for AIR involvement and prioritization decisions for targeting resources, thereby allowing AIR to manage resources with a consistent understanding of the risks based on data. The output of the RBRT process provides a means to identify what activities to work (on the system level and project level). The process will allow for decisions to be made at the appropriate level of authority. It will allow us to make risk-based business and safety decisions, and establish a means to store, retrieve, and analyze safety data and use that information to determine where to focus our resources.]
- Monitor Safety Related Data - Oversee System Performance - Internal & External (MSRD-OSPi and OSPe) – Deploy and evaluate detailed system requirements; Finish Design and Development activities for the OSPi Sub-Function.
- Assimilate Lessons Learned (ALL) – Finish development activities and evaluate 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) – Start development of detailed system requirements.
- EDA (Engineering Design Approval) – Complete System Specification Requirements documentation.
- DTE ((DDS Technical Evaluations) – Complete System Specification Requirements documentation.

Program Plans FY 2012-2015 – Performance Output Goals

- Finalize Documented detailed System Specification Requirements phase (first phase for application development lifecycle) for the following ASKME deliverables:
  - 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 – FY12.
- Complete Design, Development, Test, and Deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
  - DTE (DDS Technical Evaluations) – Starts FY12, Ends FY13
  - WTS-WAT (Work Activity Tracking) – Ends FY13
  - EDA (Engineering Design Approval) – Starts FY12, Ends FY13
  - WTS-BMgmt (Budget Management) – Starts FY13, Ends FY14
- Begin Design and Development phase activities for the following ASKME deliverables:
  - AC-StdAC (Airworthiness Certification – Standard ACs) – Starts FY13, Ends FY15

3A09, DATA CENTER OPTIMIZATION

FY 2011 Request $2.0M

- Data Center Optimization, F30.01-01

Program Description

In January 2008, FAA's Acting Administrator directed the Office of the Assistant Administrator for Information Services (AIO) and Chief Information Officer (CIO) to develop an agency-wide strategy for optimizing the IT infrastructure in support of FAA administrative and mission-support operations. This was in response to an increase in initiatives at the lines of business (LOB) and facilities level to augment infrastructure capacity without a corporate strategy for coordinating those individual initiatives and optimizing FAA's total investment. A cross-organizational team was chartered to develop the preliminary strategy, which included development of a baseline assessment of FAA's IT infrastructure. In support of this strategy, in March 2009 the Data Center Optimization Strategy program initiated Concept and Requirements Definition (CRD) in preparation for the Joint Resources Council (JRC) investment decision process.

Data Center Optimization Strategy (DCOS) will provide FAA a long-term solution for managing its total investment in IT infrastructure. By implementing the DCOS solution, FAA can realize these benefits:

Increased Capacity. FAA relies on IT automation and underlying IT infrastructure to support hundreds of administrative and mission support applications and services. These operations continue to expand, resulting in growing demand for data center capacity. However, all four Enterprise Data Centers face immediate or near-term shortages related to space, power, and cooling.

Cost Avoidance. FAA can reduce cost by eliminating duplicate investments in IT infrastructure. In the current environment, larger investments occur at the LOB and facilities level while smaller investments proliferate across hundreds of rooms and closets within those facilities. By and large these investments are neither coordinated nor are they managed from the vantage of FAA's enterprise architecture. Also, multiple and uncoordinated data center investments are an inefficient way to add capacity, they do not address long-term capacity management requirements and they prevent the agency from realizing benefits related to cost avoidance.

Improved IT Service Quality. FAA can improve IT service quality by ensuring the availability of the underlying IT infrastructure and the associated business operations. In the current environment, FAA is not able to ensure adequate levels of availability for its entire IT infrastructure. These limitations inhibit FAA's ability to ensure the availability of business operations, particularly in the event of unplanned outages and disasters. This deficit also inhibits FAA's ability to evolve toward use of industry-standard business models for data centers.

Reduced Risk. FAA can reduce the agency's risk exposure related to:

- Information security,
- Business agility – deploying new services as they are required by the Agency, and
- Business operations continuity and disaster recovery.

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

- **FAA Strategic Goal 4 – 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;
    - 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

Data center optimization is a fundamental way to lower the cost of IT operations; DCOS will enable optimization through consolidation of existing data centers and collocation of physical IT assets within the consolidated environment. Industry research and current best practices demonstrate those fewer and larger data centers are more cost-effective on a per-unit basis. For the FAA, consolidating multiple data centers is a primary strategy for controlling and cutting costs while delivering quality IT service in support of business and mission-support operations.

Program Plans FY2011 – Performance Output Goals

- Update Exhibit 300 Program Baseline Attachment 1: Program Requirements.
- Complete Exhibit 300 Program Baseline Attachment 2: Business Case.
- Update Investment Analysis Plan.
- Obtain Initial Investment Decision.
- Develop Exhibit 300 Program Baseline Attachment 3: Implementation Strategy and Planning.

Program Plans FY 2012-2015 – Performance Output Goals

- Obtain Final Investment Decision.

B. TRAINING, EQUIPMENT, AND FACILITIES

3B01, AERONAUTICAL CENTER INFRASTRUCTURE MODERNIZATION
FY 2011 Request $15.0M

- 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. Program funding will be used for facility renovation, building system 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 4 – 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;
  - 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 General Services Administration (GSA) metropolitan leased facilities and GSA national averages for leased facilities.

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 2011 – Performance Output Goals

- Systems Training Building (STB) renovation design and phased construction.
- Environmental Systems Support (ESS) Building renovation design and construction.
- Technical refresh of 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 2012-2015 – Performance Output Goals

- STB renovation construction and completion.
- Radar Training Facility renovation design and construction.
- ESS building design and renovation construction.
- Phased storm sewer construction replacement construction and completion.
- Telecommunications refresh 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 returned to service, FY 2012.
- 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 2011 Request $2.0M

- 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. The program will also provide an update to the latest satellite technology for another critical distance learning solution, The FAA's Aviation Training Network (ATN).

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

- **FAA Strategic Goal 4 – 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;
  - 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 and the ATN 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. The program contributes well over $18M 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.

ACTIVITY 4. FACILITIES AND EQUIPMENT MISSION SUPPORT

4A01, SYSTEM ENGINEERING AND DEVELOPMENT SUPPORT
FY 2011 Request $32.3M

- A, Systems Engineering and Technical Assistance – SETA and other Contractors, M03.01-00
- B, Provide ANF/ATC Support (Quick Response), M08.01-00

A, 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 elements for the NAS Enterprise Architecture's success and for 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 4 – 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;
  - 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.

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 4 – 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;
  - 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.

4A02, PROGRAM SUPPORT LEASES
FY 2011 Request $38.6M

- Program Support Leases, M08.06-00

Program Description

To operate the NAS, FAA requires real property rights for more than 3,000 rentable real estate leases. Without property rights FAA could not operate the NAS since the majority of its facilities reside either on leased land or in leased building space. The FAA must also obtain clear zones to prevent interference with electronic signals at certain facilities, such as very high frequency omnidirectional ranges, airport surveillance radars, and air route surveillance radars.

The real property leases are legally binding contracts that usually require rents to be paid each year. The total rent amount for the leases portfolio increases each year due to the addition of leases for new facilities and the renegotiation of expired leases.

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

- **FAA Strategic Goal 4 – 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% savings for strategic sourcing for selected products and services;
  - 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

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.

Program Plans FY2011-2015 – Performance Output Goals

- Pay for rents on more than 3,000 land and space leases that directly support navigation, communication, weather observation and reporting, air traffic control, and other facilities that directly support the NAS.
- Fund 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.
- Pay for condemnation (leasehold or fee) of real property interests.
- Fund conversion of existing leases to fee ownership or perpetual easements.
- Fund real estate appraisals, market surveys, title reports, and other costs associated with the acquisition and management of real property assets.
- Fund costs to relocate offices, facilities, personnel, and equipment
- Pay for costs to combine or consolidate multiple offices when technically feasible and economically advantageous.
- Fund the development of business tools to enhance real estate acquisition and management activities and the implementation of program efficiency practices.
- Fund costs associated with real property lease terminations and equipment disposals.
- Fund testing and studies (environmental, suitability, sustainability, cost-effectiveness, etc.) in connection with the leasing, purchasing, usage, management, and disposal of real property.
- Fund real property costs associated with the transition to next generation facilities.

4A03, Logistics Support Services (LSS)

FY 2011 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 ATCTs 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 4 – 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;

- 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 2011 Request $16.6M

- 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
- 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 2011 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 4 – 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;
  - 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 2011 Request $15.0M

- A, NAS Implementation Support Contract (NISC), M22.00-00
- B, Web CM, M03.01-01

A, 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 4 – 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;
  - 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.

B, WEB CM, M03.01-01

Program Description

Configuration Management (CM) is a vital component of the NAS and life cycle management of its programs. CM is a disciplined approach for establishing processes, identifying and documenting the functional and physical characteristics of a material item, controlling changes to the characteristics of a configuration item, and reporting and recording of information including maintenance of the configuration records. FAA Order 1800.66, prescribes that CM shall apply to all systems, subsystems, and components of the NAS, including the documentation describing the NAS. The efficient management of CM information is critical to the operation of CM functions and activities, as well as the management of FAA systems throughout the lifecycle. WebCM provides an automated, integrated, enterprise solution to the Agency's CM community for managing of NAS CM processes.

WebCM declared an Operational Readiness Demonstration (ORD) in January 2005. The system is in service and user training is on-going as we continue to bring new users on-board. As we move to the next phases, several key enhancements are expected to be implemented starting in 2011. Specifically, new functionality to provide document management, records management, and data repository capabilities, Integrated Enterprise Repository Management, (iERM), required to achieve full CM automation will be initiated in FY 2009 with full implementation completed by FY 2012 Once completed, this will add features such as the virtual library of NAS documentation and all product support libraries as well as key system interfaces to Mod Tracking and other systems needed in the management of NAS CM.

Integration of the safety requirements (SRM) into the CM automation tool (WebCM) for NAS Change Proposal (NCP) processing was initiated in FY 2005 and integration completed in FY 2006. Implementation in accordance with guidelines from the Safety organization, ATO-S will continue through 2011.

There are currently four (4) software components that comprise the CM Enterprise Automation suite today of which two are Commercial-of-the-Shelf (COTS) and two are "custom" built and not commercially supported. The COTS software packages are the Eden Application Server™ and iERM™ for which the FAA has purchased the appropriate enterprise licenses. WebCM is a custom application built upon the Eden technology automating our NAS Casefile/NCP/Configuration Control Decision process across the Agency. It also contains a component for Document Control (DOCCON) which is a mainframe application that currently manages the baseline documentation information regarding the NAS. Development of the DOCCON component is expected to be accelerated due to the FAA's decision to de-commission ICEMAN, which provides contract computer processing services.

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

- **FAA Strategic Goal 4 – 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;
  - 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
  - By FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing.

Relationship to Performance Target

WebCM, and its replacement CM Automation, allows management to make decisions based on reliable data, and it will improve overall customer satisfaction. WebCM/CM Automation provides access to proposed/approved changes to NAS equipment and captures critical system baseline information to use as part of the NAS master system index. This reduces the cost of NAS NCP associated with process cycle time during requirements development, acquisition, and operational phases resulting in an overall cost saving to the agency.

Program Plans – Performance Output Goals
FY 2011:
- Complete CM Automation system prototype.
- Complete business case development; obtain program approval from the Information Technology Evaluation Board.

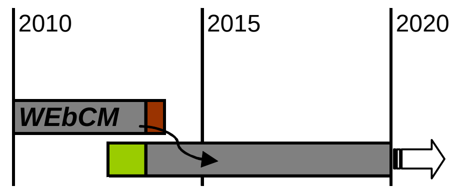
FY 2012:
- CM Automation system implementation, testing, and deployment at key site.

FY 2013:
- System implementation at disaster recover site.
- Implement user training program.

FY 2014 – FY 2015:
- CM Automation sustainment.

System Implementation Schedule
- CM Automation key site IOC September 2012
- CM Automation last site IOC September 2013
- WebCM MMAC decommissioning December 2013

Configuration Management Automation
Decom: December 2013
Key site IOC: September 2012 -- Last site IOC: September 2013



4A06, Frequency and Spectrum Engineering
FY 2011 Request $2.6M

- 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 replace 10 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.

Program Plans FY 2011 – Performance Output Goals
- Resolve 80% of all reported RFI incidents within 9 days.
- Award contract for purchase of 10 RFI vehicles and RFI towers and associated equipment for 8 OEP airports.
- Delivery of at least one RFI van.
- Delivery of at least one suit of towers and associated equipment to monitor one OEP airport.

Program Plans FY 2012-2015 – Performance Output Goals
- Resolve 82% of all reported RFI incidents within 9 days.

4A07, TECHNICAL SUPPORT SERVICES CONTRACT (TSSC)
FY 2011 Request $22.0M

- Technical Support Services Contract (TSSC) Program, M02.00-00

Program Description

The TSSC Program provides a contract vehicle to augment FAA's work force with engineers, technicians, and other staff (some under subcontracts) for site preparation and oversight of equipment installation to assist FAA project implementation. Engineers and technicians, hired under this contract, provide design services, installation work, and Resident Engineer services to oversee contractors and subcontractors that are performing construction projects and installing equipment. They also perform direct Facilities and Equipment project work, which includes: project and facility design, site surveys, site preparation, and equipment installation, as well as several other contract functions to ensure that installation schedules will be met. The TSSC Program helps the FAA ensure timely completion of projects for NAS modernization.

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

- **FAA Strategic Goal 4 – 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;
  - 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

In a typical year, more than 3,700 separate projects are completed by FAA using the TSSC Program. Customers using TSSC support services benefit from high quality contractor labor support that is experienced, flexible, reliable, and cost effective. This quality customer service is substantiated by the consistently high customer (engineer and engineering Technical Officer) participation, which is at 89 percent, and the satisfaction scores from the bi-annual award fee process, in which the contractor is rated higher than 90 percent.

The TSSC Program 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.

Another cost control by the TSSC Program is to move its regional management counterparts into vacant, unused FAA space thereby saving 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.

4A08, RESOURCE TRACKING PROGRAM (RTP)
FY 2011 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 4 – Organizational Excellence.**
- **FAA Objective 4 –** Make decisions based on reliable data to improve our overall performance and customer satisfaction.
- **FAA Performance Target 2** – 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.

4A09, CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)
FY 2011 Request $80.7M

- 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 Sponsoring Agreement with the MITRE Corporation. A Product Based Work Plan (PBWP) is developed within the context of the FAA Flight Plan and the Next Generation Air Transportation System (NextGen) Implementation Plan, NAS Enterprise Architecture, National Aviation Research Plan (NARP), other agency long-range plans, and the FAA CAASD Long Range Plan (FY 2010-2014). The CAASD PBWP and Long Range Plan, both 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 System Integration and Evolution. Improve understanding of the future environment, including anticipated demand at airports and for airspace; anticipate the impact of planned improvements on future capacity; 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 and ensure their 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 Required Navigation Performance and Area Navigation procedures that will allow increases in capacity and efficiency of traffic flows; 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 that enables NextGen technologies to increase capacity and improve operational safety; 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 terminal systems and operations 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 of 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. Integrate technical analyses and design management efforts to provide a national, system-wide optimization of airspace.

NAS System Operations. Assess system performance; develop improved analytic techniques and capabilities for system operations analysis; develop improved measurement techniques for assessing operations; develop and evaluate new metrics to measure overall NAS operational performance; 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 improving TFM safety, efficiency, predictability, and productivity; translate concepts into requirements and assess the impact of enhancement capabilities on the TFM modernization system.

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. Develop technical guidance to engineer security capabilities into the NAS; provide guidance on security threats, technology, standards, and practices to evolve Information System Security to adapt to changing threats and technology advances; create 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 in the NAS and improve airspace access and national security; assess the impact of ADS-B on safety, capacity, and efficiency benefits; develop domestic and international requirements and engineering standards for future ADS-B applications.

Special Studies, Laboratory and Data Enhancements. Provide an integrated research environment that ensures individual research activities, prototypes, and capabilities can be brought together with the appropriate mixture of fidelity and flexibility to facilitate integrated 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 provides independent advanced research and development required by the FAA to obtain operational concepts, technical analyses, prototypes, procedures, and systems requirements needed to fulfill the vision for the NAS enterprise architecture, FAA's Flight Plan, and the NextGen Implementation Plan – FAA's plan to NextGen. FAA adoption of these new systems and procedures in the NAS improves on-time performance, increases capacity, and provides a safer and more efficient air transportation system.

4A10, Aeronautical Information Management Program
FY 2011 Request $18.3M

- Aeronautical Information Management (AIM) Modernization – Segment 1, A08.03-02
- X, Aeronautical Information Management (AIM) Modernization – Segment 2, A08.03-03

Program Description

The purpose of the Aeronautical Information Management (AIM) Modernization program is to provide aviation users with digital aeronautical information that conforms to international standards and supports NextGen objectives. Digital aeronautical data enables the real-time, or near real-time, processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will replace the existing Notice to Airmen (NOTAM) and Central Altitude Reservation Function (CARF) systems using digital technology that is consistent with FAA and international architecture standards.

Following a July 2006 ATO Executive Council Investment Analysis Readiness Decision (IARD), the AIM group was organized, and it was assigned the responsibility for developing a system for managing the generation, processing, storage and distribution of aeronautical information to internal and external aviation customers. This began with the analysis of current system capability, and process deficiencies, and led to the planning, development and implementation of solutions to address identified deficiencies consistent with FAA goals, objectives and targets identified in the Flight Plan**.**

The AIM Group structured the modernization program into incremental/spiral segments.

- Segment 1: The first segment, (previously called Segment 1a) plans, develops and implements digital NOTAMs and CARF system capabilities. The new systems will address current deficiencies that cause problems affecting accuracy and timeliness which minimizes the effectiveness of automation systems. The program planning, solution development and implementation schedule for Segment 1 is expected to be completed during the FY 2010 – 2014 period. The AIM Modernization Final Investment Decision (FID) is planned for FY 2010.
- Segment 2: The second segment (previously referred to as Segment 1b), plans, develops and implements the following:
    1) Automation to coordinate use of Special Activity Airspace;
    2) New concepts for pilot briefing using digital technologies, and
    3) Airport mapping and status.

  The Segment 2 schedule (program planning through solution implementation) will take place from FY 2011 – 2015.

Segment 1 Aeronautical Information (AI) products will improve NOTAMs and CARF service to aviation system users including internal FAA and other government agencies, the international aviation community, the Department of Defense (DoD), domestic commercial air carriers, and general aviation. Traffic Flow Management (TFM) and Collaborative Decision Making (CDM) systems in the NAS and similar systems used by the military are direct users of NOTAMs and the CARF service.

Accurate and timely AI is essential or critical in 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.

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 a contributing factor in operational errors and runway incursions. AIM Modernization will target enhancements and new functionality to improve and expand services. The program will improve the accuracy and timeliness of NOTAM and CARF data. Analyses will be conducted to compare this data to the legacy systems baseline to determine the actual amount of improvement provided.

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. NAS safety depends upon the timely and accurate exchange of information between internal and external users.

Program Plans FY 2011 – Performance Output Goals

<u>Segment 1:</u>

- Transition operation of FAA NOTAM System (FNS) and CARF systems and subsystems to the Oklahoma City, OK (OEX) Data Center.
- Design, develop and test the following:
    - Software to store, process and retrieve FNS and CARF data,
    - Security Access Control software to create and manage user accounts,
    - Business Process Workflow Software,

    - Software to generate ICAO compliant NOTAMs and other AI,
    - CARF Software,
    - Web Services Software, and
    - Performance Metrics Software to collect system performance data for comparative analysis.
- Design and develop pilot web software enhancements.
- Design and develop Global Navigation Satellite Systems (GNSS) Integrity and Prediction Modernization (GIP-M) hardware and legacy interfaces to replace GPS WAAS.

Segment 2:

- Draft and coordinate review and approval of documents required to support Joint Resource Council's (JRC) Final Investment Decision (FID).
- Develop system specification document for Digital Flight Planning and Digital Weather.
- Award development contract for Digital Flight Planning and Digital Weather.
- Plan, develop and implement the following capabilities acquired in Segment 1:
    - Military airspace management (Special Use Airspace Management System (SAMS), Special Activities Airspaces (SAA), Military Airspace Data Entry (MADE) and Special Use Airspace (SUA)),
    - Pilot briefing planning and delivery (Aeronautical Information System Replacement (AISR)),
    - Airport Geographic Information System (GIS), and
    - Modernize the remaining AI functionality.

Program Plans FY 2012-2015 – Performance Output Goals

Segment 1:

- Begin operation of FNS and CARF systems and subsystems at Anchorage, AK (ZAN) and Atlantic City (ACY) Data Centers.
- Design, develop, test and deploy the following:
    - Software to store, process and retrieve FNS and CARF data,
    - Security Access Control software to create and manage user accounts,
    - Business Process Workflow Software,
    - Software to generate ICAO compliant NOTAMs and other AI,
    - CARF Software,
    - Web Services Software, and
    - Performance Metrics Software to collect system performance data for comparative analysis.
- Complete Segment 1 implementation and deployment. Transition to full system operation and sustainment at OKC, ACY and ZAN.
- Replace existing AISR Workstations to refresh technology.
- Develop and deliver AIXM Software Version 5.1.
- Recertification of System Certification and Authorization Package (SCAP).
- Design, develop, test and deploy software that will enable transition from legacy to new systems.
- Design, develop, test and deploy Multi-View Portal Software at the ATCSCC.

Segment 2:

- Complete Digital Flight Planning and Digital Weather.
- Implement, test and deploy Digital Flight Planning and Digital Weather.
- Implement, test and deploy the following capabilities acquired in Segment 1:
    - Military airspace management (SAMS SAA, MADE and SUA),
    - Pilot briefing planning and delivery (AISR),
    - Airport GIS, and
    - Modernize the remaining AI functionality.
- Complete Segment 2 implementation and deployment.
- Update and finalize the Aeronautical Information Infrastructure Architecture to include Segment 2 functionalities.
- Develop, test and deploy hardware/software for AI Infrastructure.

Program Implementation Schedule

Implementation schedule will be provided upon receipt of FID.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix C

Fiscal Years 2011 – 2015

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Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2011 Budget	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.
	Activity 1: Engineering, Development, Test, and Evaluation	**$708.6**	**$893.7**	**$1,157.1**	**$1,356.0**	**$1,403.1**
1A01	Advanced Technology Development and Prototyping (ATDP)	$25.5	$32.9	$29.4	$27.1	$29.9
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$13.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$7.5	$5.7	$5.9	$6.0	$6.1
1A05	NextGen Network Enabled Weather (NNEW)	$28.3	$56.4	$36.6	$33.8	$18.6
1A06	Data Communication in support of Next Generation Air Transportation System (NextGen)	$153.3	$214.6	$389.5	$739.7	$555.5
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$27.0	$30.0	$30.0	$30.0	$30.0
1A08	Next Generation Air Transportation System (NextGen) - System Development	$95.0	$100.2	$101.0	$119.1	$120.9
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations	$58.6	$26.0	$25.0	$22.0	$16.0
1A10	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact	$43.2	$66.7	$109.8	$77.0	$97.6
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$57.0	$54.0	$63.7	$61.1	$41.0
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$75.5	$53.0	$51.0	$44.0	$42.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$80.7	$39.1	$38.4	$18.0	$14.0
1A14	Next Generation Air Transportation System (NextGen) - Safety, Security, and Environment	$8.0	$10.0	$10.0	$8.0	$5.0
1A15	Next Generation Air Transportation System (NextGen) - Networked Facilities	$35.0	$192.1	$253.8	$157.2	$413.5
	Activity 2: Air Traffic Control Facilities and Equipment	**$1,377.9**	**$1,553.2**	**$1,543.2**	**$1,405.9**	**$1,434.5**
	A. En Route Programs	**$594.9**	**$619.6**	**$581.1**	**$513.7**	**$452.5**
2A01	En Route Automation Modernization (ERAM)	$132.3	$89.1	$95.0	$89.8	$120.0
2A02	En Route Communications Gateway (ECG)	$6.0	$19.8	$18.5	$9.9	$13.4
2A03	Next Generation Weather Radar (NEXRAD)	$6.7	$2.8	$3.3	$1.2	$1.3
2A04	Air Traffic Control System Command Center (ATCSCC) Relocation	$2.1	$2.1	$0.0	$0.0	$0.0
2A05	ARTCC Building Improvements/Plant Improvements	$36.9	$52.0	$52.4	$57.4	$57.4
2A06	Air Traffic Management (ATM)	$16.5	$7.5	$9.9	$8.1	$0.9
2A07	Air/Ground Communications Infrastructure	$7.6	$2.8	$2.0	$2.0	$2.0
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.3	$5.8	$5.9	$0.9	$0.0
2A09	Voice Switching Control System (VSCS)	$15.6	$0.0	$0.0	$0.0	$0.0
2A10	Oceanic Automation System	$4.0	$14.9	$12.1	$11.8	$0.0
2A11	Next Generation VHF Air/Ground Communications System (NEXCOM)	$49.9	$44.7	$33.4	$22.0	$80.3
2A12	System-Wide Information Management (SWIM)	$92.0	$39.9	$33.0	$13.6	$6.6
2A13	Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$176.1	$284.2	$270.7	$256.9	$157.3
2A14	Windshear Detection Service	$1.0	$0.0	$0.0	$0.0	$0.0
2A15	Weather and Radar Processor (WARP)	$2.1	$2.5	$0.5	$0.7	$0.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2011 Budget	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.
2A16	Collaborative Air Traffic Management Technologies (CATMT)	$35.9	$41.5	$34.4	$29.3	$3.3
2A17	En Route Automation Modernization (ERAM) - Post Release 3	$5.0	$10.0	$10.0	$10.0	$10.0
	B. Terminal Programs	**$387.0**	**$459.5**	**$513.3**	**$508.9**	**$591.4**
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$4.2	$2.2	$10.0	$11.1	$13.4
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$8.6	$7.7	$2.1	$0.5	$0.0
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$22.0	$41.8	$42.0	$39.5	$54.0
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$20.0	$78.2	$102.4	$126.9	$224.2
2B05	Terminal Automation Program	$3.9	$2.5	$2.5	$2.6	$2.6
2B06	Terminal Air Traffic Control Facilities - Replace	$114.6	$150.0	$150.0	$150.0	$150.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$45.6	$53.3	$52.7	$52.7	$52.1
2B08	Terminal Voice Switch Replacement (TVSR)	$11.5	$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)	$3.0	$0.0	$0.0	$0.0	$0.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$4.1	$3.4	$4.4	$4.4	$4.4
2B12	Precision Runway Monitors	$1.0	$0.0	$0.0	$0.0	$0.0
2B13	Runway Status Lights (RWSL)	$55.0	$29.0	$56.4	$32.6	$14.6
2B14	National Airspace System Voice Switch (NVS)	$30.2	$50.0	$50.0	$50.0	$33.5
2B15	Voice Recorder Replacement Program (VRRP)	$9.4	$0.0	$0.0	$0.0	$0.0
2B16	Integrated Display System (IDS)	$8.7	$8.8	$8.2	$8.2	$2.9
2B17	ASR-8 Service Life Extension Program	$2.6	$0.0	$0.0	$0.0	$0.0
2B18	Integrated Terminal Weather System (ITWS)	$5.5	$0.0	$0.0	$1.3	$9.7
2B19	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)	$3.1	$2.4	$3.0	$3.0	$2.7
2B20	Remote Maintenance Monitoring	$6.5	$4.2	$3.7	$0.0	$1.2
2B21	Mode S Service Life Extension Program (SLEP)	$1.5	$0.0	$0.0	$0.0	$0.0
	C. Flight Service Programs	**$31.3**	**$23.8**	**$12.9**	**$8.7**	**$2.7**
2C01	Automated Surface Observing System (ASOS)	$6.7	$2.5	$0.0	$0.0	$0.0
2C02	Flight Service Station (FSS) Modernization	$21.4	$16.5	$8.5	$2.5	$2.5
2C03	Weather Camera Program	$3.2	$4.8	$4.4	$6.2	$0.2
	D. Landing and Navigation Aids Programs	**$214.8**	**$220.2**	**$223.7**	**$162.0**	**$167.9**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$5.0	$5.0	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$7.8	$5.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$95.0	$109.3	$107.1	$115.5	$121.4
2D04	Runway Visual Range (RVR)	$5.0	$5.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$5.0	$5.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$4.1	$5.0	$5.0	$0.0	$0.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2011 Budget	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.
2D07	Visual Navaids - Establish/Expand	$3.8	$3.4	$5.0	$0.0	$0.0
2D08	Instrument Flight Procedures Automation (IFPA)	$0.6	$2.2	$1.8	$2.0	$2.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$6.0	$6.0	$8.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$7.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$58.5	$47.3	$55.3	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$20.0	$20.0	$20.0	$20.0	$20.0
	E. Other ATC Facilities Programs	**$149.9**	**$230.0**	**$212.2**	**$212.7**	**$220.0**
2E01	Fuel Storage Tank Replacement and Monitoring	$6.3	$6.4	$6.6	$6.7	$6.8
2E02	Unstaffed Infrastructure Sustainment (formerly FAA Buildings and Equipment)	$14.1	$15.7	$16.3	$16.5	$15.8
2E03	Aircraft Related Equipment Program	$9.0	$13.0	$9.0	$9.0	$9.0
2E04	Airport Cable Loop Systems - Sustained Support	$7.0	$5.0	$5.0	$5.0	$5.0
2E05	Alaskan NAS Interfacility Communications System (ANICS)	$12.1	$10.7	$0.0	$0.0	$0.0
2E06	Facilities Decommissioning	$6.4	$5.0	$5.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$95.0	$160.0	$165.0	$170.0	$177.8
2E08X	Aircraft Fleet Modernization*	$0.0	$9.0	$0.0	$0.0	$0.0
2E09X	Independent Operational Test/Evaluation*	$0.0	$5.2	$5.3	$5.5	$5.6
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$150.5**	**$162.8**	**$120.8**	**$112.3**	**$82.3**
	A. Support Equipment	**$133.5**	**$151.5**	**$109.3**	**$100.4**	**$70.2**
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)	$14.6	$22.5	$8.9	$11.5	$10.6
3A03	Logistics Support Systems and Facilities (LSSF)	$11.5	$0.8	$0.0	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$15.0	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$17.0	$30.0	$18.0	$19.4	$0.0
3A06	Information Security	$15.2	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$23.4	$37.1	$31.5	$9.5	$9.5
3A08	Aviation Safety knowledge Management Environment (ASKME)	$14.8	$17.1	$6.9	$16.0	$6.1
3A09	Data Center Optimization	$2.0	$0.0	$0.0	$0.0	$0.0
	B. Training, Equipment, and Facilities	**$17.0**	**$11.3**	**$11.5**	**$11.8**	**$12.1**
3B01	Aeronautical Center Infrastructure Modernization	$15.0	$10.3	$10.5	$10.8	$11.1
3B02	Distance Learning	$2.0	$1.0	$1.0	$1.0	$1.0
	Activity 4: Facilities and Equipment Mission Support	**$241.1**	**$238.2**	**$234.9**	**$239.7**	**$254.0**
4A01	System Engineering and Development Support	$32.3	$32.9	$33.5	$34.1	$32.9

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2011 Budget	FY 2012 Est.	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.
4A02	Program Support Leases	$38.6	$39.7	$40.9	$42.1	$55.2
4A03	Logistics Support Services (LSS)	$11.0	$8.5	$8.5	$8.5	$8.5
4A04	Mike Monroney Aeronautical Center Leases	$16.6	$17.0	$17.5	$17.9	$18.4
4A05	Transition Engineering Support	$15.0	$15.0	$15.0	$15.0	$15.0
4A06	Frequency and Spectrum Engineering	$2.6	$0.0	$0.0	$0.0	$0.0
4A07	Technical Support Services Contract (TSSC)	$22.0	$22.0	$25.0	$30.0	$30.0
4A08	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$0.0	$0.0
4A09	Center for Advanced Aviation System Development (CAASD)	$80.7	$80.8	$82.7	$84.6	$86.5
4A10	Aeronautical Information Management Program	$18.3	$18.3	$7.8	$7.6	$7.5
	Activity 5: Personnel Compensation, Benefits, and Travel	**$492.0**	**$497.0**	**$502.0**	**$507.0**	**$519.0**
5A01	Personnel and Related Expenses	$492.0	$497.0	$502.0	$507.0	$519.0
	* BLI numbers with X represent outyear programs not requested in the FY 2011 President's Budget.					
	Out-year funding amounts are estimates.					
	Total Year Funding	**$2,970.0**	**$3,345.0**	**$3,558.0**	**$3,621.0**	**$3,693.0**
	Targets January 2010	**$2,970.0**	**$3,345.0**	**$3,558.0**	**$3,621.0**	**$3,693.0**

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix D

Fiscal Years 2011 – 2015

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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.

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FAA Capital Programs
Current Information for Major Programs

	Original Baseline			Current Baseline			Current Estimate		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
Air Traffic Control Beacon Interrogator Replacement (ATCBI-6)	Aug-97	Sep-04	$282.9	May-08	Sep-11	$255.1	Sep-11	$255.1	Current Baseline vs Original Baseline: The budget was revised downward, per the May-08 JRC Rebaseline Decision, to reflect lower system procurement and installation costs. The program schedule was extended due to budget reductions and deferrals, as well as the addition of new establishment sites. Note: In this FY11-15 CIP Appendix D, the current baseline completion date has been extended to Sep-11 to reflect the addition of two new establishment sites (Congressional requests), encompassed in the May-08 JRC decision.
Airport Surface Detection Equipment - Model X (ASDE-X/3X)	Sep-01	Jan-07	$505.2	Sep-05	May-11	$550.1	May-11	$550.1	Current Baseline vs Original Baseline: The program's schedule has been extended and budget increased due to funding reductions and increased costs for implementation activities.
Airport Surveillance Radar - Model 11 (ASR 11)	Nov-97	Sep-05	$743.3	Sep-05	Sep-09	$696.5	Jul-10	$696.5	Current Baseline vs Original Baseline: The procurement and deployment schedule has been extended due to funding reductions. The lower budget number in the current baseline is associated with a reduction of scope. Current Estimate vs Current Baseline: The estimated 10 month extension to the completion date is due to an unusually long real estate acquisition for the last site.

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	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2	Aug-07	Sep-14	$1,681.5	Aug-07	Sep-14	$1,681.5	Sep-14	$1,697.6	Current Estimate vs Current Baseline: The increase of $16.1M to the current estimate (1.0% variance) is due to a $6.8M funding earmark in FY 2009 to conduct a Target Level of Safety study to obtain approval for 3 nautical mile separation standards for En Route and another funding earmark of $9.3M in FY 2008 to accelerate Future Air to Air Applications Development. Note: The FY10-14 CIP Appendix D showed the current baseline as $1,690.8M which included $1,681.5M approved at the Aug-07 Final Investment Decision and the $9.3M non-baselined FY 2008 earmark. This FY11-15 CIP Appendix D corrects the current baseline amount back to the $1,681.5M approved at the Aug-07 FID.
Collaborative Air Traffic Management Technologies (CATMT) Work Package 2	Sep-08	Sep-14	$109.5	Sep-08	Sep-14	$109.5	Sep-14	$109.5	
En Route Automation Modernization (ERAM)	Jun-03	Dec-10	$2,154.6	Jun-03	Dec-10	$2,154.6	Dec-10	$2,154.6	
Integrated Terminal Weather System (ITWS)	Jun-97	Jul-03	$276.1	Nov-07	Jun-10	$282.1	Aug-10	$282.1	Current Baseline vs Original Baseline: The program's schedule has been extended and budget increased due to funding reductions and requirements changes to add Terminal Convective Weather Forecasting. Current Estimate vs Current Baseline: The 2 month extension to the completion date (6.5% schedule duration variance) is due to the addition of the Northern California TRACON (NCT) as an ITWS site at the end of the deployment (Jul-09 JRC decision).

FAA Capital Programs
Current Information for Major Programs

	Original Baseline			Current Baseline			Current Estimate		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
Next Generation Air-to-Ground Communication System (NEXCOM)	Sep-98	Sep-08	$407.6	Dec-05	Sep-13	$324.7	Sep-13	$324.7	Current Baseline vs Original Baseline: The schedule extension was due to resource issues to install radios. The decrease in budget is associated with a May-00 JRC decision to reduce the program scope to the acquisition of multimode digital radios.
System Wide Information Management (SWIM) Segment 1	Jul-09	Sep-15	$310.2	Jul-09	Sep-15	$310.2	Sep-15	$310.2	Note: The FY10-14 CIP Appendix D showed a JRC decision in Jun-07 where only two years of budget for SWIM Segment 1 were approved. This FY11-15 CIP Appendix D shows the budget and completion date for the entire SWIM Segment 1 program that was approved at the Jul-09 JRC Final Investment Decision.
Traffic Flow Management (TFM) - Infrastructure	Aug-05	Apr-10	$398.1	Aug-05	Apr-10	$398.1	Apr-10	$398.1	
Wide Area Augmentation System (WAAS)	Jan-98	Aug-99	$1,006.6	May-09	Sep-13	$3,008.1	Sep-13	$,3008.1	Current Baseline vs Original Baseline: Budget 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. Note: The FY10-14 CIP Appendix D represented the May-04 JRC decision which approved Phase II for Full Localizer Performance with Vertical guidance (LPV). Phase II was completed in 2008. This FY11-15 CIP Appendix D lists the budget and completion date approved by the JRC in May-09 for the next useful segment of WAAS. This decision approved Phase III for Technical Refresh, Operations and Maintenance, which spans the 2009-2013 timeframe.

FAA Capital Programs
Major Programs with Completed Acquisition Phase

	Original Baseline			Current Baseline			Actual Results		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
Advanced Technologies and Oceanic Procedures (ATOP)	May-01	Mar-06	$548.2	May-01	Mar-06	$548.2	Mar-06	$548.2	The acquisition phase completed in Mar-06. ATOP is now in the tech refresh phase with funding through FY 14.
Aviation Surface Weather Observation Network (ASWON)	Oct-99	Apr-02	$350.9	Jun-06	Jun-07	$384.3	Jun-07	$384.3	The acquisition phase completed in Jun-07 with the commissioning of the last of 120 SAWS systems. ASWON is now in the pre-planned product improvements (P3I) phase with funding through FY 12.
En Route Communication Gateway (ECG)	Mar-02	Dec-05	$315.1	Mar-02	Dec-05	$315.1	Oct-05	$315.1	The acquisition phase completed in Oct-05. ECG is now in the tech refresh phase with funding through FY 15.
En Route System Modernization	Aug-03	May-09	$201.9	Aug-03	May-09	$201.9	Oct-07	$165.5	The program completed in Oct-07. The last console modification was completed earlier than planned and below cost
FAA Telecommunications Infrastructure (FTI)	Jul-99	Dec-08	$205.7	Sep-06	Dec-08	$318.6	Mar-08	$316.8	This program completed in Mar-08. The initial schedule delay was caused by changes to InfoSec requirements, LINCs Bridge contract, and Growth in Telecom requirements.
Standard Terminal Automation Replacement System (STARS)	Feb-96	Feb-05	$940.2	May-04	Dec-07	$2,769.5	Jun-07	$2,719.2	This acquisiton phase of the program completed in Jun-07. STARS is now in the tech refresh phase with funding through FY 31.
Terminal Automation Modernization Replacement (TAMR) Phase 2	Jun-05	Jul-08	$139.5	Jun-05	Jul-08	$139.5	Jul-08	$139.5	This acquisiton phase of the program completed in Jul-08. TAMR Phase 2 is now in the tech refresh phase with funding through FY 31.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix E

Fiscal Years 2011 – 2015

LIST OF ACRONYMS AND ABBREVIATIONS

--Number--	
3D	three dimensional
4D	four dimensional
4D-OTM	four dimensional-oceanic trajectory management
--A--	
ABRR	airborne reroute execution
ACE-IDS	automated surface observing system controller equipment-information display system
ACFT	aircraft
ADAM	advanced dynamic airspace management
ADAS	automated weather observation data acquisition system
ADD	airworthiness directives development
A/DMT	arrival/departure management tool
ADS-B	automatic dependent surveillance-broadcast
ADS-C	automatic dependent surveillance-contract
ADS-ITP	automatic dependent surveillance in-trail procedures
ADSIM	airfield delay simulation model
ADS-R	automatic dependent surveillance-rebroadcast
AEDT	aviation environmental design tool
AEE	Aviation Policy, Planning & Environment
AEFS	advanced electronic flight strip
AFIS	automatic flight inspection system
AFS	Office of Flight Standards Service
AFS-400	FAA Flight Technologies and Procedures Division
AFSM	Alaskan flight service modernization
AFSS	automated flight service station
A/G	air-to-ground
AGIS	airport geographic information system
AI	aeronautical information
AIM	aeronautical information management
AIO	Office of the Chief Information Officer
AIR	FAA Aircraft Certification Service
AIRE	atlantic interoperability initiative to reduce emissions
AirNav	airports and navigations aids
AISM	aeronautical information system modernization
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
AJE	ATO en route service unit
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
AMP	airspace management program
AMS	acquisition management system
ANF	air navigation facilities

ANICS	Alaskan national airspace system interfacility communications system
ANS	automation notification system
ANSP	air navigation service providers
ANT	automated NextGen tower
AOC	airline operational control
AOCC	atlantic operations control center
APMT	aviation portfolio management tool
APTS	AVN process tracking system
ARC	Assistant Administrator for Regions and Center Operations
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
ASPIRE	Asia south pacific initiative to reduce emissions
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
ATIS	automated terminal information service
ATM	air traffic management
ATN	aeronautical telecommunication network
ATN	aviation training network
ATO	Air Traffic Organization
ATOP	advanced technologies and oceanic procedures
ATS	air traffic services
AUM	arrival uncertainty management
AVN	Office of Aviation System Standards
AVS	Office of Aviation Safety
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
BUEC	Back up emergency communication
BWM	bandwidth manager
--C--	
C2	command and control
C3	command and control communications
CAASD	Center for Advanced Aviation System Development
CACR	collaborative airspace constraint resolution
CAMI	civil aerospace medical institute
CARF	central altitude reservation function
CARTS	common-automated radar tracking system
CAST	commercial aviation safety team
CAT	category
CATM	collaborative air traffic management
CATMT	collaborative air traffic management technologies
CBI	computer-based instruction
CCS	conference control switch
CDA	continuous descent approach
CDM	collaborative decision making
CDP	concept development plan
CDTI	cockpit display of traffic information
CEA	compliance and enforcement actions
CERAP	center radar approach control
CFE	communications facilities enhancement
CFIT	controlled-flight-into-terrain
CHI	computer human interface
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
CONV	convective
COTS	commercial off-the-shelf
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
CSSD	Common status and structure data
CTAS	center TRACON automation system
CTP	collaborative trajectory planning
CTS	coded time source
CWP	corporate work plan

--D--	
DALR	digital audio legal recorder
DASI	digital altimeter setting indicator
DataComm	data communications
DCNS	data communication air/ground network service
DCOS	data center optimization strategy
DCS	data communication system
DELPHI	DOT accounting system
DHS	Department of Homeland Security
DME	distance measuring equipment
DMN	data multiplexing network
DOC	Department of Commerce
DOCCON	document control
DoD	Department of Defense
DOT	Department of Transportation
DOTS+	dynamic ocean tracking system plus
D-side	data controller position
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
DVRS	Digital voice recorder system
--E--	
EA	enterprise architecture
EBUS	enhanced backup surveillance
ECG	en route communication gateway
EDA	engineering design approval
EDC	en route departure capability
ESS	environmental systems support
EFS	electronic flight strip
EFSTS	electronic flight strip transfer system
EMS	environmental management system
EON	emergency operations network
EOSH	environmental & occupational safety and health
EPA	Environmental Protection Agency
EPI	enhanced precipitation identifiers
ER	environmental remediation
ERAM	en route automation modernization
ERIDS	en route information display system
E-Scan	electronic scan
ETMS	enhanced traffic management system
ETR	emergency transmitter replacement
ETVS	enhanced terminal voice switch
EUROCONTROL	European organization for the safety of air navigation
--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
FCST	forecast
FDIO	flight data input/output
FDP2K	flight data processing 2000
F&E	facilities and equipment
FFRDC	federally funded research and development center
FI	flight inspection
FIAPA	flight inspection airborne processor application
FID	final investment decision
FIS-B	flight information service – broadcast
FISMA	Federal Information Security Management Act
FM	frequency modulated
FMS	flight management system
FNS	federal NOTAM system
FSRM	facility security risk management
FSS	flight service station
FST	fuel storage tank
FTI	FAA telecommunications infrastructure
FW	firmware
FY	fiscal year
--G--	
GA	general aviation
GBAS	ground-based augmentation system
GDP	gross domestic product
GEO	geosynchronous communication satellite
GFP	government furnished package
G/G	ground to ground
GIS	geographic information system
GNSS	global navigation satellite system
GPS	global positioning system
GPS RAIM	global positioning system receiver autonomous integrity monitoring
GSA	General Services Administration
GUI	graphical user interface
GUS	ground uplink station
--H--	
HADDS	Host ATM data distribution system
HAZMAT	hazardous materials
HCS	host computer system
HF	high frequency
HITL	human-in-the-loop
HOST	host computer system
HSI	human system integration
HSPD	Homeland Security Presidential Directive

HUD	heads-up-display
HVAC	heating, ventilating and air conditioning
--I--	
IAPA	instrument approach procedures automation
IARD	investment analysis readiness decision
ICAO	International Civil Aviation Organization
ICSS	integrated communications switching system
IDAC	integrated departure arrival capability
IDLM	interference detection, location and mitigation
IDRP	integrated departure route planner
IDS	information display system
iERM	integrated enterprise repository management
IES	integrated enterprise solution
IFDO	international flight data object
IFPA	instrument flight procedures automation
IFP	instrument flight procedures
IFR	instrument flight rule
I&I	interface and integration
IID	initial investment decision
ILS	instrument landing system
IMC	instrument meteorological conditions
IOC	initial operating capability
IP	internet protocol
IPDS	instrument procedure development system
IPE	Intelligent Peripheral Equipment
IRU	inertial reference unit
IDS	integrated display system
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
LCGS	low cost ground surveillance
LCSS	logistical center support system
LDRCL	Low-Density Radio Communication Link
LED	light emitting diode
LIDAR	light identification detection and ranging

LIS	logistics and inventory system
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	localizer performance with vertical guidance
LRR	long-range radar
LRU	line replaceable units
LSS	logistics support services
LSSF	logistics support system and facilities
--M--	
MADE	military airspace data entry
MALSR	medium-intensity approach light system with runway alignment indicator lights
MAPS	meteorological and aeronautical planning system
MASR	mobile/transportable airport surveillance radar
MASS	maintenance automation system software
MDR	multimode digital radio
MEARTS	microprocessor en route automated radar tracking system
MicroEARTS	microprocessor en route automated radar tracking system
MIT/LL	Massachusetts Institute of Technology Lincoln Laboratory
MITRE	MITRE Corporation
MLAT	multilateration
MMAC	Mike Monroney Aeronautical Center
MOA	memorandum of agreement
Mode S	mode select
MOIE	mission oriented investigation and experimentation
MOPS	minimum operational performance standards
MP	merge points
MPT	meter point time
MPS	maintenance processor subsystem
MSAD	monitor safety and analyzed data
MSP	multi sector planner
MSRD	monitor safety related data
--N--	
NADIN	national airspace data interchange network
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
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

NCP	NAS change proposal
NDB	non-directional beacon
NEO	network enabled operations
NEVS	network-enabled verification service
NEXCOM	next generation air/ground communications
NEXRAD	next generation weather radar
NextGen	next generation air transportation system
NGFTWP	next generation far term work package
NGVRRP	next generation voice recorder replacement program
NIEC	NextGen integration and evaluation capability
NISC	national airspace system implementation support contract
NLDN	national lightning detection network
NLIHA	NEXRAD legacy, icing, and hail algorithm
NLN	national logging network
NMR	NADIN MSN Rehost
NNEW	NextGen network enabled weather
NOAA	National Oceanic and Atmospheric Administration
NOCC	national operations control center
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
NWP	NextGen weather processor
NWS	National Weather Service
--O--	
OASIS	operational and supportability implementation system
OCX	modernized operational control segment
OEAAA	obstruction evaluation/airport airspace analysis
OEP	operational evolution partnership
OFDPS	offshore flight data processing system
OI	operational improvement
O&M	operation and maintenance
OMB	Office of Management and Budget
OPD	optimized profile descents
Ops	operations
ORD	operational readiness demonstration
OSHA	Occupational Safety and Health Administration
OSPe	oversee system performance - external
OSPi	oversee system performance - internal
OTA	other transactions agreements
OT&E	operation test and evaluation
OTM	oceanic trajectory management
--P--	
P3I	pre-planed product improvement
P#	program element #
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
PGUI	plan-view graphical user interface
PIREPS	pilot reports
PLM	programming language for microcomputers
PNT	position, navigation and timing
PM	meter points
POCC	pacific operations control center
PRM	precision runway monitor
PRM-A	precision runway monitor alternate
--R--	
R#	release number
RA	resolution advisory
RAMP	radar acquisition and mosaic processor
RAPCON	radar approach control
RAPT	route availability planning tool
RBRT	risk based resource targeting
RCE	radio control equipment
RCISS	regulation and certification infrastructure system safety
RCL	radio communication link
RCOM	recovery communications
RDA	radar data acquisition
R&D	research and development
RDVS	rapid deployment voice switch
RE&D	research, engineering, and development
REIL	runway end identifier lights
REL	runway entrance lights
RFFA	radio-frequency filter amplifier
RFI	radio frequency interference
RFI ELIM	radio frequency interference elimination
RIL	runway intersection lights
RIRP	runway incursion reduction program
RMLS	remote monitoring and logging system
RMLS NRN	remote monitoring and logging system national RMM network
RMM	remote maintenance monitoring
RMMS	remote maintenance and monitoring system
RNAV	area navigation
RNP	required navigation performance
RNP-4	required navigation performance-4 nm
RPG	radar product generator
RPI	relative position indicator
RPM	revenue passenger mile
RSA	runway safety areas
R-side	radar controller position
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--	
SAA	special activities airspaces
SAIDS	system Atlanta information display system
SAMS	special use airspace management system
SARPS	standards and recommended practices
SAS	safety assurance system
SAS	single authoritative source
SASO	system approach for safety oversight
SAWS	standalone weather sensors
SBAS	satellite based augmentation system
SBS	surveillance and broadcast services
SC	special committee
SCAP	security certification and authorization package
SDAT	sector design and analysis tool
SDP	signal data processor
SESAR	Single European Sky ATM Research
SETA	system engineering and technical assistance
SFA	special flight authorizations
SID	standard instrument departure
SIM	surveillance interface modernization
SIR	screening information request
SITS	security integrated tool set
SITA	Societe internationale de telecommunications aeronautiques
SLEP	service life extension program
SMA	surface movement advisor
SMS	safety management system
SMS	surface management system
SNT	staffed NextGen tower
SOA	service oriented architecture
SpclAC	special airworthiness certifications
SPS	standard positioning service
SR	system requirements
SRM	safety risk management
SSA	system safety assessment
SSR	secondary surveillance radar
STAR	standard terminal arrival routes
STARS	standard terminal automation replacement system
STARS/SL	STARS Lite
STB	system training building
STBO	surface trajectory based operation
STD	standard
StdAC	standard airworthiness certifications
STEP	sustainment and technology evolution plan
STM	surface traffic management
STN	satellite telephone network
STVS	small tower voice switch
SUA	special use airspace
SWIM	system-wide information management

--T--	
TACAN	tactical air navigation antenna
TAMR	terminal automation modernization replacement
TBA	trajectory based airspace
TBFM	time-based flow 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
TERA	terminal enhancements for RNAV ATC
TFDM	tower flight data manager or management
TFM	traffic flow management
TFM-M	traffic flow management modernization
TFMS	traffic flow management system
TFR Bldr	temporary flight restriction builder
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
TSDE	traffic situation display re-engineering
TSO	technical standard order
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
UPS	uninterruptible power source
--V--	
VASI	visual approach slope indicator
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
VTABS	VSCS training and backup system
--W--	
WAAS	wide-area augmentation system
WAM	wide are multilateration
WARP	weather and radar processor
WAT	work activity tracking
WebCM	CM automation tool
WINS	weather information network server
WJHTC	William J. Hughes Technical Center
WM/LAT	wide area multilateration
WMSCR	weather message switching center replacement
WMSS	WARP maintenance and sustainment services
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
WTS	work tracking software
WTS-BMgmt	work tracking software - budget management
Wx	Weather