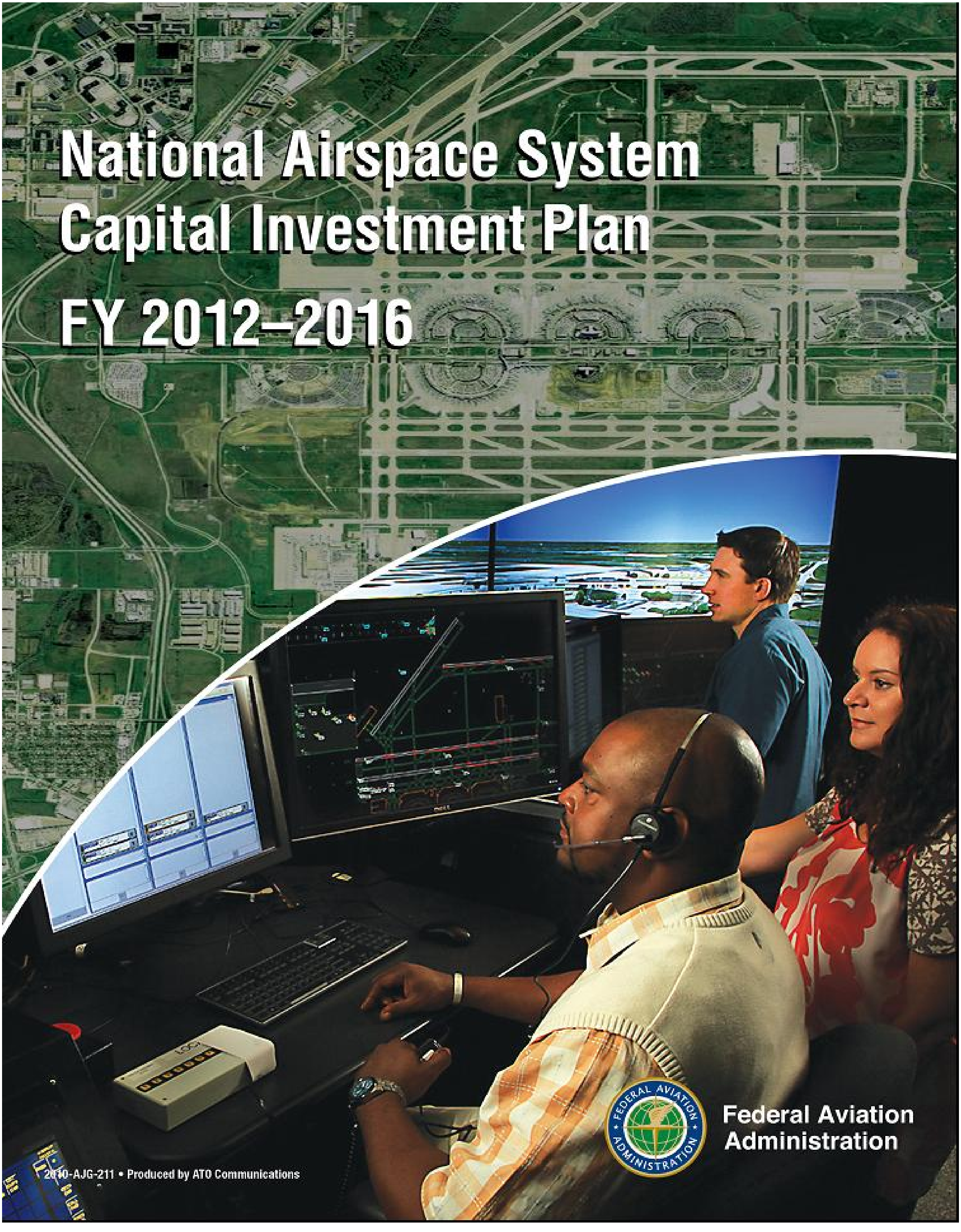
National Airspace System Capital Investment Plan

FY 2012–2016



Federal Aviation Administration

2010-AJG-211 • Produced by ATO Communications

Table of Contents

Table of Figures

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Executive Summary

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) is prepared annually as required by provisions in legislation. In addition to addressing the legislated requirements, the CIP is a valuable tool for meeting the internal need for managing complex modernization of the National Airspace System (NAS). It assists FAA management in balancing the pace of modernization with available resources, focuses investments on meeting strategic goals, and allows the integration of program planning necessary to manage interdependencies and product deliveries. The CIP describes planned capital investments for the next five years consistent with the amount requested in the annual budget submission.

The planned project accomplishments shown in the CIP are consistent with the President's Fiscal Year (FY) 2012 budget request and out-year funding estimates. These out-year funding amounts are changes from the 2010 CIP and require a re-plan of our modernization program. Our planning allows us to remain on track to deliver the FAA's core framework for Next Generation Air Transportation System (NextGen) implementation, particularly the capabilities requested by the aviation community. These core elements include improving surface operations, freeing up metroplex congestion and implementing Automatic Dependence Surveillance-Broadcast (ADS-B) ground infrastructure, progress that focuses on delivering capabilities to operators and benefits to the public. This CIP slows the deployment, however, of certain transformational NextGen capabilities, such as Data Communications and the NAS Voice System, and it defers some research and development activities. It also defers construction activities of NextGen facilities.

We have only had time to do a preliminary adjustment to funding levels and planned accomplishments. Rather than defer sending the CIP, we are sending this version which is based on the planning that was completed late last fall. In most cases it is a reasonable representation of the work that needs to be done to improve air traffic control. The FAA goals to increase capacity and improve efficiency remain the same, so the operational improvements should remain stable. The major changes will be to the scheduled implementation of these improvements. We will prioritize our investments to focus on those operational improvements that have industry support and the potential for early benefits.

The detailed analysis needed to update implementation schedules and the enterprise architecture roadmaps will take several months. We must review the service roadmaps and modify them, as necessary, to adjust the implementation schedules for operational improvements. The next step is to identify which systems are needed to support the planned timelines shown in the service roadmaps. The enterprise architecture roadmaps will be adjusted to show the progression from the current NAS to its planned future configuration. We plan to complete this work in time for it to be included in the Fiscal Year (FY) 2013-2017 CIP.

In addition to financing NextGen, NAS investment must continue to maintain the reliability and availability of systems used for current operations. We anticipate that significant levels of investment will continue to be allocated to sustaining current infrastructure to prevent failures and maintain the reliability and efficiency of current operations.

Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2012–2016

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) 2012 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

The FAA's strategic plan is being used to relate the capital projects to our goals, objectives and performance targets. The strategic plan articulates the most important goals for improving our performance in delivering aviation services. These goals guide us in upgrading NAS systems and adjusting operating procedures 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 allow us to measure 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 and quickly make adjustments when they are not producing the expected results.

The FAA strategic plan covers four goal areas:

- **Increased Safety—**To achieve the lowest possible accident rate and constantly improve safety;
- **Greater Capacity—**Work with local governments and airspace users to provide increased capacity 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 tables 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 efficiencies.

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 Strategic 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. For the budget year, there is a rigorous method for evaluating and approving funding for projects. To obtain approval, many projects are required to 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 and other factors to determine whether the project should be funded. Initial approval to proceed with a program is made by one of the three FAA executive levels designated as the Investment Decision Authority (IDA). The largest and most sensitive programs are approved by the highest level IDA which is the Joint Resources Council (JRC) consisting of FAA's top executives. The IDA for significant ATO programs can be the FAA Executive Council (EC) and decisions on small programs are delegated to ATO vice-presidents or FAA associate administrators. The JRC approves or requests changes in a baseline cost and schedule estimate prepared by the integrated product teams. As appropriate, baselines may be established and approved by the EC and ATO vice-presidents. The cost baselines play an important role in formulating future budgets. Information Technology projects for elements of FAA outside the ATO must also be approved by the Information Technology Executive Board (ITEB). Details on how the overall process for Acquisition Management System approval works can be found at http://fast.faa.gov.

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 will have to be extended, which results in increased costs. Shifting labor costs to future years requires inflation adjustments to labor rates, and the labor hours used often increase and exceed the baseline estimates. The other common reasons for baseline increases are that the project encounters technical problems that require additional engineering design and production time, or issues discovered during field installation that require more elaborate site preparation.

To manage projects to stay within the established baselines, project oversight continues after the 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 either be restructured or cancelled. We update the Capital Investment Plan financial baseline to reflect these decisions to continue or cancel programs.

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 are an integral part of planning for the future and indicate that modernization of the air traffic control system will continue well into the future. The Service Roadmaps in Section 3 show the schedule for Next Generation Air Transportation System (NextGen) operational improvements and system upgrades that will continue through 2025. Section 4 contains the infrastructure roadmaps that system engineers have developed to show the hardware and software changes needed to implement those improvements. These roadmaps are an essential part of the Enterprise Architecture that support a broader system engineering focus on ensuring that modernization efforts are integrated. 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 Economic Considerations

In addition to supporting increased demand and improving the efficiency of air travel by implementing NextGen, it is important to recognize the impact of our Nation's air transportation industry on economic growth. A 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, estimated 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.

In addition, civil aviation has a significant impact on the economy of every state in the Union as shown in Figure 1 below. Each state provides unique opportunities for the aviation industry to invest and do business whether it is transportation services or manufacture of aircraft and supporting equipment. Since aviation provides a vital link for people, goods, and services to move throughout the nation and globe, it contributes to overall state economies which collectively increase the national economy. It also creates opportunities for local economic development and national economic growth. From a low of 0.3 percent contribution to State GDP in Delaware to a high of 16.1 percent in Hawaii, it is clear that the aviation industry is a significant part of most state's economic well-being.

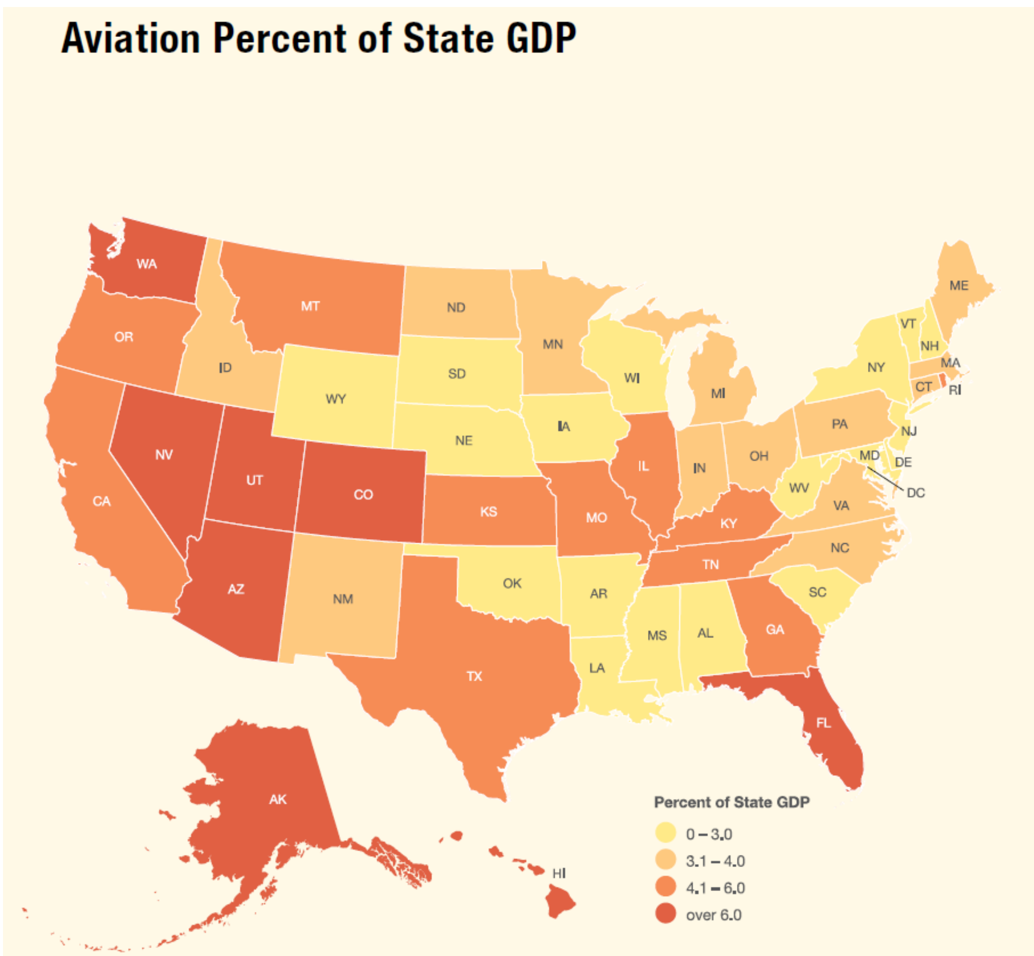

Figure 1 Aviation Percent of State Gross Domestic Product[1]

[1] Source: "The Economic Impact of Civil Aviation on the U.S. Economy", December 2009.

1.4.2 Air Travel Demand

The demand for air travel is closely related to changes in the economy. As Figure 2 shows the growth trend in revenue passenger miles (RPM) over the last 30 years corresponds positively with the growth in Gross Domestic Product (GDP). The U.S. inflation-adjusted (real) economic output long-term growth trend has supported the continuing increases in the number of passengers and the miles traveled. There are some deviations in both GDP and RPM growth, which are caused by abnormal events, such as the terrorist attacks of September 11, 2001 and the current continuing adjustments in the financial sector. Full data is not available for 2010, but economic growth has resumed. It is at a slower pace than past recoveries, but the pace of long term economic growth is expected to increase because population growth, increases in productivity, and introduction of new technology will promote economic growth. This will result in continued future growth in air travel, which normally leads to more aircraft operations, and translates into increased workload for the FAA. It also translates into more pressure on the core airports to handle additional operations. Significant increases in operations at these airports could increase delays, and we must implement the advanced NextGen capabilities to provide the improved services to handle this growth.

A recent study by the National Center of Excellence for Aviation Operations Research (NEXTOR) Universities estimates the total cost of delay in the current national aerospace system and the potential for increases in these costs in the future. The direct cost of delay in 2007 for domestic airlines and passengers was estimated at $28.9 billion. The indirect cost of delay measured by reduced efficiency and productivity of the U.S. economy was estimated to be nearly $4 billion. The research concludes that, “One can certainly expect that new aviation technologies and procedures, including those associated with Next Generation Air Transportation System (NextGen), coupled with appropriate government policies and infrastructure investments have the potential to reduce the identified costs [of delays] by a very large percentage.”

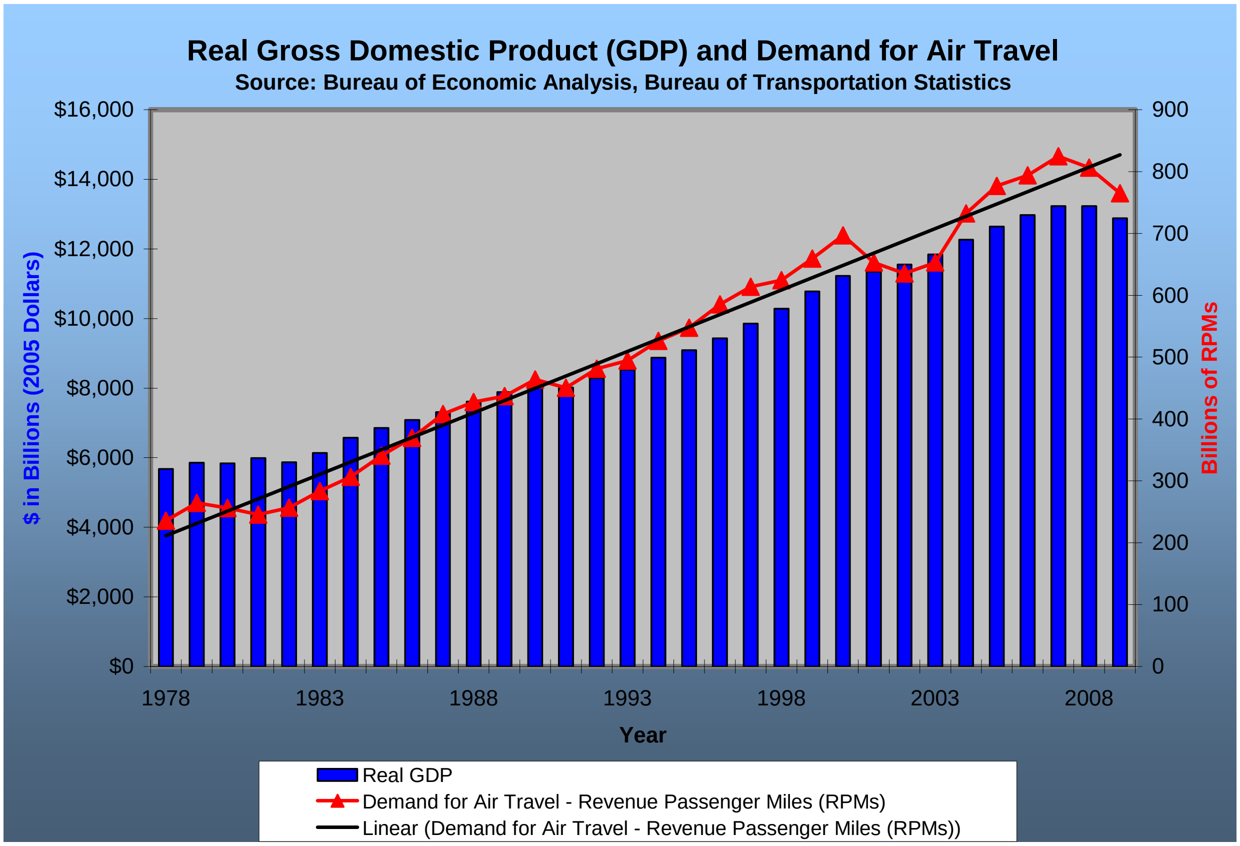

Figure 2 Air Travel Demand Growth Compared to Growth in GDP

1.4.3 Growth in Operations

In FY 2010, preliminary data show that air carrier operations are recovering from the effects of the significant downturn in the economy. Some of the sluggishness is due to air carrier's efforts to adjust their capacity to match demand. Once carriers have exhausted their ability to absorb demand with increased load factors and larger aircraft, operations should begin to increase. The economy is growing, and the Administration's economic forecast is for 3.4 percent annual growth in 2012.

The nature of the past downturn suggests that recovery will be slower than it was in past downturns and the strength of the recovery will be more muted. However, 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.

An ongoing effort to increase airport capacity also affects the need for capital investment, especially at the congested airports, which are experiencing significant delays. There are two projects currently active at Chicago O'Hare and Fort Lauderdale to expand capacity. Over the last decade, 23 airfield projects have been started or completed at 20 of the busiest airports, and these projects will provide those airports with the potential to accommodate 1.9 million more annual operations, decrease average delay per operation at these airports by about 5 minutes. These busy 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 frequently requires installing new navigational aids and precision landing systems to help pilots in the approach patterns for the runways. To achieve the full benefits of precision approach guidance systems, 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 airport. 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 investments normally require extensive planning and development time. They often take several years to implement because the systems being purchased are technologically complex and require development of both new software and hardware. New systems 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 many years in the future rather than assuming systems that can handle the present level of operations will be adequate. To help project managers assess the future operating environment, the FAA prepares an annual detailed forecast of future aviation activity.

Capital planning also 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 and efficiency.

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 system 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 a significant portion 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 to reduce operating costs. The payback period for some new equipment can be as short as 1 or 2 years, so it can be economical for the FAA to replace equipment in the short term while designing and testing NextGen systems. When the equipment reduces energy consumption, it has the added benefit of lowering emissions, which is receiving more attention lately. 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 2012 budget includes $590 million to deploy transformational programs including Automatic Dependent Surveillance - Broadcast (ADS-B), Data Communications (DataComm), NextGen Network Enabled Weather (NNEW), NAS Voice System (NVS), Collaborative Air Traffic Management Technologies (CATMT) 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 are necessary to implement NextGen operations.

The FAA requests an additional $515 million over and above the funding for the transformational programs to develop procedures and technology to support the NextGen solution sets (i.e., trajectory-based operations and the six others described in section 3). Future investments in improved communications, navigation, surveillance, and automation systems will support transition to a more capable air traffic control system, which will result in more efficient use of available capacity, as well as reducing the cost of air travel and reducing its environmental impact.

This CIP shows that 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.

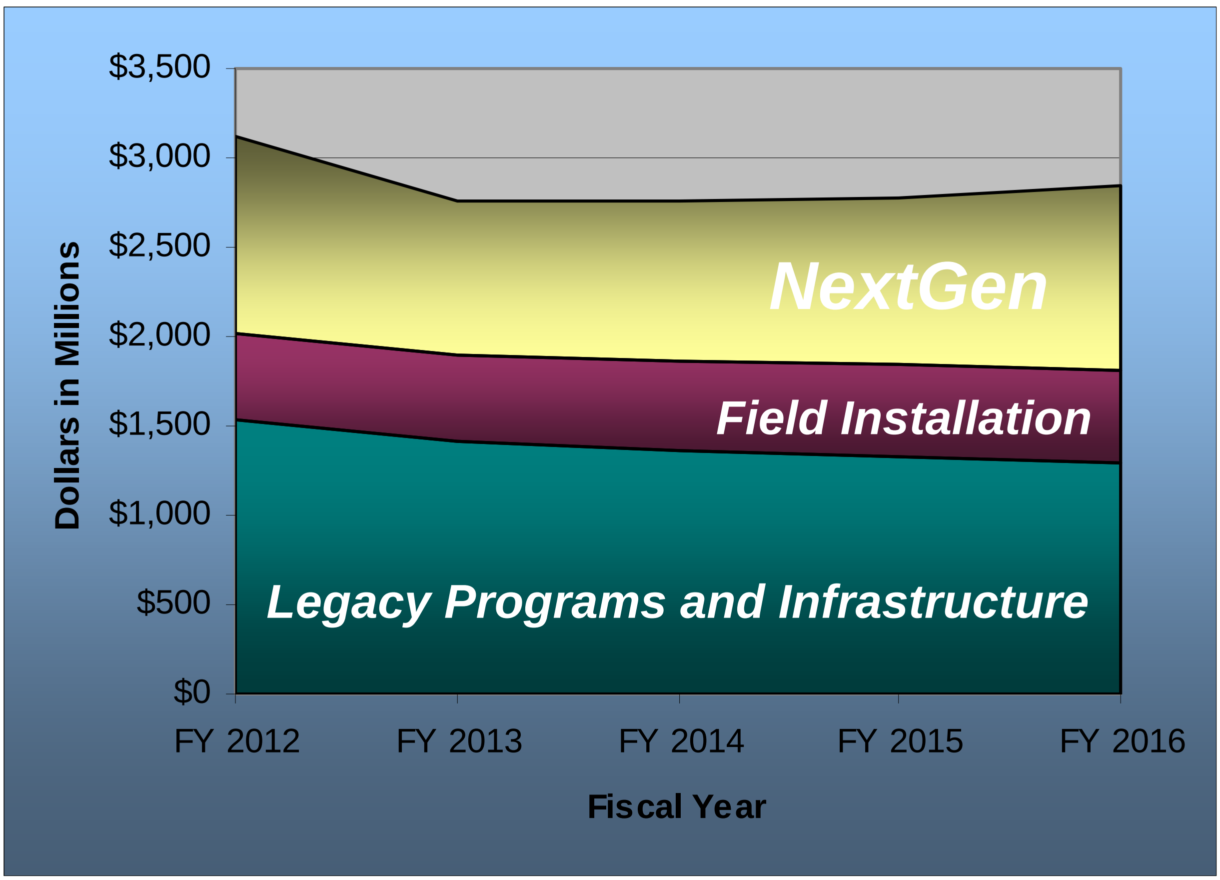

Figure 3 NextGen Portfolio Relative to the Total Capital Request

3 Next Generation Air Transportation System

The FAA has begun evaluating and demonstrating improvements to the existing air traffic control system to keep pace with expected future demand. Passenger bookings are increasing for some air carriers and air freight tonnage is increasing. In the short term, this demand is being met by increased load factors and replacement of smaller regional aircraft with larger aircraft. If growth reappears as expected, increased operations will be necessary to support the demand, and our current air traffic control system is neither scalable nor flexible enough to meet significant increases in future demand.

Some current efforts to introduce NextGen capabilities include:

- incorporating the ability to handle ADS-B surveillance data into terminal and en route automation systems;
- improvements to Conflict Alert systems for en route controllers,
- designing procedures that offer the most benefits to aircraft that equip to make use of NextGen improvements,
- evaluation of surface management techniques at Memphis and Orlando,
- installation of new runway visual range sensors and distance measuring equipment to increase the number of landings airports can accommodate
- prototype demonstrations of the Tower Flight Data Management System, and
- Preparation of NextGen test beds at three locations

Our planning for NextGen investments, as reflected in this Plan, allows us to remain on track to deliver the FAA's core framework for NextGen implementation, particularly the capabilities requested by the aviation community. These core elements include improving surface operations, freeing up metroplex congestion and implementing ADS-B ground infrastructure, progress that focuses on delivering capabilities to operators and benefits to the public. Highlighted below are more details about these core elements of NextGen.

- **Surface Movement Improvements**

By installing surface monitoring systems and integrating the information into automation support and sharing that information with aircraft operators, we can decrease taxi delays and fuel consumption. Taxi route instructions can be issued from automation systems and aircraft conformance to those instructions can be tracked to ensure ground operations are more efficient by reducing the time to taxi to the runway.

- **Metroplex Airport Operations**

In addition to improving efficiency of ground operations at major metropolitan area airports as noted above, several steps can be taken to reduce approach path length and improve runway utilization. Development of Required Navigation Performance (RNP) approach procedures creates shorter approach paths for equipped aircraft. Improvements that support higher utilization of closely spaced runways allow a larger number of arrivals and departures in limited visibility conditions. Restructuring airspace around these large airports can increase the efficient sequencing of aircraft and promotes fuel efficient procedures and shorter approach paths.

- **Automatic Dependent Surveillance**

Funding of the nationwide implementation of ADS-B will continue. Using this system will improve the accuracy of position information available to controllers resulting in better use of available airspace and increased safety for general aviation operations. ADS-B already provides a major improvement in air traffic safety and efficiency over the Gulf of Mexico, and advanced applications will support efforts to allow pilots to self separate in areas with limited radar coverage.

The roadmaps in this CIP reflect the scope of the NextGen initiatives as contained in the 2010 planning cycle, but once the service roadmaps and enterprise architecture roadmaps are revised over the next several months, it likely there will be an adjustment in scheduled activities.

NextGen solution sets described in this section identify specific operational improvements that will enhance system capacity and efficiency. Integration efforts have been ongoing to identify the capital improvements necessary to meet these timelines (the roadmaps in section 4 show the 2010 approved estimate for progression from the current system to NextGen capabilities). Sections 3.1 through 3.7 describe the mid-term operational improvements and initiatives that will require funding in the FY 2012 and future budgets.

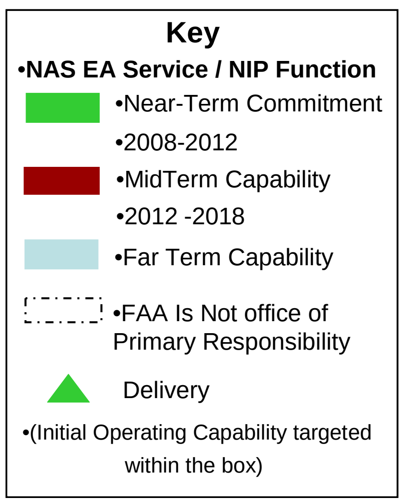

Figure 4 Service Roadmap Legend

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 continually updates the aircraft position, so the controller can determine whether the aircraft 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.

Timeline:

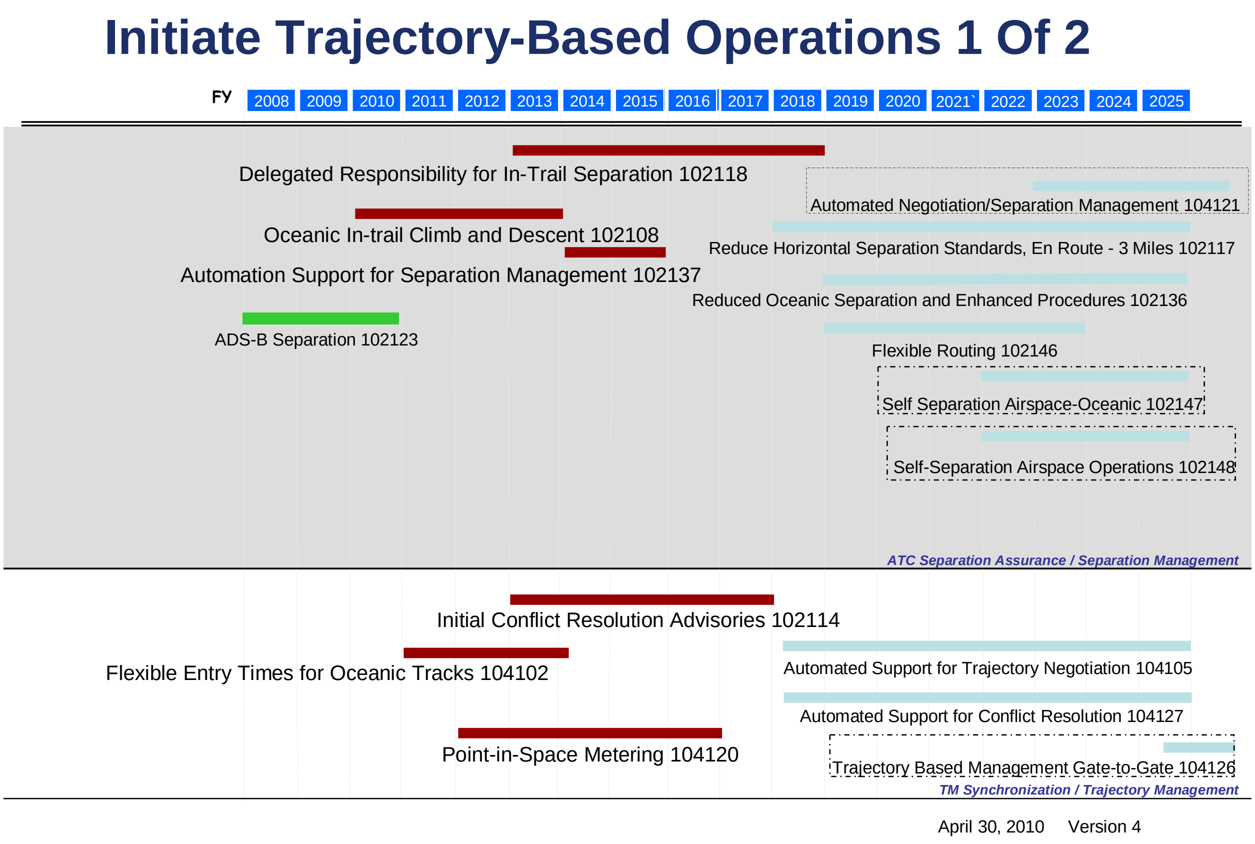

Figure 5 Trajectory Based Operations (1)

Operational Improvements

This section describes the mid term-planned operational improvements associated with TBO. In Figure 5, the ATC Separation Assurance/ Separation Management services area, planned improvements are the following:

1. Delegated Responsibility for In-Trail 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. Air traffic 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). FAA investments would include upgrades to ATOP (an oceanic air traffic automation system) and CPDLC capabilities.
3. Automation Support for Separation Management 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 ERAM D-position upgrade and system enhancements will have to be operational.

In the TM Synchronization/Trajectory Management services area 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 ERAM D-position upgrade and system enhancements; 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.
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 to ensure smooth flow of traffic and efficient use of airspace. The FAA will invest in Collaborative Air Traffic Management (CATM) upgrades; the ERAM D-position upgrade and system enhancements; and the Time 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 reducing the need to alter aircraft flight paths to maintain separation.

Timeline:

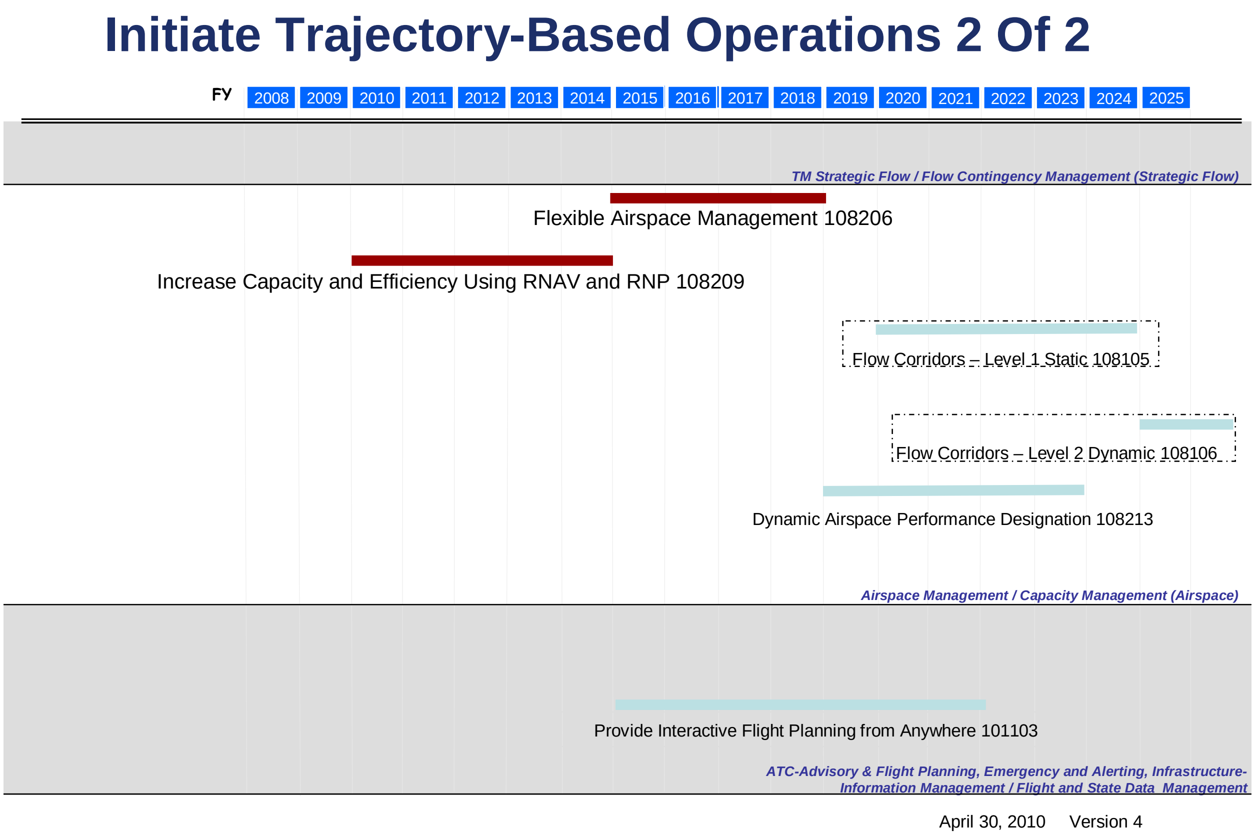

Figure 6 Trajectory Based Operations (2)

In Figure 6, the Airspace Management/Capacity Management service area's planned mid-term improvements are:

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 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; Time Based Flow Management (TBFM); the NextGen Weather Processor; and the NAS Voice System.

2. Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP) would expand the number of approach and departure

routes at airports for those aircraft equipped with highly accurate aircraft navigation systems and qualified pilots. The FAA would have to invest in CATM work package 2; ERAM release 2 and the ERAM D-position upgrade and system enhancements; WARP and Integrated Terminal Weather System (ITWS); the 4D weather cube and additional Distance Measuring Equipment (DME) systems. More accurate weather information allows the FAA to reduce the length of diversions to alternative flight paths when they are needed to avoid severe weather.

3.2 Increase Arrivals and Departures at High Density Airports

Summary Description:

This 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.

Operational issues make it difficult for an airport to achieve its maximum arrival or departure capacity. If the arrival stream to an airport contains a mixture of small and large aircraft, maximizing runway capacity is not possible. Differences in aircraft arrival speed or the effect of wake turbulence from large aircraft require increased separation between aircraft. Wake turbulence from a large aircraft requires controllers to increase separation to 5 miles or more between the two aircraft when a small aircraft is following a larger aircraft. Multiple runways at an airport 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 that have overlapping terminal airspace must share that airspace, and significant restrictions on terminal operations result, when winds dictate that an approach path used for the active runways at one of the airports limits the use of approach paths for certain runways at nearby airports. Operational improvements in this solution set address some of these limitations in order to make more efficient use of the available runways

Timeline:

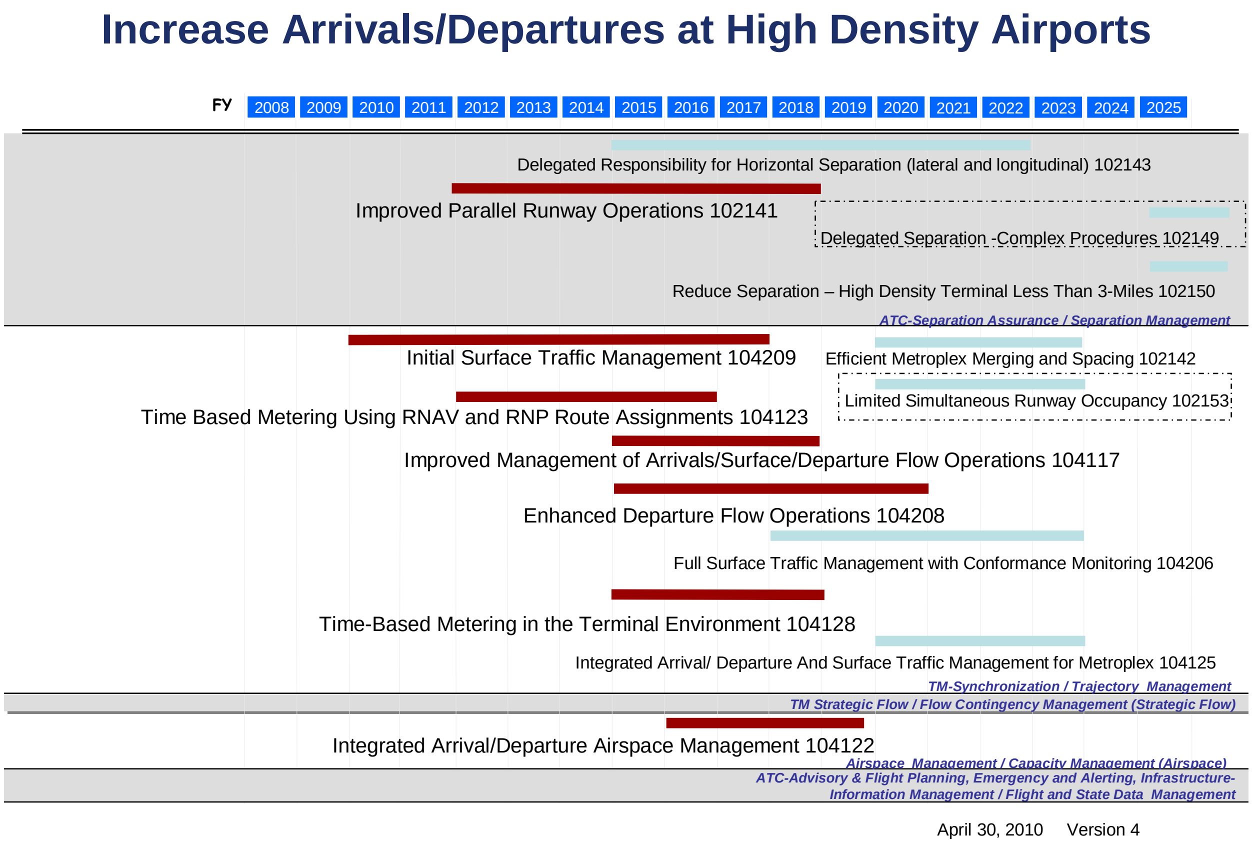

Figure 7 Increase Arrivals/Departures at High Density Airports

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Arrivals/Departures at High Density Airports. In Figure 7 the ATC Separation Assurance/Separation Management service area's planned improvement is:

> Improved Parallel Runway Operations which will explore concepts to recover lost capacity by reducing separation standards for two aircraft approaching side by side to closely spaced parallel runways. 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. Depending on the amount of runway separation, these procedures can be for dependent (terminal controller must adjust separation) or independent (ATC shares separation responsibility with the flight deck) operations in lower visibility conditions. Investments planned 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.

In the Traffic Management Synchronization/Trajectory Management services area, 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. By better scheduling departures from the gate, the time between leaving the gate and takeoff is reduced resulting in fuel and time savings. Investments that support this capability are: Time Based Flow Management (TBFM), Tower Flight Data Manager (TFDM), Airport Surface Detection Equipment, and the System Wide Information Management (SWIM) segment 2.
2. Time Based Metering Using RNAV and RNP Route Assignments allows 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 that support this capability include the ERAM Midterm work package; TBFM; Weather and Radar Processor; 4D Weather Cube; and Distance Measuring Equipment. These investments allow the FAA to establish and use these routes.
3. Improved Management of Arrivals/Surface Departure Flow Operations integrates advanced arrival and 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 aircraft sequencing to optimize use of airport capacity. Investments that support this capability 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.
4. Enhanced Departure Flow Operations incorporate taxi instructions, surface movement information, and aircraft wake category in decision support tools. Clearances are developed, delivered, monitored and provided in digital data or textual format to the flight deck display. Surface decision support and management systems use ground and airborne surveillance and a scheduling and sequencing system to develop and maintain schedules of departing aircraft to optimize runway use and facilitate transmission of other operational information.
5. Time Based Metering in the Terminal Environment optimizes use of terminal airspace and surface capacity. Automation develops trajectories and allocates time-based slots for various points within the terminal environment, using RNAV routes enhanced surveillance, and data communications. It extends current metering capabilities into the terminal environment and supports end-to-end metering and trajectory-based operations. It also supports capabilities designed to expand the use of terminal separation standards in transition airspace, and builds the foundation for future advanced airborne-based applications that will use ground-based automation to maintain the sequence of aircraft into and out of high density terminal locations.

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

> Integrated Arrival/Departure Airspace Management to take advantage of terminal procedures and separation standards in adjacent en route airspace to increase flow and introduce additional routes and flexibility. Investments that support this capability are the CATM Work Package 3; the ERAM Midterm work package; the TBFM Work Package 3; 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 set reflects the common needs that all airports have: precision landing guidance, surface situational awareness, and improved management of flight data.

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. We anticipate that some satellite airports will experience higher traffic demand due to migration of aircraft with less sophisticated avionics to these smaller airports to avoid traffic congestion. These airports can serve an important role by handling the potential increase in use of personal aircraft for pleasure and business.

Timeline:

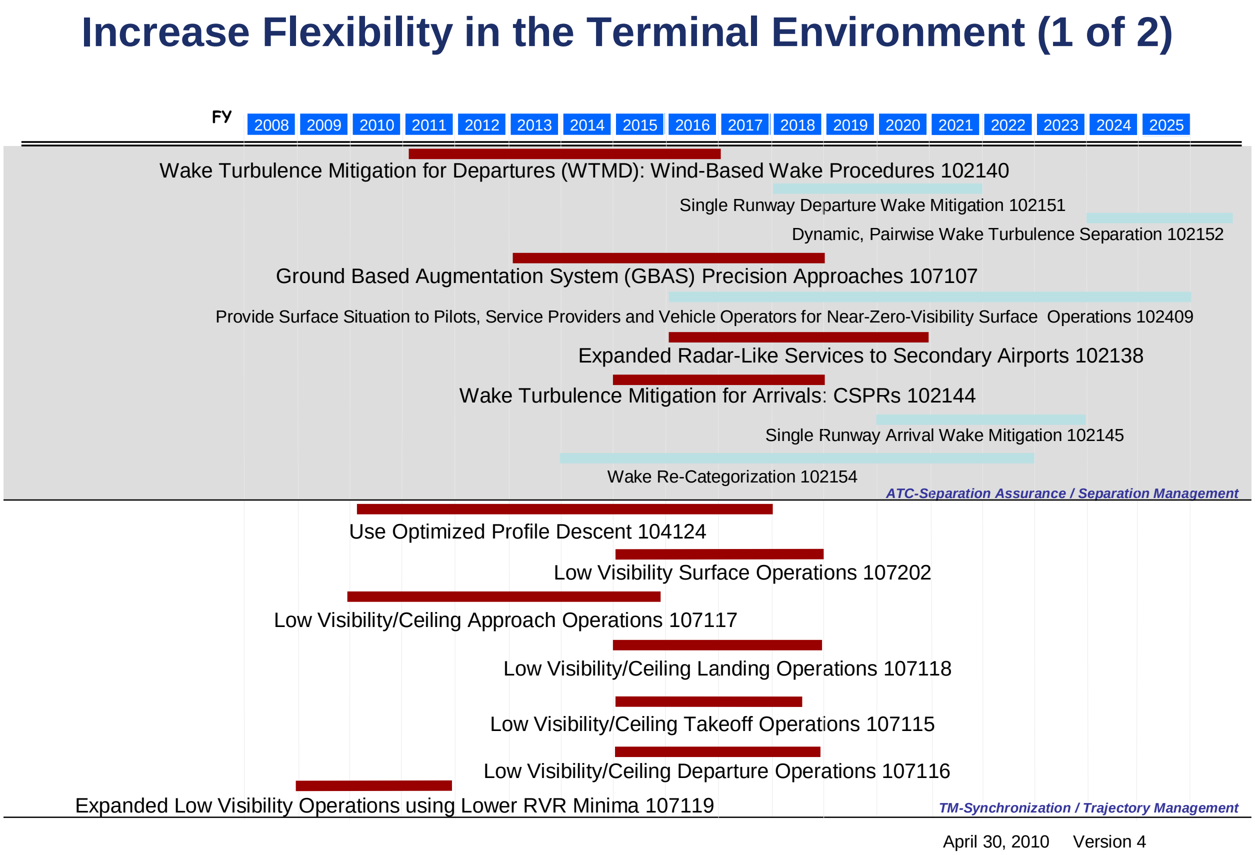

Figure 8 Increase Flexibility in the Terminal Environment (1)

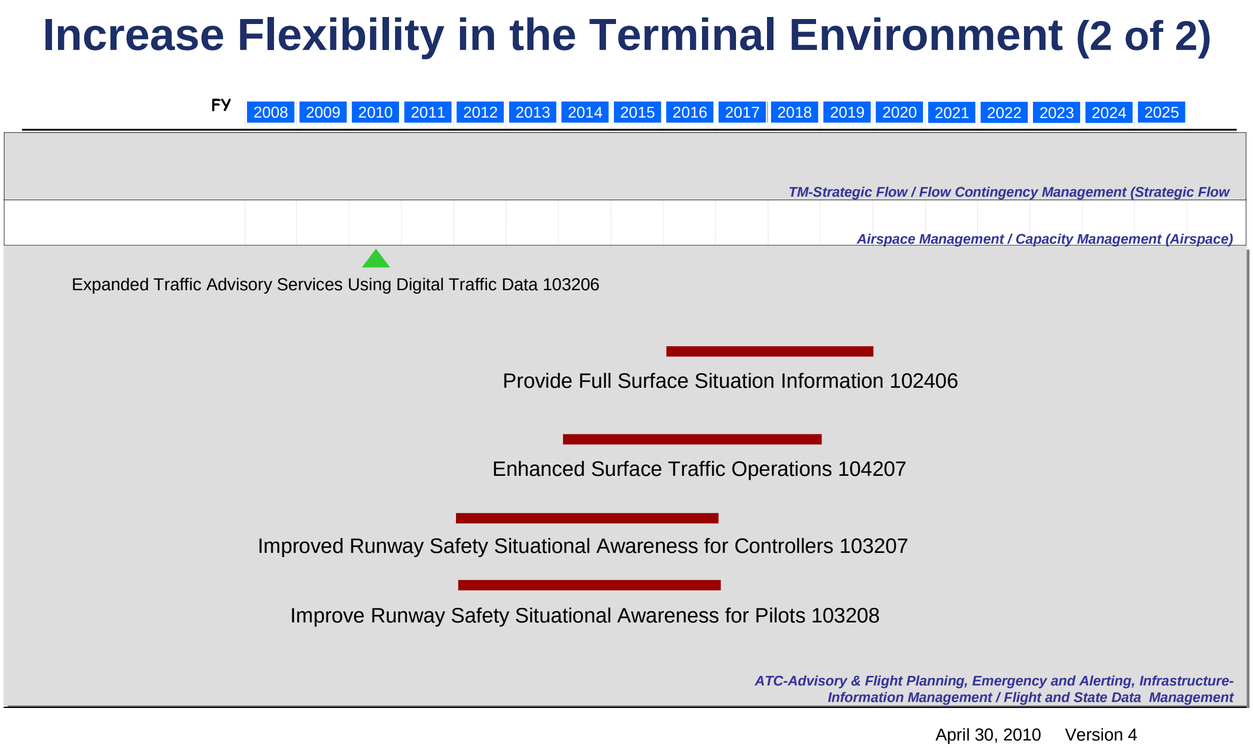

Figure 9 Increase Flexibility in the Terminal Environment (2)

Operational Improvements

This section describes the mid-term planned improvements associated with Increase Flexibility in the Terminal Environment. In Figure 8 the ATC Separation Assurance/Separation Management services area planned improvements are the following:

1. Wake Turbulence Mitigation for Departures (WTMD): Wake turbulence separation standards can be adjusted quickly to allow more departure operations on an airport's Closely Spaced Parallel Runways (CSPR), which would improve use of runway capacity, based on wind measurements. Investments that support this capability are a small laptop sized computer to process observed and forecasted airport wind information, and enhanced tower controller display areas to indicate which runways can be used for immediate departures after a Boeing 757 or heavier aircraft departs on an adjacent CSPR. The wake turbulence generated by a departing 757 or heavier aircraft presents a serious danger to aircraft that depart after them on an adjacent CSPR. Aircraft generated wakes are transported by crosswinds. The WTMD system measures and forecasts runway crosswinds to determine when there will be sufficient crosswind to prevent the wake from a departing aircraft from moving into the takeoff corridor of an aircraft departing on an adjacent runway. Using WTMD during periods of favorable crosswinds will allow controllers to maximize the departure capacity of an airport's CSPR.
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 that support this capability 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. Expanded Radar-Like Services to Secondary Airports will be available in Instrument Meteorological Conditions (IMC) at secondary airports. Equipped aircraft will automatically receive airborne broadcast traffic information, and at select airports surface traffic information. Enhanced surveillance coverage will also be available in areas of mountainous terrain where radar coverage is limited.

4. Wake Turbulence Mitigation for Arrivals (WTMA) allows controllers to reduce the instrument flight rules wake mitigation dependent staggered separation for two aircraft landing on an airport's adjacent CSPR. When crosswinds are stable and strong enough so that the wake of the lead aircraft landing on one runway can not be transported into the path of the following aircraft, controllers can reduce wake mitigation separations. To implement WTMA investments would include a small laptop sized computer to process observed and forecasted airport wind information and enhancements to terminal area controller displays to show the minimum diagonal separation between approaching aircraft.

The Traffic Management Synchronization/ Trajectory Management service area (shown in Figure 8) planned improvements are the following:

1. Use Optimized Profile Descent permits aircraft to minimize power settings during descent to an airport to save fuel. These descent profiles have been tested, and they save significant fuel. Investments that support this capability include: TBFM Work Package 3, the ERAM D-position upgrade and system enhancements, 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 improved location information. Investments that support this capability 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 that support this capability 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 that support this capability 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. 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 that support this capability 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 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 Figure 9, the ATC Advisory and Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's planned improvements are the following:

1. Provide Full Surface Situation Information by broadcasting aircraft and vehicle position to ground and aircraft displays 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 that support this capability 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 that support this capability 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 that support this capability 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 that support this capability 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 flights 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.

Existing 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:

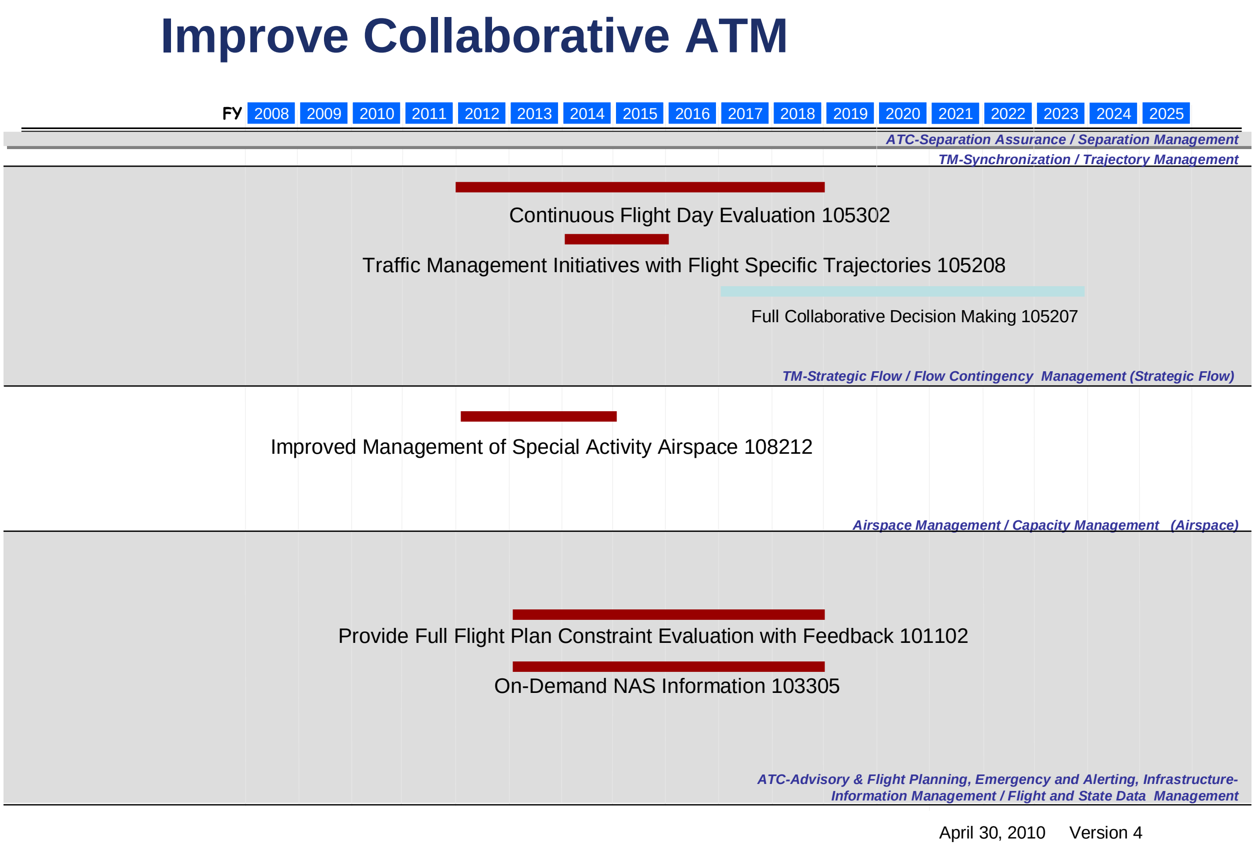

Figure 10 Improve Collaborative ATM

Operational Improvements

This section describes the mid-term planned improvements associated with Improve Collaborative Air Traffic Management.

In Figure 10, the Traffic Management Strategic Flow/Flow Contingency Management service area's 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 that support this capability are: the Aeronautical Information Management (AIM)

segment 2, CATM work packages 2, 3 and 4, the ERAM D-position upgrade and system enhancements, 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 that support this capability are: the CATM work package 2, the ERAM Release 2, ERAM D-position upgrade and system enhancements; 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 service area the planned improvement is the following:

Improved Management of Special Use Airspace 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. Investments that support this capability are AIM segment 2; the CATM work package 3; the ERAM D-position upgrade and system enhancements and accelerated TDLS.

In the ATC - Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area, 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 that support this capability are; Flight Service Automation Modernization (FSAM); AIM segment 2; the ERAM D-position upgrade and system enhancements; 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 that support this capability include weather observing information display systems; FSAM; AIM segment 2; CATM work packages 2 and 3; En Route Information Display System (ERIDS); the ERAM D-position upgrade and system enhancements; 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:

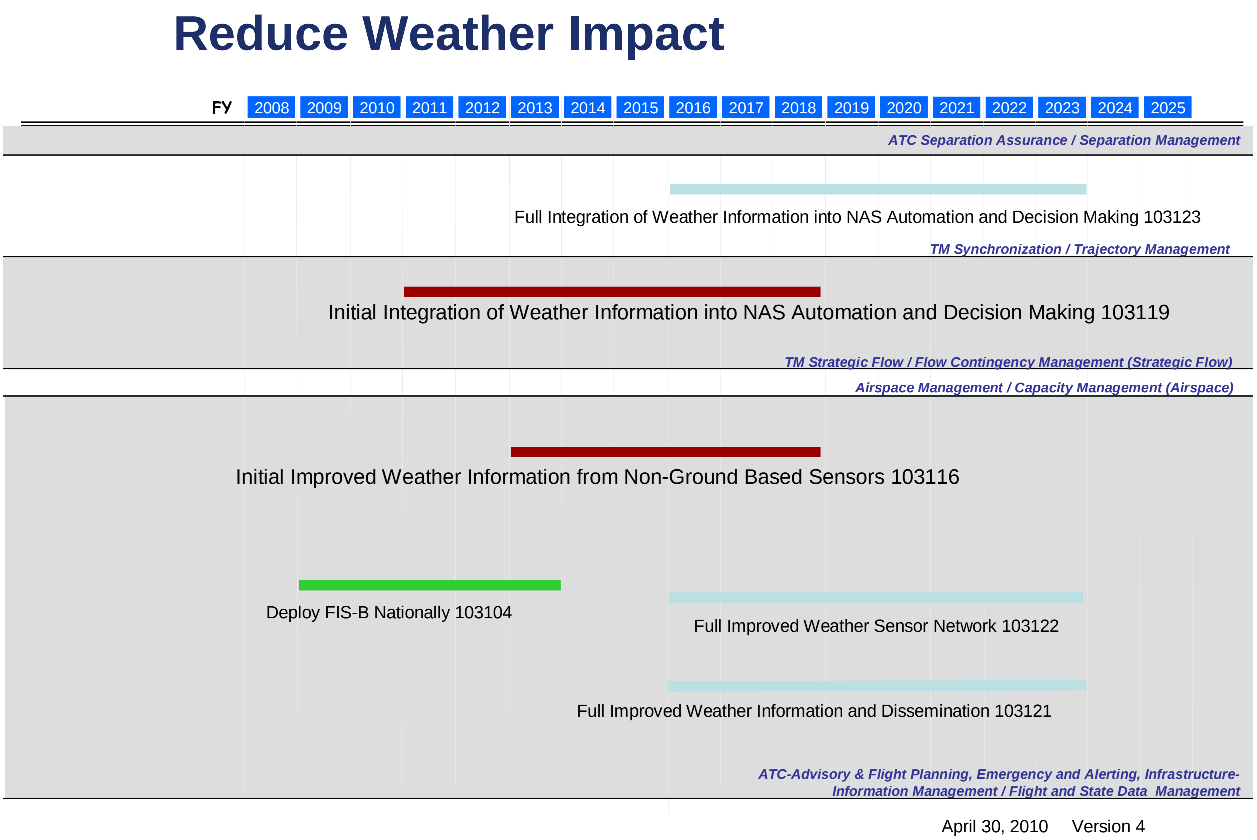

Figure 11 Reduce Weather Impact

Operational Improvements

This section describes the mid-term planned improvements associated with the Reduce Weather Impact solution set.

In Figure 11, the Traffic Management Synchronization/Trajectory management service area's 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 that support this capability 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.

The ATC Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's 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 that support this capability are: upgrades to Flight Service stations, AIM segment 2, the CATM work package 2, DOTS, the ERAM Midterm work package, the ERAM D-position upgrade and system enhancements, 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 interweave safety analysis with every initiative that is part of the NextGen effort. As NextGen technologies are introduced in the NAS, cross-cutting teams of safety experts from FAA lines of businesses (LOB's) will ensure that potential risks due to system changes are identified and adequately mitigated. Integrated safety assessments of NextGen conceptual initiatives will identify hazards and potential contributory factors (e.g., high workload, training, fatigue, and situational awareness) to help validate requirements for system design and implementation.

An integrated Safety Risk Management (SRM) capability for NextGen portfolios will enable safety stakeholders to take a system-of-systems approach to ensure safe design and implementation of NextGen mid-term capabilities. Risk-based models for NextGen concepts/solution sets will be developed at the NextGen Integration and Evaluation Capability (NIEC) lab in coordination with the aviation research stakeholders on human factors during NextGen development.

The ATO Safety Management Services will integrate and fuse ATC safety data sources, current and future, to support the safety data analysis for prognostic safety risk management of NextGen initiatives.

Safety Timeline:

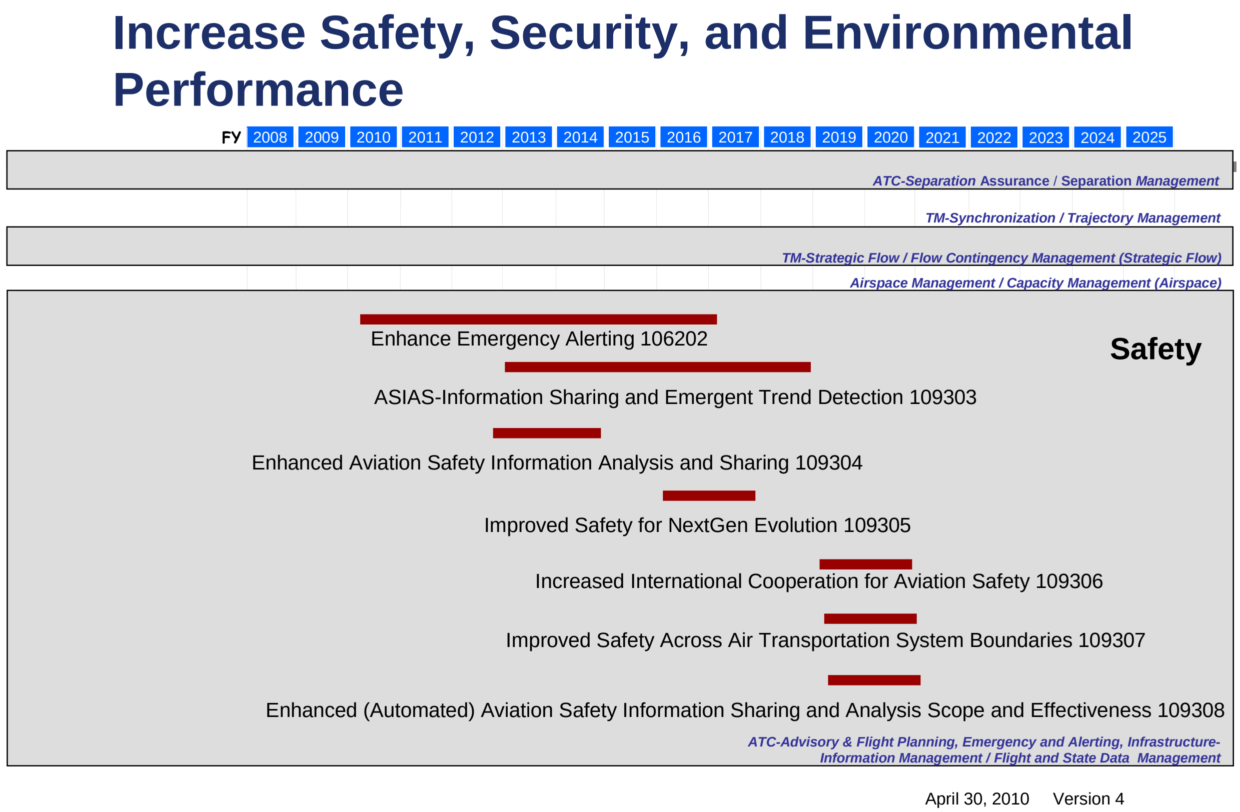

Figure 12 Increase Safety

Operational Improvements

This section describes the mid-term planned improvements associated with the Increase Safety timeline.

In Figure 12, the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's 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 that support this capability are FSAM; upgraded terminal automation systems; the Oceanic Automation System; the ERAM D-position upgrade and system enhancements; 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 that support this capability are: AIM segment 2, the ERAM D-position upgrade and system enhancements, the Remote Maintenance Logging System (RMLS)/Swim interface, DataComm segments 1 and 2, the NAS Voice System (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 that support this capability 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 that support this capability are: DataComm segment 1, the NAS Voice System, and ASIAS.
5. Increased International Cooperation for Aviation Safety will reduce safety risk associated with international operations by harmonizing standards, regulations and procedures. A special focus will be on the handling of dangerous goods
6. Improved Safety Across Air Transportation Boundaries will address similar issues to item 5 above.
7. Enhanced (Automated) Aviation Safety Information Sharing and Analysis Scope and Effectiveness will automate risk identification and notification processes. The ASIAS will be expanded to include additional data sources and enhanced by actions that improve data security, quality and scope.

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:

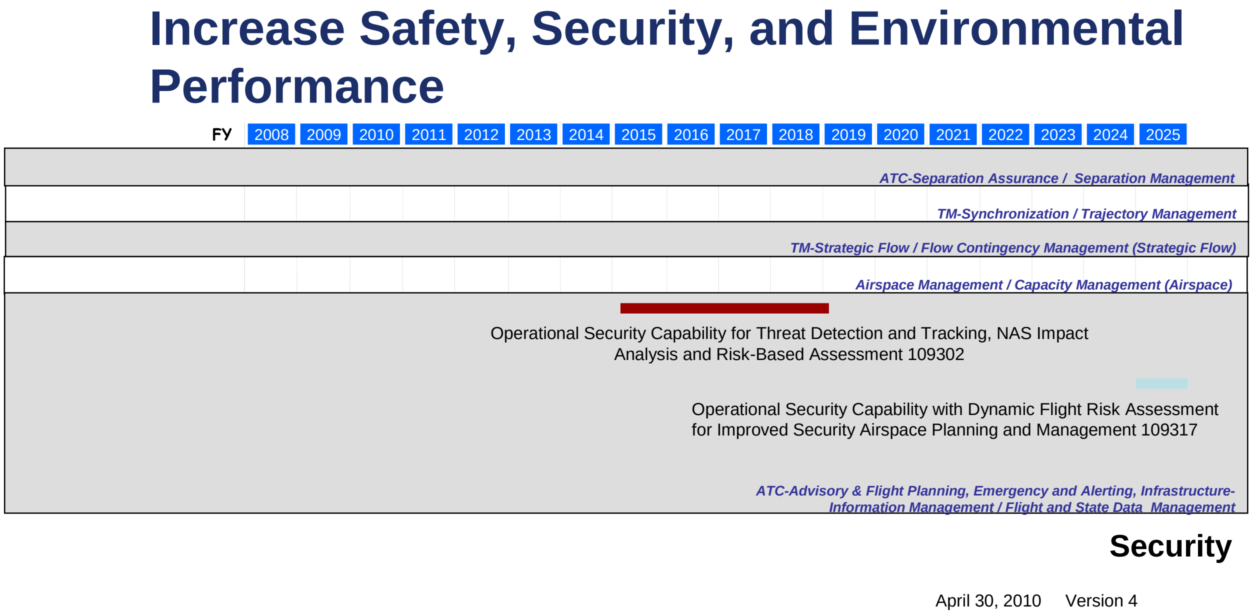

Figure 13 Improve Security

Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Security timeline.

In Figure 13 the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area's 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 that support this capability 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:

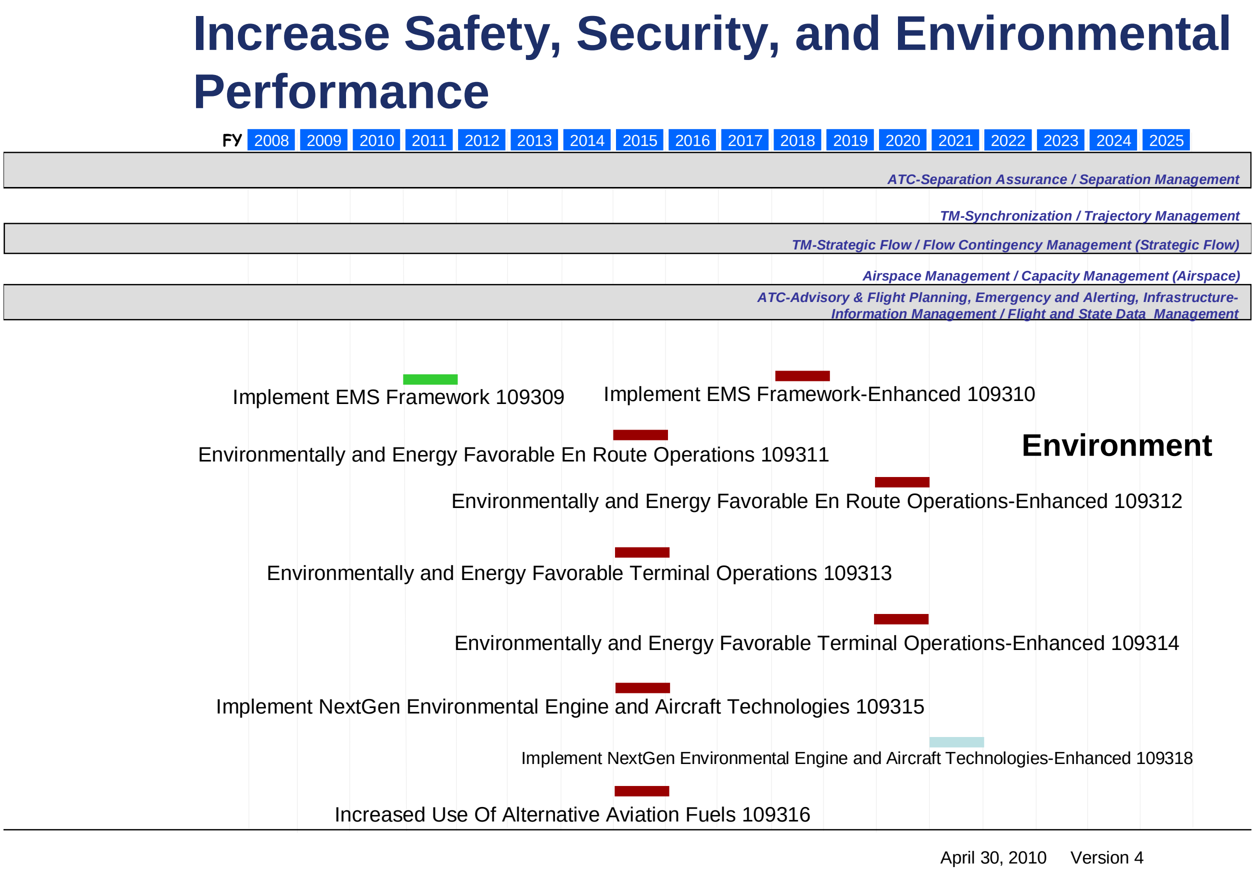

Figure 14 Improve Environmental Performance

Operational Improvements

This section describes the mid-term planned improvements associated with the Improve Environmental Performance timeline. Many of the Operational Improvements shown below are supported by the NextGen project – Environment & Energy – Environmental Mgmt System & Noise/Emission Reduction, which provides the funds to model and demonstrate the initiatives aimed at achieving these improvements. Capital investment will be needed to implement the operational improvements

In the Environment service area, the operational improvements include the following:

1. Implement EMS Framework – Enhanced will further enable the use of the Environmental Management System (EMS) framework for subsequent applications including refined environmental goals and decision support tools to address, plan and mitigate environmental issues through implementation of ongoing EMS improvements and availability of enhanced environmental information.
2. Environmentally and Energy Favorable En Route Operations will optimize en route operations to reduce emissions, fuel burn and noise. It will take advantage of new operational capabilities such as advanced aircraft technologies including Flight Management Systems and avionics to achieve more efficient en route operations for individual aircraft and system wide (which would include environmentally sensitive areas).
3. Environmentally and Energy Favorable En Route Operations – Enhanced will further optimize en route operations to reduce emissions, fuel burn and noise. It will use the EMS for real time route planning to reduce environmental impact and improve operations system wide.
4. Environmentally and Energy Favorable Terminal Operations will optimize aircraft arrival, departure, and surface operations to reduce emissions, fuel burn and noise using environmentally favorable procedures. It will develop enhanced surface operation procedures to maximize airport through put.
5. Environmentally and Energy Favorable Terminal Operations – Enhanced will further optimize aircraft arrival, departure, and surface operations to reduce emissions, fuel burn, and noise.
6. Implement NextGen Environmental Engine and Aircraft Technologies will reduce aircraft noise, emissions, and fuel burn through improvements in engines and airframe technologies based on the Continuous Low Emissions, Energy, and Noise (CLEEN) program.
7. Increased Use of Alternative Aviation Fuels will determine the feasibility and market viability of alternative aviation fuels for civil aviation use. It will obtain certification of Hydrotreated Renewable Jet (HRJ) fuels from fossil and renewable resources that are compatible with the existing infrastructure and aircraft fleet and will meet the requirements for a “drop in” fuel.

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:

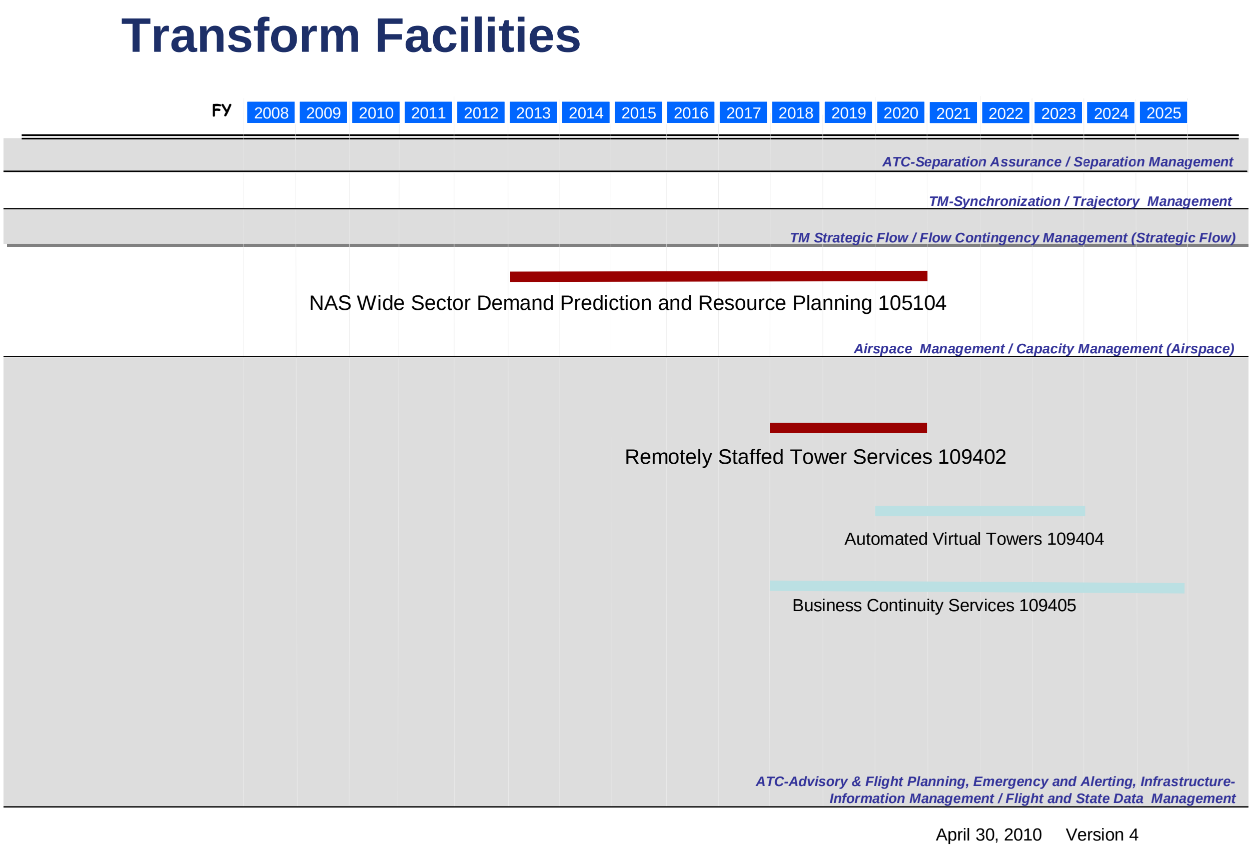

Figure 15 Transform Facilities

Operational Improvements

This section describes the mid-term planned improvements associated with the Transform Facilities solution set.

In Figure 15, the Airspace Management/Capacity Management service area's operational improvement is:

> NAS Wide sector Demand Prediction and Resource Planning which uses an integrated model of capacity resource drivers and demand information from collaborative decision making (CDM) to determine the capacity impact of key resource constraints such as: (1) gate, airspace or runway blockages (for safety, security or weather); (2) fleet mix and performance characteristics; (3) flow structure which modifies the complexity of the operation; and (4) workload. It also models strategic resources (e.g., airspace, sectors, personnel, facilities, NAS systems) in parallel with systemic changes in demand due to increases in air traffic, seasonality, or city pair business case decisions. Future traffic loads are modeled against various solutions to mitigate adverse impacts to users.

In the ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure Information Management/Flight and State Data Management service area, 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 that support this capability are: upgraded terminal automation systems, TFDM, DataComm segments 1 and 2, the NAS Voice System, 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 subsections are an integral part of the NAS Enterprise Architecture to 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 stretching beyond the five year timeframe of the CIP. The roadmaps are our plan for 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.

Transition to NextGen requires detailed engineering design and testing of both new equipment and operational changes. 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 annually to reflect results of studies, demonstration projects, and economic analysis related to projects; however, the roadmaps are and should be reasonably stable 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 anytime within the next 5 years except the internal labor related project are described in appendix B. For more detailed information on the roadmaps, view the Enterprise Architecture and Roadmaps at: https://nasea.faa.gov

Figure 16 shows and defines the symbols used in the roadmaps. The dashed lines indicate that a system may be drawn down 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.

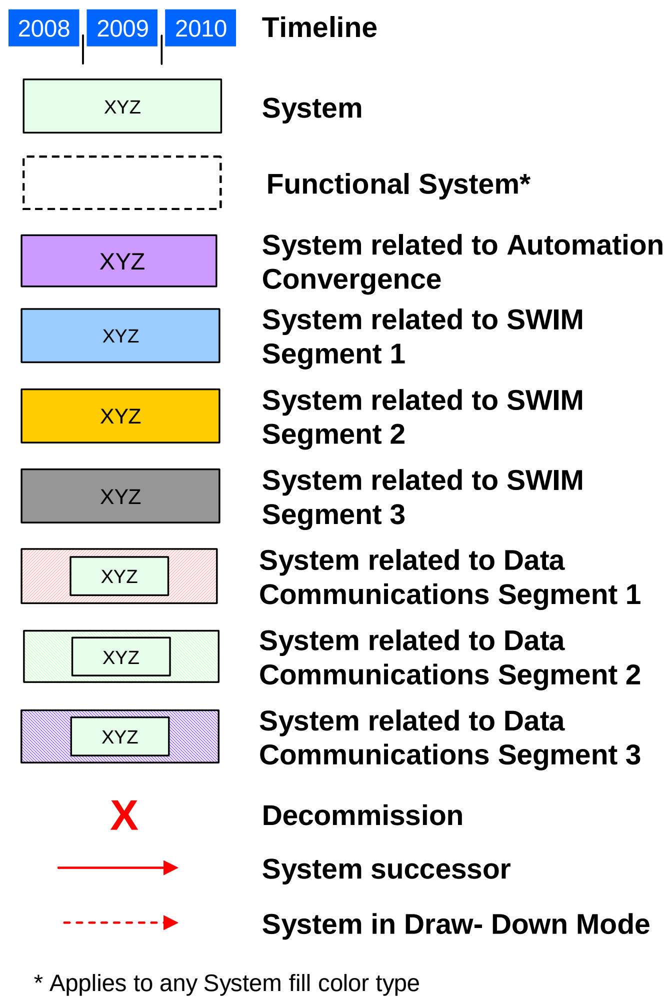

Figure 16 Roadmap Legend

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 and then back to terminal and tower as the aircraft approaches its destination.
- 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 17 and 18 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.

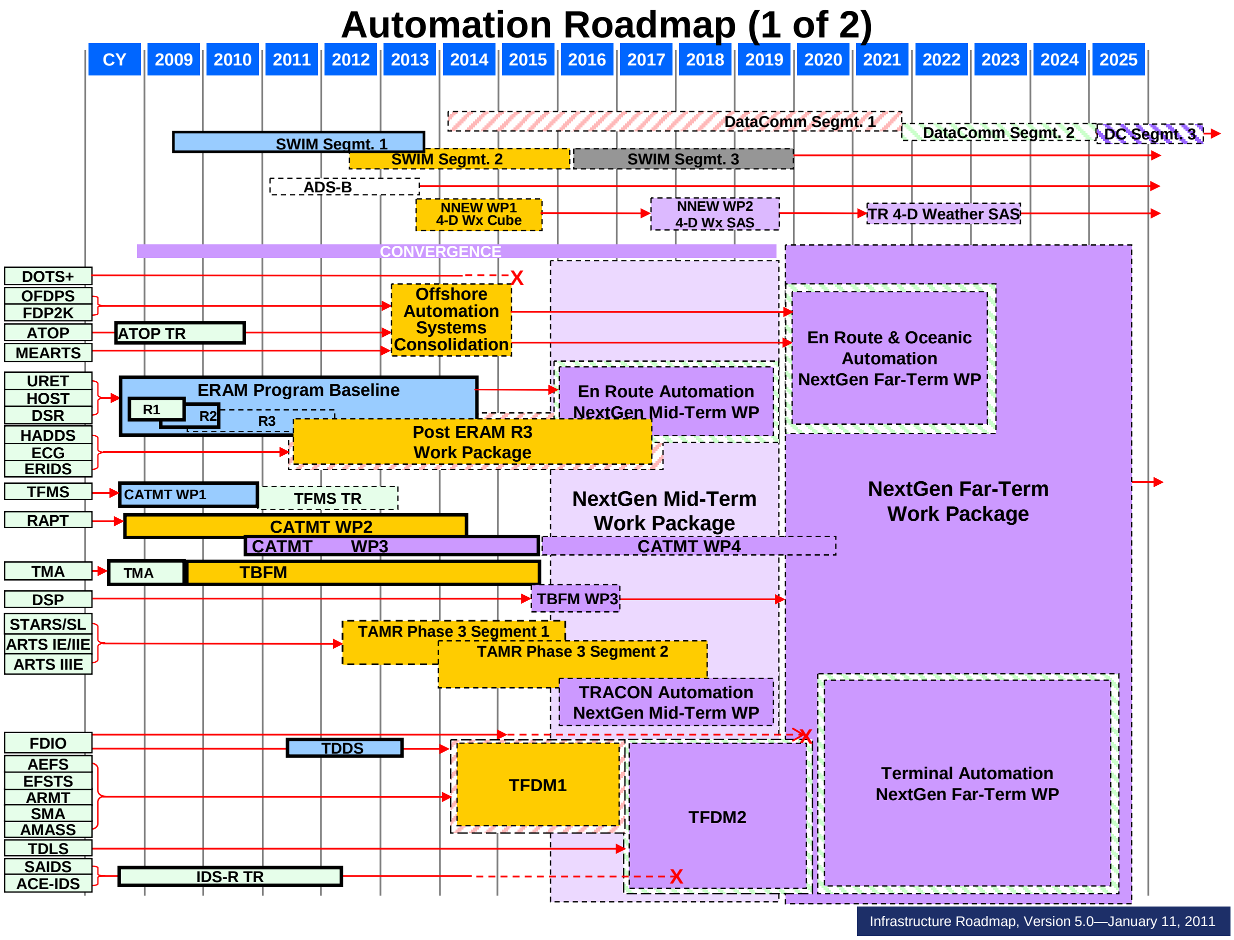

Figure 17 Automation Roadmap (1 of 2)

Enabling technologies for NextGen appear at the top of the automation roadmaps: Data Communications (DataComm) Segments 1, 2 & 3, System-Wide Information Management (SWIM) Segments 1, 2, & 3, Automatic Dependent Surveillance-Broadcast (ADS-B), and the Next Generation Network Enabled Weather (NNEW) System which will use data from the 4-D Weather (Wx) Cube (which will support the 4-D Weather Single Authoritative Source (4-D Wx SAS). These systems are central to the concept of NextGen which relies on collecting and sharing information to improve operational efficiency. They transmit and receive critical information to support air traffic control in both the en route and terminal environments. DataComm and SWIM will allow improved data sharing that will minimize adjustments to planned trajectories and make more efficient use of airspace capacity. 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. ADS-B, which relies on position reporting from the aircraft to a ground station, will improve both the accuracy and update rate of surveillance systems. Collecting and sharing data provides common ground for all parties making operational decisions.

The first 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 plans to establish a program for consolidating these automation systems in 2013 and upgrading the consolidated system in the 2020 timeframe.

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 all these component pieces except ECG (which is a separate program) with new hardware and revised ATC software. Although originally planned to be deployed by December 2010 at all 20 sites, the ERAM program experienced several difficulties in its testing and deployment phase and is now being tested at operational sites. FAA plans to have it operational at the first site during FY 2011. ERAM is needed to replacing the aging legacy automation infrastructure that is not supportable over the long term, as well as provide a foundation for the agency's transition to NextGen. This new system will have the capacity and expansion potential to support the introduction of Next Gen operational improvements. The improvements are being added with a series of releases to introduce improvements as quickly as possible. The ERAM D-position upgrade and system enhancements will build in new software to fully 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 third group on the left side of the roadmap contains the systems used for traffic management, such as the Traffic Flow Management System (TFMS), Route Availability Planning Tool (RAPT), 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 both of aircraft in flight and of 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, by expanding collaboration to individual pilots and by improving information exchanged between the FAA and airline dispatch offices.

The next three systems (STARS/S L, ARTS 1E/IIE, and ARTS IIIE) are different terminal automation models that the FAA will maintain as separate systems, until the Terminal Automation Modernization and Replacement Phase 3 (TAMR P3) upgrades or replaces them. TAMR Phase 3 will initially update 11 larger ARTS systems and a decision is pending on whether it will replace all the current ARTS systems and upgrade the existing Standard Terminal Automation Replacement System (STARS) so they can process position information from the ADS-B system along with information from terminal radars.

The Tower Flight Data Management (TFDM) system supports a phased implementation of a new terminal local area network (LAN)-based infrastructure to reduce redundant displays and integrate flight data functions. TFDM will provide 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 whether information from additional systems such as the Automated Surface Observing System (ASOS) Controller Equipment-Information Display System (ACE-IDS), and System Atlanta Information Display System (SAIDS can be integrated in TFDM phase 2).

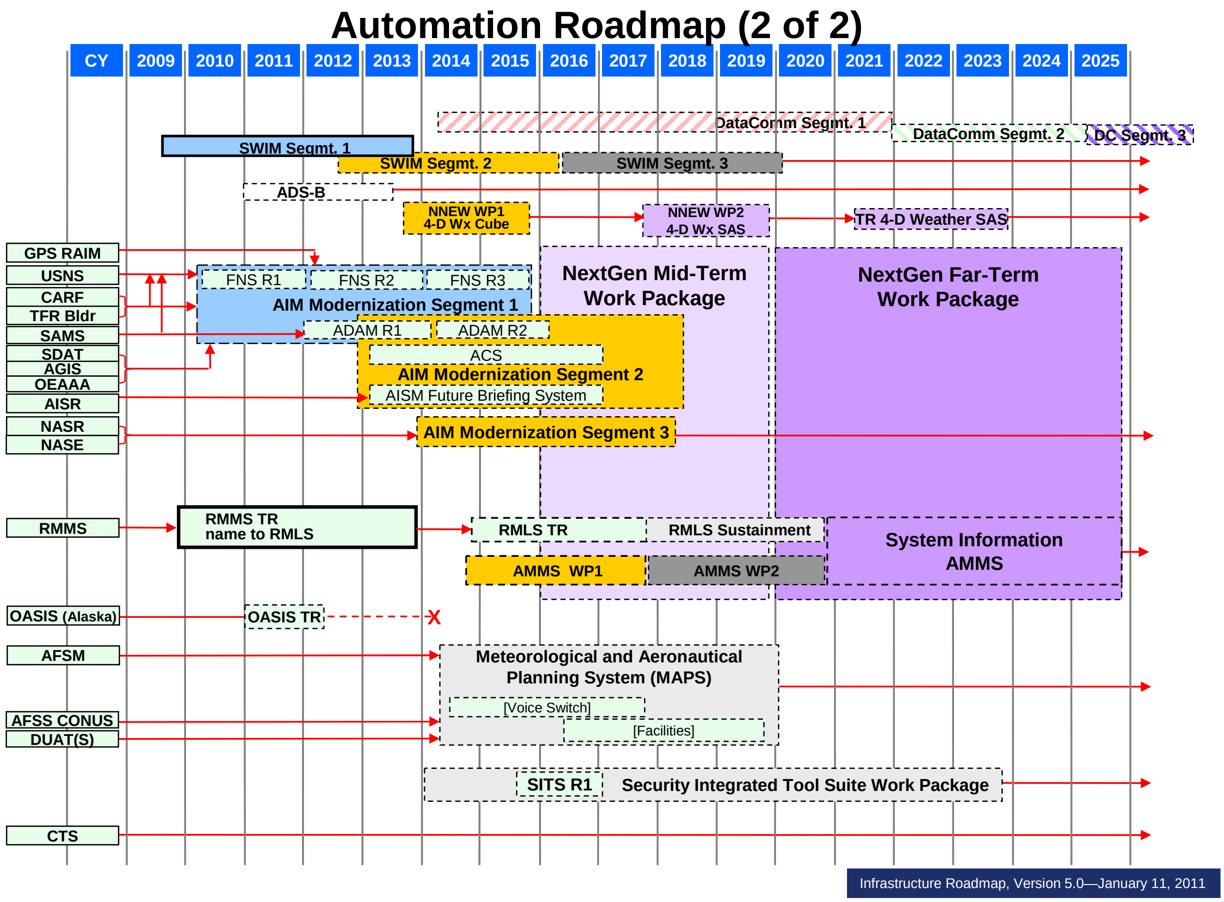

Figure 18 Automation Roadmap (2 of 2)

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.

OASIS (Alaska), AFSM, AFSS CONUS and DUATS support flight services. Flight services are mostly used by general aviation pilots and include weather briefings and flight plan filings. 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. The FAA has contracted for flight services in the lower 48 States, and flight service specialists use Automated Flight Service Systems (AFSS CONUS) to record flight plans and provide weather briefings to pilots. The Alaska Flight Service Modernization (AFSM) sustainment project will modernize or replace the Flight Service facilities in Alaska.

Flight Service Automation Modernization (FSAM), formerly known as Meteorological and Aeronautical Planning System (MAPS), program is developing alternatives and acquisition strategy for the automation platform for all FSS facilities. Options include integrating graphical and text-based weather products and other aeronautical information for use in pilot briefings; integrating aeronautical data updates with NOTAM and flight plan data into FSAM; and the development of a web portal that will provide both FAA users and aviation community users with access to the same data, improving access to consistent and accurate flight service information. In addition, there will be consideration of an automatic capability to provide pilots with critical updates that occur after having received preflight briefings, and to monitor VFR aircraft in order to be more proactive in search and rescue efforts.

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.

The Coded Time Source (CTS) project 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.

The Aviation System Performance Metrics (ASPM) system provides information on individual flight performance and airport efficiency. Arrival /departure rates and runway configuration data are stored in this system

Figure 19 shows projected CIP expenditures on automation roadmap projects. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Automation Functional Area	**$174.4**	**$711.3**	**$885.7**	**$673.1**	**$649.0**	**$776.8**	**$826.7**
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development*	$8.1	$16.9	$25.0	$24.6	$24.6	$24.6	$24.6
1A08	Next Generation Air Transportation System (NextGen) - System Development*	$19.0	$90.0	$109.0	$76.5	$76.5	$80.5	$80.5
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations (TBO)*	$13.7	$9.3	$23.0	$18.0	$18.0	$18.0	$33.0
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports*	$13.7	$14.3	$28.0	$11.0	$8.0	$27.4	$42.4
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)*	$25.0	$28.0	$53.0	$27.5	$31.0	$37.0	$33.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment*	$21.8	$36.3	$58.1	$69.1	$70.5	$67.5	$98.8
2A01	En Route Automation Modernization (ERAM)	$0.0	$120.0	$120.0	$90.0	$70.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements*	$64.5	$0.0	$64.5	$57.0	$70.0	$204.0	$165.0
2A03	En Route Communications Gateway (ECG)*	$4.0	$2.0	$6.0	$3.1	$4.9	$4.7	$0.9
2A07	Air Traffic Management (ATM)	$0.0	$7.5	$7.5	$23.7	$8.3	$0.9	$1.2
2A11	Oceanic Automation System*	$2.0	$6.0	$8.0	$4.0	$2.8	$0.0	$0.0
2A13	System-Wide Information Management (SWIM)	$0.0	$66.4	$66.4	$33.0	$28.0	$59.1	$61.7
2A17	Collaborative Air Traffic Management Technologies (CATMT)	$0.0	$41.5	$41.5	$34.4	$29.3	$3.3	$15.6
2A20	Tactical Flow Time Based Flow Management (TBFM)	$0.0	$38.7	$38.7	$12.9	$10.5	$0.5	$3.6
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$0.0	$25.0	$25.0	$42.0	$39.5	$54.0	$76.8
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$0.0	$98.8	$98.8	$67.4	$91.9	$141.2	$126.9
2B05	Terminal Automation Program	$0.0	$2.5	$2.5	$2.5	$2.6	$2.6	$2.7
2B14	Integrated Display System (IDS)	$0.0	$8.8	$8.8	$8.2	$8.2	$2.9	$2.3
2B19X	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)**	$0.0	$0.0	$0.0	$0.0	$3.0	$2.7	$5.4
2D08	Instrument Flight Procedures Automation (IFPA)	$0.0	$2.2	$2.2	$7.1	$4.5	$2.4	$3.0
3A02	Aviation Safety Analysis System (ASAS) - Regulation & Certification for Infrastructure System Safety (RCISS)	$0.0	$30.1	$30.1	$15.8	$12.7	$11.9	$20.2
3A07	System Approach for Safety Oversight (SASO)	$0.0	$23.6	$23.6	$26.0	$11.5	$10.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$0.0	$17.2	$17.2	$6.8	$16.0	$6.1	$4.6
4A09	Aeronautical Information Management Program*	$2.6	$26.3	$28.9	$12.5	$6.7	$15.0	$15.0

Figure 19 Expenditures in the Automation Functional Area[2]

Figure 8 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)

[2] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 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.

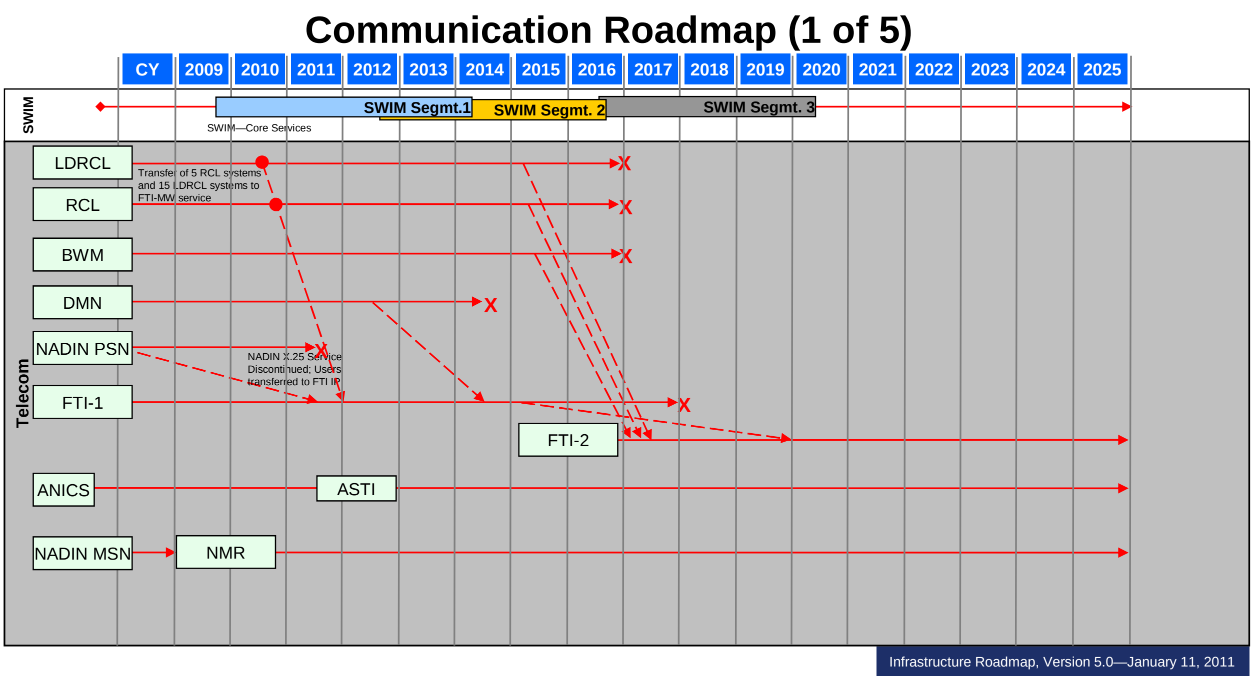

Figure 20 Communications Roadmap (1 of 5)

At the top of figure 20 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. Some of the LDRCL and RCL systems have already transitioned to the FAA Telecommunications Infrastructure (FTI) to carry this data. In 2013, a decision will be made concerning the transitioning of the remaining systems (majority of the systems) to the FTI - Phase 2 (FTI-2) contract. 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 21 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.

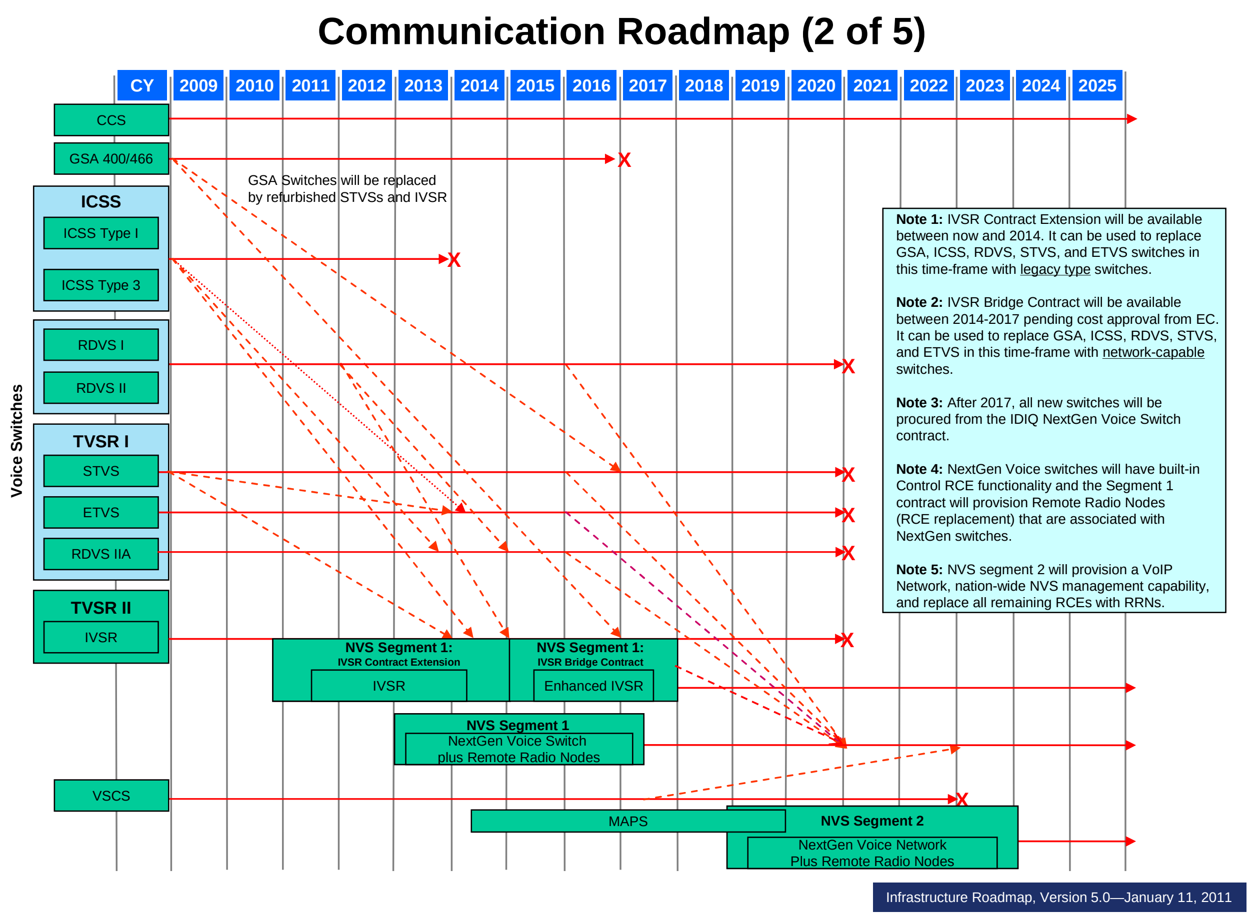

Figure 21 Communications Roadmap (2 of 5)

The Command Center Conference Control Switch (CCS) installed at the facility in Herndon, Virginia 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 System (NVS). 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 will replace ARTCC and TRACON voice switches. Depending on the results of further analysis, NVS may replace some or all of the ATCT switches.

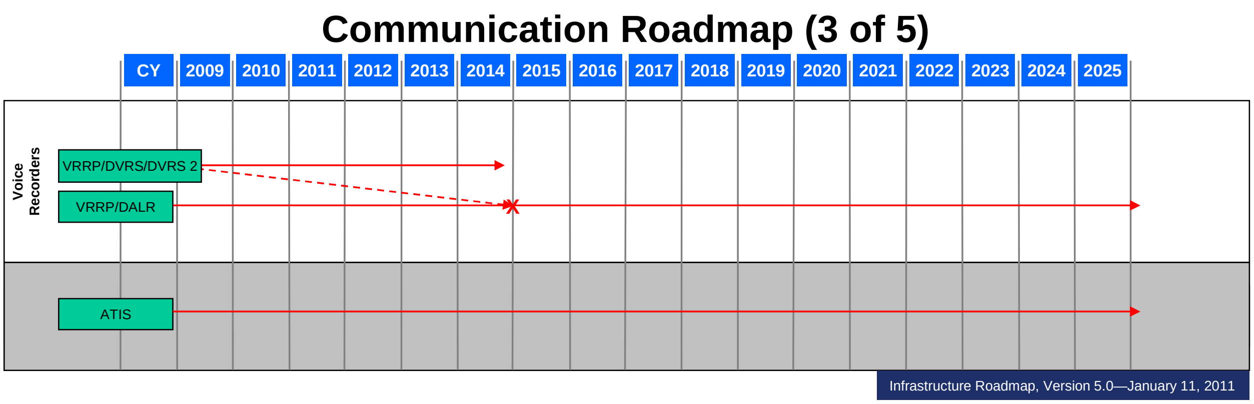

Figure 22 Communications Roadmap (3 of 5)

The Digital Voice Recorder System Replacement (DVSR) program is upgrading the digital recorders that keep a record of controller voice messages that can be used for safety analysis and when approved the Digital Audio Legal Recorder (DALR) program will replace these recorders. The Automated Terminal Information System (ATIS) broadcasts weather and other pertinent information to pilots as they approach an airport. We will maintain the ATIS functions during the entire timeframe of the roadmap.

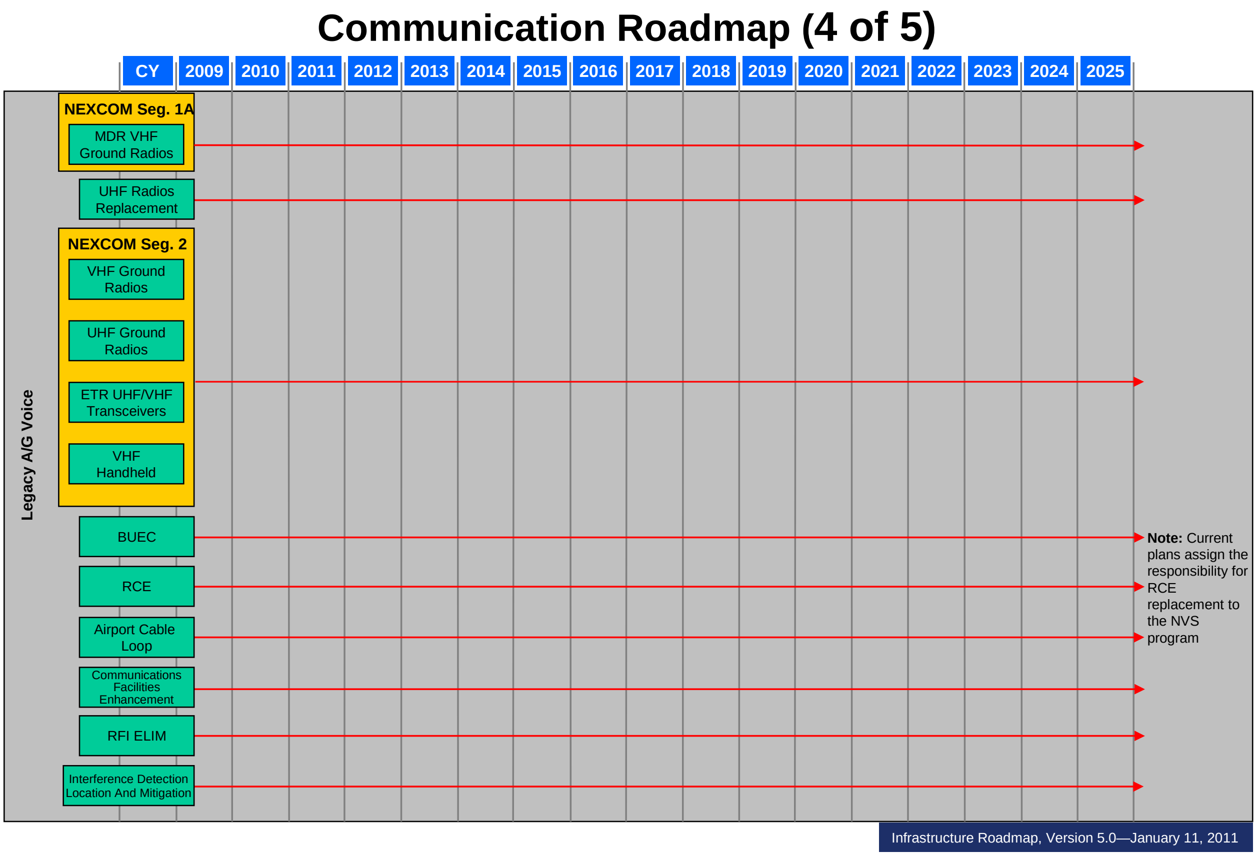

Figure 23 Communications Roadmap (4 of 5)

The fourth communications roadmap (figure 23) 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) radios used by civil users and Ultra High Frequency (UHF) radios used by military aircraft. 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. It will also upgrade emergency backup radios used if the primary radios are not working.

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.

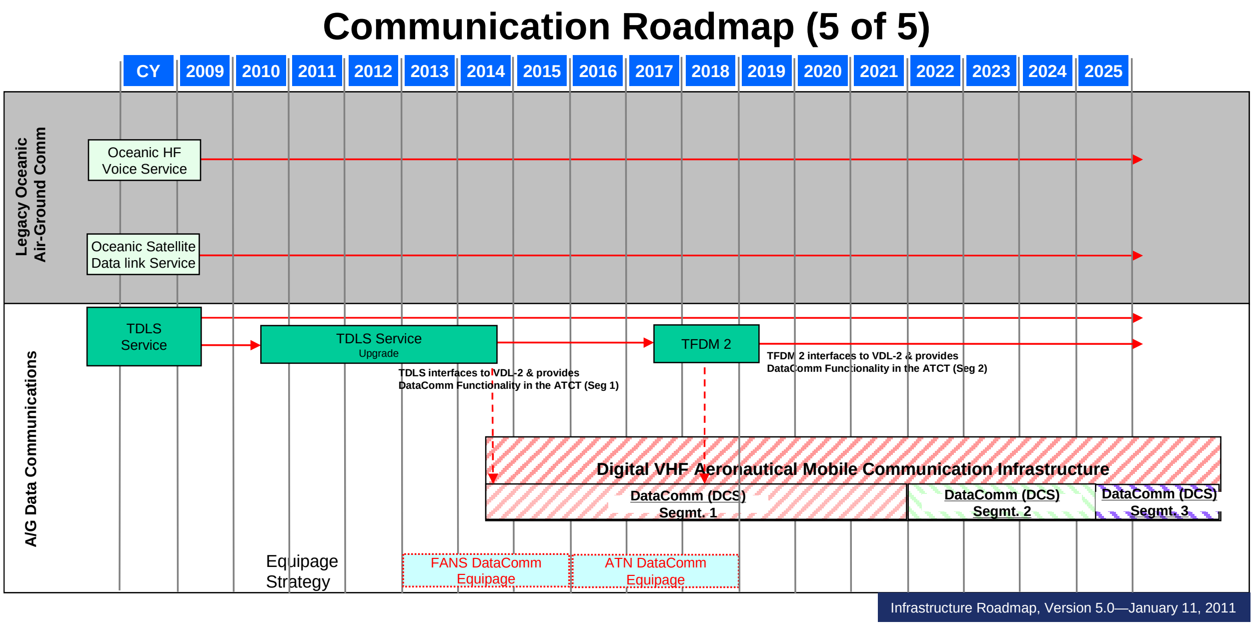

Figure 24 Communications Roadmap (5 of 5)

The fifth communications roadmap (figure 24) shows an Airport Wireless Communications System named AeroMACS 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 Oceanic Satellite Data Link Services used by newer better equipped aircraft, and this system relies on communications satellites to transfer messages over long distances.

The Terminal Data Link System (TDLS) is currently used to transmit clearances and other information to aircraft preparing to depart the airport. It is being upgraded and modernized for use until Tower Flight Data Management (TFDM) or Data Comm can take over its functions.

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 14 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 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Communication Functional Area	**$10.2**	**$252.8**	**$263.0**	**$206.1**	**$221.7**	**$245.8**	**$204.4**
1A06	Data Communication in support of Next Generation Air Transportation System (NextGen)*	$7.2	$143.0	$150.2	$113.3	$119.1	$129.8	$104.8
2A08	Air/Ground Communications Infrastructure	$0.0	$4.8	$4.8	$2.6	$2.6	$2.6	$2.6
2A10	Voice Switching Control System (VSCS)	$0.0	$1.0	$1.0	$15.0	$20.0	$20.0	$15.0
2A12	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$0.0	$45.2	$45.2	$33.4	$22.0	$40.0	$40.0
2A19	Automated Terminal Information Services (ATIS)	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
2B08	Terminal Voice Switch Replacement (TVSR)	$0.0	$10.0	$10.0	$8.0	$5.0	$0.0	$0.0
2B13	National Airspace System Voice System (NVS)	$0.0	$19.8	$19.8	$10.0	$30.0	$30.0	$30.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)*	$3.0	$16.0	$19.0	$11.8	$11.0	$11.4	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$0.0	$12.0	$12.0	$12.0	$12.0	$12.0	$12.0

Figure 25 Expenditures in the Communications Functional Area[3]

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

[3] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 Out-year funding amounts are estimates.

improve detection of aircraft and provides a clear display of the positions of aircraft and vehicles on or near taxiways and runways.

Figure 26 is one of the two roadmaps for surveillance systems.

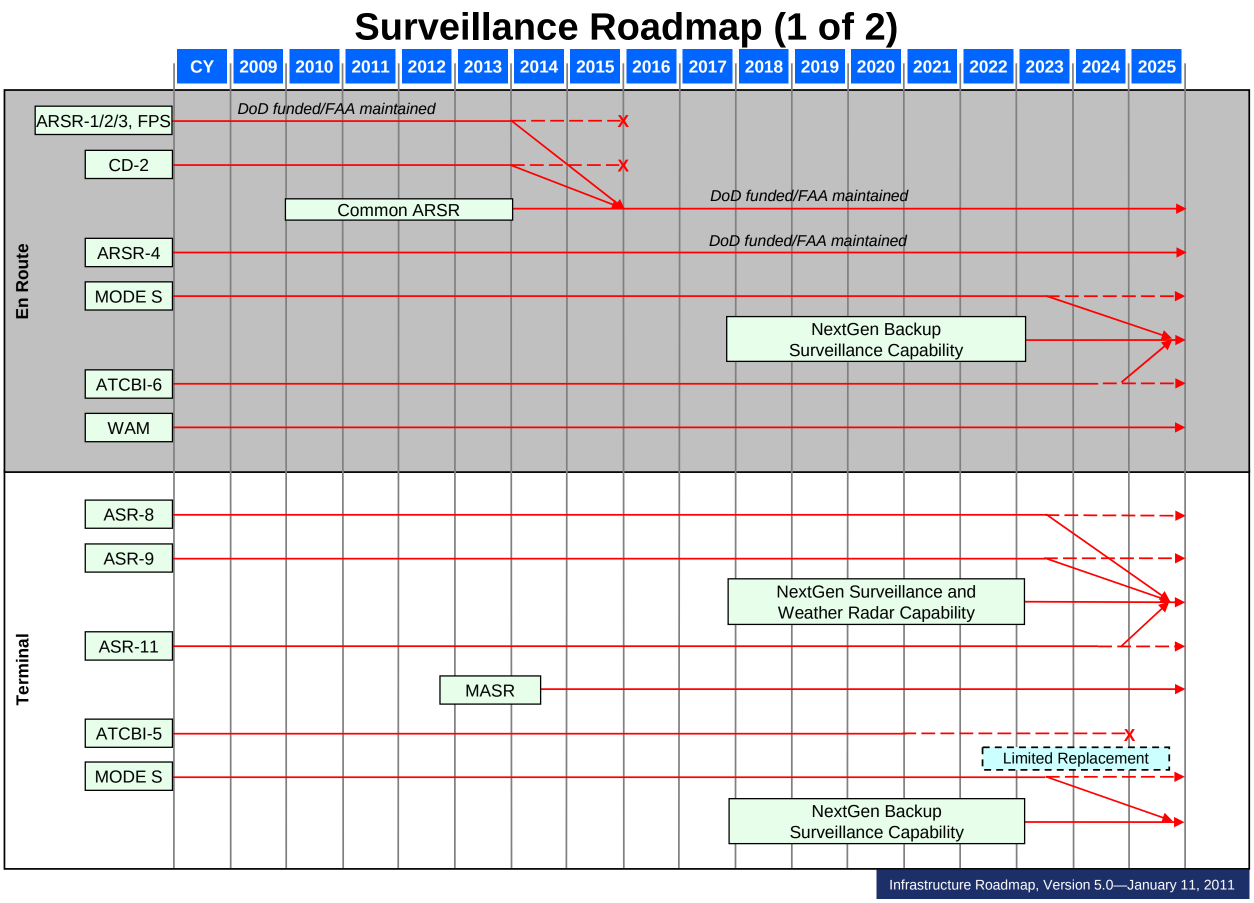

Figure 26 Surveillance Roadmap (1 of 2)

The major systems shown in the en route block are the various ARSR models and Common Digitizer (CD-2); the Air Traffic Control Beacon Interrogator (ATCBI); and the Mode S. The ARSR 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 and the more advanced Mode S transmit 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 Colorado Wide Area Multilateration (WAM) system uses several technologies to detect aircraft position in areas where the radar signal may be blocked by mountainous terrain.

The FAA, the Department of Homeland Security, and the Department of Defense will jointly maintain the ARSR through 2025 due to aviation security concerns. We will begin evaluating a next-generation backup surveillance capability in 2013 and decide whether to begin a replacement program in 2017.

There are four models of terminal radars currently in use. The Airport Surveillance Radar Model 11 (ASR-11) is the newest and has replaced some of the older radars that the ASR-9 program did not replace. 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 radar systems as a backup for ADS-B to address safety, security, and weather detection requirements.

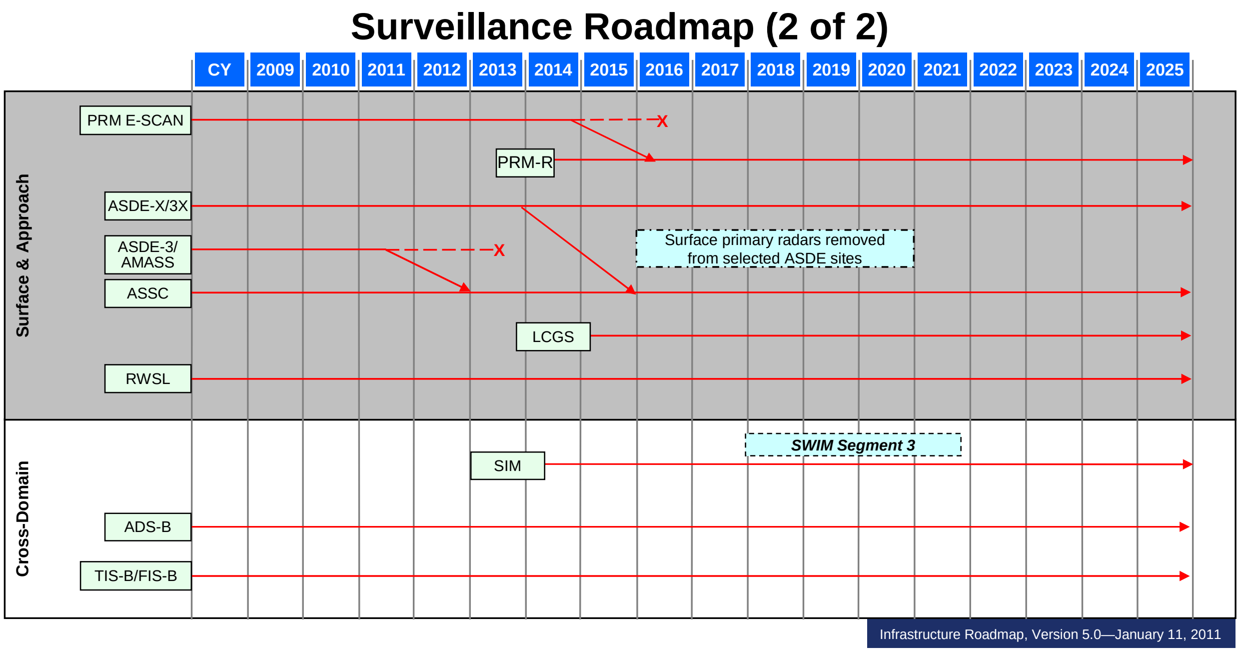

Figure 27 Surveillance Roadmap (2 of 2)

The second Surveillance roadmap (figure 27) shows the systems used on the surface and ADS-B with the application it 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 back-to-back turning antenna.

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.

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 23 systems operational and 3 support sites 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 will support 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. The Traffic Information System (TIS-B) broadcasts information on the location of nearby aircraft to aircraft that are equipped with the capability to receive it.

Figure 28 shows the CIP costs associated with upgrading the surveillance units. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Surveillance Functional Area	**$8.0**	**$343.3**	**$351.3**	**$338.8**	**$336.4**	**$156.1**	**$126.2**
2A09	Air Traffic Control En Route Radar Facilities Improvements	$0.0	$5.8	$5.8	$5.9	$0.0	$0.0	$0.0
2A14	Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide	$0.0	$285.1	$285.1	$270.7	$271.9	$107.3	$112.5
2A18	Colorado ADS-B Wide Area Multilateration (WAM) Cost Share*	$2.0	$3.8	$5.8	$1.4	$1.4	$1.4	$1.4
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$0.0	$2.2	$2.2	$10.0	$11.1	$13.4	$7.9
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)*	$2.0	$6.0	$8.0	$4.0	$5.0	$5.0	$0.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$0.0	$3.9	$3.9	$8.4	$9.4	$6.3	$4.4
2B12	Runway Status Lights (RWSL)	$0.0	$29.8	$29.8	$36.4	$32.6	$22.7	$0.0
2B16	Mode S Service Life Extension Program (SLEP)*	$4.0	$4.0	$8.0	$2.0	$5.0	$0.0	$0.0
2B17	ASR-8 Relocation	$0.0	$2.7	$2.7	$0.0	$0.0	$0.0	$0.0

Figure 28 Expenditures in the Surveillance Functional Area[4]

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/or distance from their location. The ground-based system commonly used for en route navigation is the Very High Frequency

[4] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 Out-year funding amounts are estimates.

Omnidirectional Range with Distance Measuring Equipment (VOR with DME). There are more than 1,000 VORs spread across the United States. They enable pilots to determine an accurate position and also define the Victor and Jet airways, which are published routes based on straight lines from VOR to VOR. Airways simplify route planning and 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 to help pilots 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 pair of radio beams – one for lateral guidance and the other for vertical guidance - to define the approach glidepath, 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 a network of 38 ground monitors to calculate corrections to the GPS signals and broadcast those corrections from telecommunications satellites. WAAS-equipped aircraft can use the information to fly a precision approach to a runway in low-visibility conditions. There are currently more than 1,300 WAAS precision approach procedures 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 29 and 30 show the roadmaps for navigation aids.

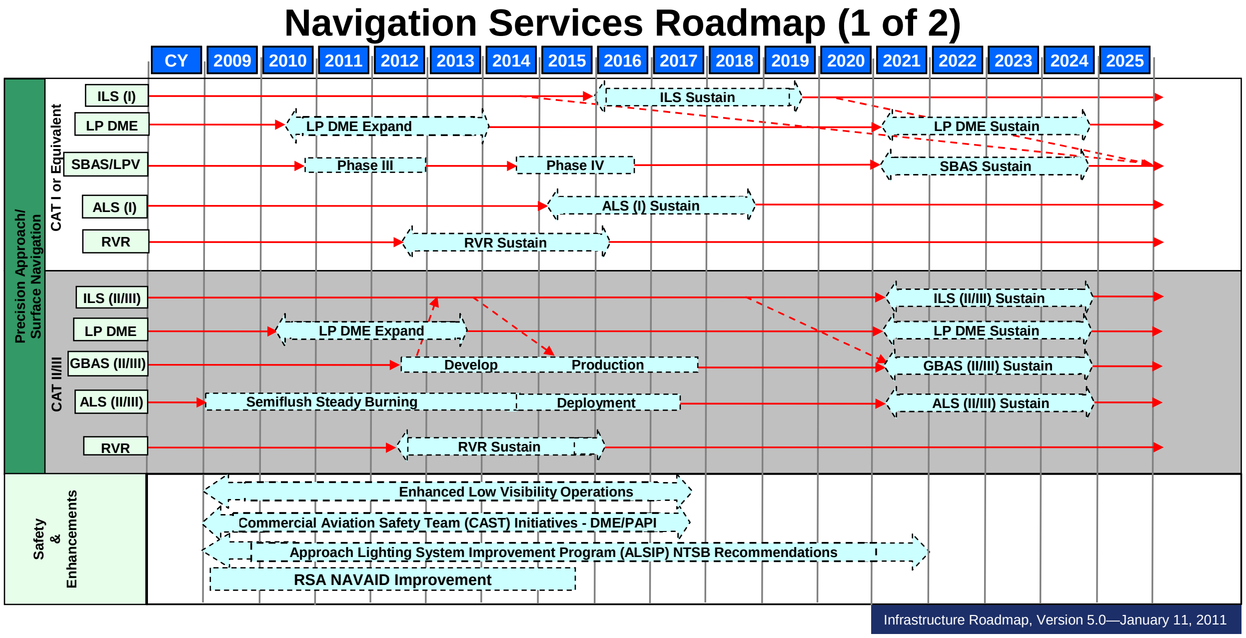

Figure 29 Navigation Roadmap (1 of 2)

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 allow aircraft to descend to lower minimums (i.e., less vertical and horizontal visibility is required). Currently, 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 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 core and other airports as required. The FAA plans to make an initial decision in 2014 whether to begin a drawdown of Category I ILS, and a decision in 2020 whether to decommission all remaining Category I ILSs.

In both Category I and Category II/III sections of the roadmap the Approach Light System (ALS) and the Runway Visual Range (RVR) systems are shown. The ALS helps the pilot see the runway and transition from instrument to visual flight for landing before reaching runway minimums. 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 ALS to reduce both maintenance and operating costs. The approach lights and visibility sensors will need to be sustained and remain in operation for precision approach guidance regardless of any decision on decommissioning ILSs.

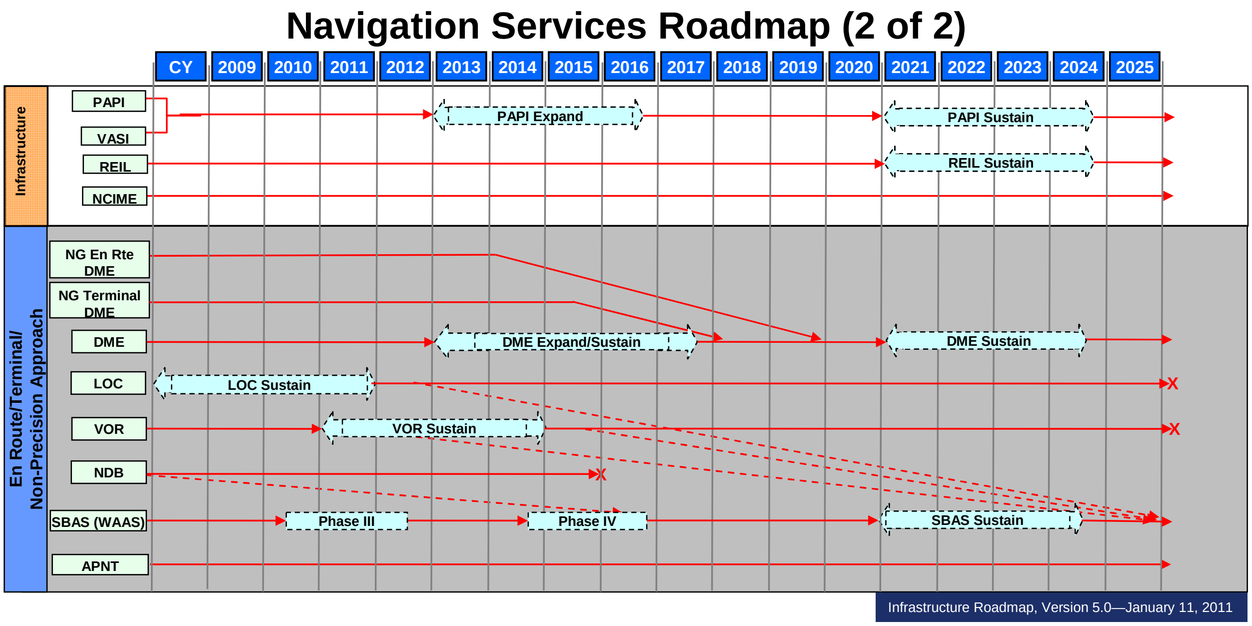

Figure 30 Navigation Roadmap (2 of 2)

As shown in Figure 30, 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. The Navaid Control Interlock and Monitoring System (NCIME) will be installed to assist controllers to rapidly activate and deactivate the navigational aids in use at an airport

The low power Distance Measuring Equipment (LPDME) will replace outer markers that provide pilots with an indication of their distance from an airport as they fly the final approach. NextGen en route and terminal DME will be installed beginning in the 2014 timeframe to support Area Navigation/Required Navigation Performance (RNAV/RNP) operations.

The Localizer (LOC) is an ILS component that provides horizontal guidance to a runway end. When used as a stand-alone system without a Glideslope component, LOC supports non-precision approach operations. 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. 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 2016, 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 typically 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 internally calculate corrections that enhance the accuracy of the position calculation and eliminate the errors caused by ionospheric distortion. The GPS III family of satellites will be upgraded with an additional civil signal (L1C) and increased transmitting power.

The Wide Area Augmentation System (WAAS) improves the precision of GPS by providing corrections and satellite reliability information to aeronautical GPS receivers. Aircraft receivers use WAAS corrections to calculate a precise geographic position. Introduction of the L5 signal 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 operations. 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 31 shows the future capital investments for navigation systems included in the CIP. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Navigation Functional Area	**$1.0**	**$268.4**	**$269.4**	**$251.8**	**$196.2**	**$192.6**	**$156.9**
1A18	Next Generation Air Transportation System (NextGen) - Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0.0	$26.2	$26.2	$26.2	$21.2	$16.7	$16.7
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$0.0	$5.0	$5.0	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$0.0	$5.0	$5.0	$7.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$0.0	$125.5	$125.5	$111.1	$115.5	$121.4	$95.7
2D04	Runway Visual Range (RVR)	$0.0	$5.0	$5.0	$4.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$0.0	$5.0	$5.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$0.0	$5.0	$5.0	$5.0	$0.0	$0.0	$0.0
2D07	Visual Navaids - Establish/Expand	$0.0	$3.4	$3.4	$5.0	$0.0	$0.0	$0.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$0.0	$6.0	$6.0	$8.0	$3.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$0.0	$7.0	$7.0	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$0.0	$50.3	$50.3	$55.0	$0.0	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$0.0	$25.0	$25.0	$20.0	$35.0	$30.0	$20.0
2D13	Navaid Control, Interlock and Monitoring Equipment (NCIME)*	$1.0	$0.0	$1.0	$0.0	$0.0	$0.0	$0.0

Figure 31 Expenditures in the Navigation Functional Area[5]

[5] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 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 32 shows the current and planned status of weather sensors.

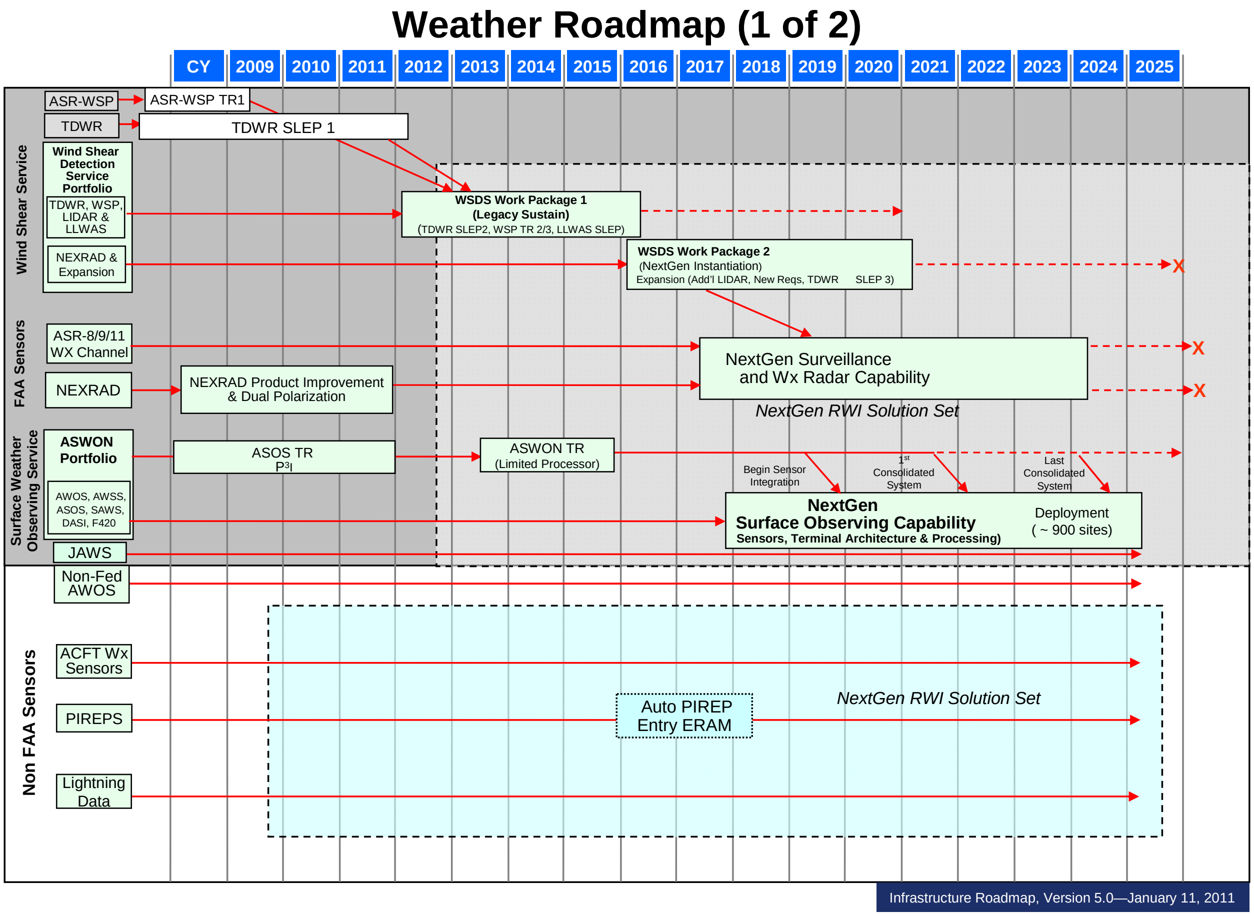

Figure 32 Weather Sensor Roadmap

The Wind Shear Detection Services Portfolio and radar system 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.

The most sophisticated wind shear detection system 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 ASR-WSP which 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 both serves airports that do not have a TDWR or WSP, and at several locations, the system supplements the weather 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 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 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.

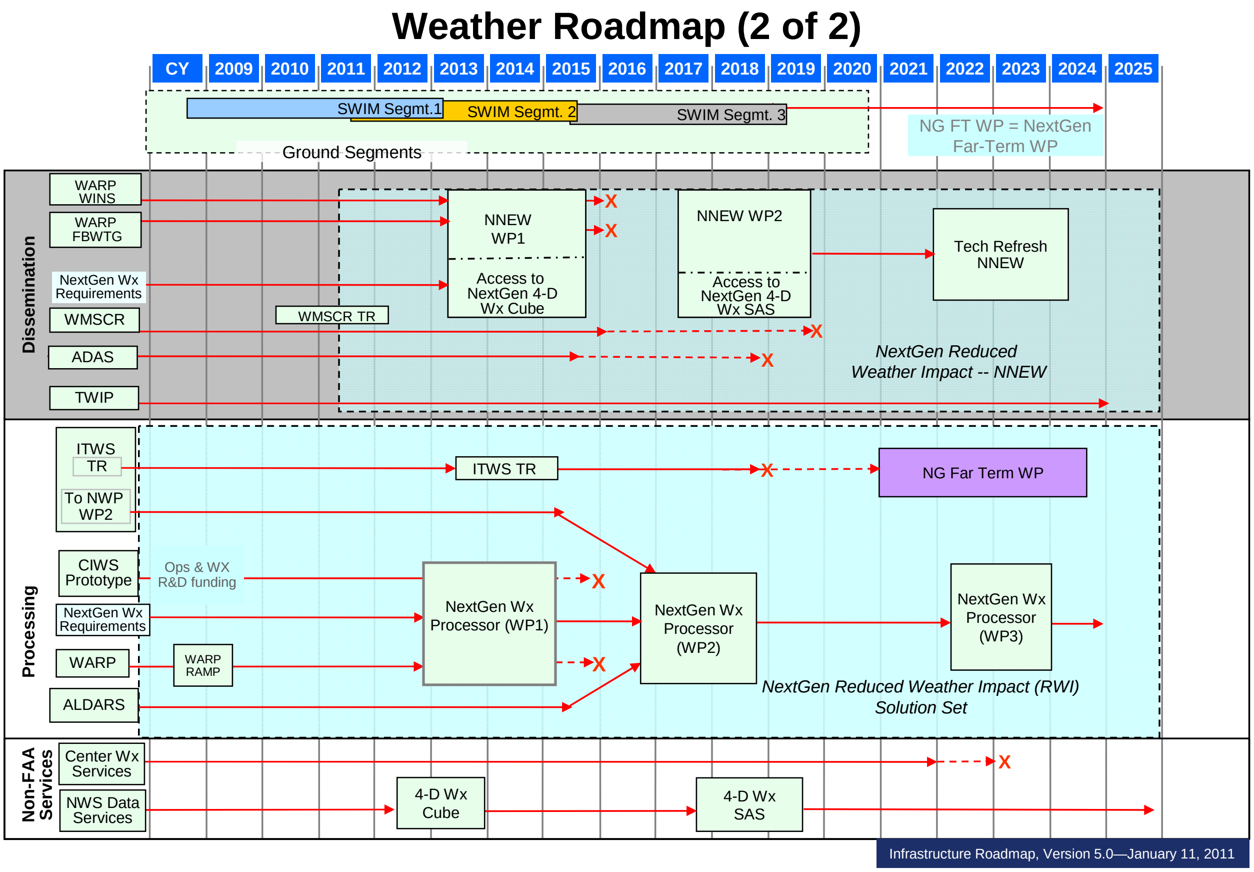

Figure 33 Weather Dissemination, Processing, and Display Roadmap

Figure 33 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. 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.

Figure 34 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 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Weather Functional Area	**$18.4**	**$63.3**	**$81.7**	**$52.4**	**$49.9**	**$41.2**	**$37.2**
1A05	NextGen Network Enabled Weather (NNEW)	$0.0	$27.4	$27.4	$25.0	$25.0	$10.0	$10.0
1A10	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact*	$18.4	$14.6	$33.0	$14.6	$20.0	$20.0	$20.0
2A04	Next Generation Weather Radar (NEXRAD)	$0.0	$2.8	$2.8	$3.3	$1.2	$1.3	$1.2
2A15	Windshear Detection Service	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
2A16	Weather and Radar Processor (WARP)	$0.0	$2.5	$2.5	$0.5	$0.7	$0.0	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$0.0	$7.7	$7.7	$4.6	$0.5	$0.0	$0.0
2B18X	Integrated Terminal Weather System (ITWS)**	$0.0	$0.0	$0.0	$0.0	$1.3	$9.7	$5.9
2C01	Automated Surface Observing System (ASOS)	$0.0	$2.5	$2.5	$0.0	$0.0	$0.0	$0.0
2C03	Weather Camera Program	$0.0	$4.8	$4.8	$4.4	$1.2	$0.2	$0.1

Figure 34 Expenditures in the Weather Functional Area[6]

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, each 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 NAS. The FAA has requested funding for 2012 and beyond to upgrade buildings and infrastructure such as roads. Annual funding is provided to reconfigure the research

[6] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 Out-year funding amounts are estimates.

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 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 over $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 35 shows the planned expenditures for facilities projects for the air traffic control system. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Facilities Functional Area	**$31.5**	**$410.1**	**$441.6**	**$455.9**	**$496.5**	**$542.7**	**$657.1**
1A03	William J. Hughes Technical Center Facilities	$0.0	$15.0	$15.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment*	$4.9	$7.5	$12.4	$5.9	$6.0	$6.1	$6.2
1A15	Next Generation Air Transportation System (NextGen) - System Networked Facilities*	$1.0	$9.0	$10.0	$11.0	$11.0	$11.0	$11.0
1A16	Next Generation Air Transportation System (NextGen) - Future Facilities	$0.0	$19.5	$19.5	$10.0	$20.0	$70.0	$165.9
2A05	Air Traffic Control System Command Center (ATCSCC) - Relocation	$0.0	$3.6	$3.6	$0.0	$0.0	$0.0	$0.0
2A06	ARTCC Building Improvements/Plant Improvements*	$6.0	$46.0	$52.0	$50.9	$52.4	$52.4	$62.4
2B06	Terminal Air Traffic Control Facilities - Replace	$0.0	$51.6	$51.6	$100.0	$100.0	$100.0	$115.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve*	$5.0	$56.9	$61.9	$47.7	$52.7	$52.1	$52.1
2C02	Flight Service Station (FSS) Modernization	$0.0	$4.5	$4.5	$10.5	$27.0	$32.0	$37.0
2E01	Fuel Storage Tank Replacement and Monitoring	$0.0	$6.4	$6.4	$6.6	$6.7	$6.8	$6.8
2E02	Unstaffed Infrastructure Sustainment*	$4.6	$18.0	$22.6	$27.8	$33.1	$33.8	$33.8
2E04	Airport Cable Loop Systems - Sustained Support	$0.0	$5.0	$5.0	$5.0	$5.0	$5.0	$5.0
2E06	Facilities Decommissioning	$0.0	$5.0	$5.0	$5.0	$0.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support*	$10.0	$85.6	$95.6	$95.0	$100.0	$100.0	$100.0
2E09	FAA Employee Housing and Life Safety Shelter System Services	$0.0	$2.5	$2.5	$2.5	$2.5	$0.0	$0.0
3A01	Hazardous Materials Management	$0.0	$20.0	$20.0	$20.0	$20.0	$20.0	$20.0
3A05	Facility Security Risk Management	$0.0	$18.0	$18.0	$18.0	$19.4	$12.0	$0.0
3A09	Data Center Optimization	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
3B01	Aeronautical Center Infrastructure Modernization	$0.0	$18.0	$18.0	$10.5	$10.8	$11.1	$11.1
4A04	Mike Monroney Aeronautical Center Leases	$0.0	$17.0	$17.0	$17.5	$17.9	$18.4	$18.8

Figure 35 Expenditures in the Facilities Functional Area[7]

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 2020 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.

[7] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 Out-year funding amounts are estimates.

Figure 36 shows planned expenditures for specific mission support projects. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013	FY 2014	FY 2015	FY 2016
	Mission Support Functional Area	**$6.5**	**$340.9**	**$347.4**	**$300.9**	**$301.1**	**$303.5**	**$307.8**
1A01	Advanced Technology Development and Prototyping (ATDP)*	$1.5	$31.9	$33.4	$26.6	$24.5	$28.0	$26.2
1A02	NAS Improvement of System Support Laboratory	$0.0	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0
1A14	Next Generation Air Transportation System (NextGen) - Safety, Security and Environment*	$3.0	$5.0	$8.0	$0.0	$0.0	$0.0	$0.0
1A17	Joint Planning and Development Office (JPDO)	$0.0	$3.0	$3.0	$2.0	$2.0	$2.0	$2.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$0.0	$26.0	$26.0	$26.0	$26.0	$26.0	$26.0
2B15	Remote Monitoring and Logging System (RMLS)	$0.0	$4.2	$4.2	$3.7	$0.0	$1.2	$1.1
2E03	Aircraft Related Equipment Program	$0.0	$11.7	$11.7	$10.1	$10.4	$9.0	$11.4
2E08	Aircraft Fleet Modernization	$0.0	$9.0	$9.0	$2.1	$0.0	$0.0	$0.0
2E10X	Independent Operational Test/Evaluation**	$0.0	$0.0	$0.0	$3.5	$3.5	$3.5	$3.5
3A03	Logistics Support Systems and Facilities (LSSF)	$0.0	$10.0	$10.0	$10.0	$10.0	$0.2	$0.0
3A06	Information Security*	$2.0	$17.0	$19.0	$12.0	$12.0	$12.0	$12.0
3A10	Aerospace Medical Equipment Needs (AMEN)	$0.0	$12.0	$12.0	$3.0	$3.0	$0.0	$2.5
3B02	Distance Learning	$0.0	$1.5	$1.5	$1.0	$1.0	$1.0	$1.0
4A01	System Engineering and Development Support	$0.0	$32.9	$32.9	$33.5	$34.1	$32.9	$33.3
4A02	Program Support Leases	$0.0	$41.7	$41.7	$40.9	$42.1	$55.2	$56.7
4A03	Logistics Support Services (LSS)	$0.0	$11.7	$11.7	$11.5	$11.5	$11.5	$11.0
4A05	Transition Engineering Support	$0.0	$13.0	$13.0	$15.0	$15.0	$15.0	$15.0
4A06	Technical Support Services Contract (TSSC)	$0.0	$22.0	$22.0	$25.0	$25.0	$25.0	$25.0
4A07	Resource Tracking Program (RTP)	$0.0	$4.0	$4.0	$4.0	$0.0	$0.0	$0.0
4A08	Center for Advanced Aviation System Development (CAASD)	$0.0	$80.8	$80.8	$70.0	$80.0	$80.0	$80.0
4A10	Permanent Change of Station (PCS) Moves	$0.0	$2.5	$2.5	$0.0	$0.0	$0.0	$0.0

Figure 36 Expenditures in the Mission Support Functional Area[8]

[8] *BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request. ** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget. FY 2013 – 2016 Out-year funding amounts are estimates.

5 Conclusion

The recession had a tremendous impact on the airline industry between 2007 and 2009, but the aviation industry has begun to rebound with cautious and optimistic expectations. Average yield (cents per passenger mile) declined during those years because of decreased business travel. The number of flight operations decreased by about 10 percent from 2008 to 2009, but operations in 2010 appear on the path to recovery compared to 2009 totals at major airports. The past decline in air travel has resulted in adjustments in the number of available seats offered for air travel and fewer seats have translated into reduced aircraft operations.

From recent reports, it appears that the industry is slowly recovering. Economic growth did resume in 2010, although air travel has been slower in responding. As mentioned in section 1.4.3, the economic forecast is for 3.4 percent growth in 2012 with continued growth in future years. Increased air travel has always followed economic recovery, and the FAA must assume that operations will increase and 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 supporting 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 and improved efficiency and reduced environmental impact 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. We are committed to modernizing the existing air traffic control system, and we will be doing that continuously into the future.

The NextGen transition to air traffic management introduces another significant pressure in capital planning. As the operational improvements to expand capacity become more complex, more time needs to be devoted to developing air traffic procedures and demonstrating the new technologies that enable more intense use of the NAS. Achieving all the planned operational improvements for NextGen including more efficiency, improved safety, reduced environmental impact and better use of available capacity will require consistent levels of investment over several years

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 2012–2016 — performance output goals.
- Shows system implementation schedules.

Appendix C

- Provides estimated expenditures from FY 2012 through FY 2016 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 2012 – 2016

APPENDIX A

GOAL MATRIX

The Capital Investment Plan (CIP) projects have been aligned to the goals, objectives, and performance targets in the Federal Aviation Administration (FAA) Strategic 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) 2012-2016 funding are included in Appendix A, B, and C.

The FAA's Strategic Plan has four 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) *Economic Competitiveness*	Greater Capacity
3) *(No comparable DOT goal)*	International Leadership
4) *Organizational Excellence*	Organizational Excellence

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 2012 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 Strategic Plan 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 2012 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	G07M.02-01	NextGen – Safety, Security, Environment – System Dev – Systems Safety Mgmt Transformation
1A08X	G07A.02-01	NextGen – Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS)
2A15	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
2E03B	M12.01-03	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Technical Refresh
2E08	M11.02-01	Flight Standards Inspector Aircraft Replacement – Phase 2
3A02	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
3A10	M53.01-01	Aerospace Medical Equipment Needs (AMEN)
3A10X	M53.01-02	Aerospace Medical Equipment Needs (AMEN) – Tech Refresh
4A09A	A08.03-02	Aeronautical Information Management (AIM) Modernization – Segment 1
4A09B	G05A.02-05	CATM – Flight & State Data Mgmt – AIM Segment 2
4A09C	G05A.02-06	CATM – Flight & State Data Mgmt – AIM Segment 3

- **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 2012 BLI	CIP #	CIP Name
1A01J	F05.05-01	Flight Services Facilities – Flight Service Automation Modernization
2D03A	N12.01-00	Wide Area Augmentation System (WAAS) – LPV Segment
2D03B	N12.01-06	Wide Area Augmentation System (WAAS) – Survey and Procedures
2D13	N18.01-01	Navaid Control, Interlock, and Monitoring Equipment (NCIME)

  - **FAA Performance Target 2:** By the end of FY 2019 reduce the Rate of Fatal and Serious Injury Accidents by 10% in 10 Years.

FY 2012 BLI	CIP #	CIP Name
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 2012 BLI	CIP #	CIP Name
1A01A	S09.02-00	Runway Incursion Reduction Program (RIRP) – ATDP
2B01	S09.01-01	ASDE-X –Tech Refresh & Disposition
2B12	S11.01-02	Runway Status Lights (RWSL) – Segment 1

  - **FAA Performance Target 2:** By the end of FY 2013, reduce total runway incursions by 10 percent to 909 from the FY 2008 baseline number of 1009.

FY 2012 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 2012 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:** System Risk Event Rate (SRER) – Reduce risks in flight by limiting the rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) losses of standard separation within the National Airspace System.

FY 2012 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 2011, integrate Air Traffic Organization, Office of Aviation Safety, and Office of Airports into an interoperable, agency-wide SMS. In FY 2012, implement SMS policy in all appropriate FAA organizations.

FY 2012 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 2012 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
1A01K	M52.01-01	Operational Modeling Analysis and Data
1A05	G04W.01-01	NextGen – NextGen Network Enabled Weather (NNEW) – Segment 1
1A06	G01C.01-01	NextGen – Data Communications – Segment 1a
1A06	G01C.01-03	NextGen – Data Communications – Segment 2
1A06X	G01C.01-02	NextGen – Data Communications – Segment 1b
1A07	G08M.01-01	NextGen – Demonstrations and Infrastructure Development
1A08A	G01M.02-01	NextGen – System Dev – ATC/Tech Ops Human Factors
1A08B	G01M.02-02	NextGen – System Dev – New ATM Requirements
1A08C	G01M.02-03	NextGen – System Dev – Ops Concept Validation Modeling
1A08D	G03M.04-01	Staffed NextGen Towers (SNT)
1A08F	G06M.02-02	NextGen – System Dev – Wake Turbulence Re-Categorization
1A09A	G01A.01-01	NextGen – TBO – Separation Mgmt – Modern Procedures
1A09B	G01A.02-02	NextGen – TBO – Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt
1A09C	G01A.02-03	NextGen – TBO – Trajectory Mgmt – Conflict Advisories
1A09D	G01N.01-01	NextGen – TBO – Capacity Mgmt – NextGen DME
1A10A	G04W.02-01	NextGen – RWI – Weather Observation Improvements
1A10B	G04W.03-01	NextGen – RWI – Weather Forecast Improvements
1A11A	G02A.01-01	NextGen – HD – Trajectory Mgmt – Surface Tactical Flow
1A11B	G02A.01-02	NextGen – HD – Trajectory Mgmt – Surface Conformance Monitor
1A11C	G02A.01-05	NextGen – HD – Trajectory Mgmt – Surface Traffic Data Sharing
1A11D	G02A.01-06	HD Trajectory Mgmt – Time Based Flow Management (TBFM) Work Package 3
1A11E	G02M.02-01	NextGen – HD – Capacity Mgmt – Integrated Arrival & Departure Operations
1A12A	G05A.01-01	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Integration
1A12B	G05A.01-02	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Enhance
1A12C	G05A.02-01	NextGen – CATM – Flight & State Data Mgmt – Common Status & Structure Data

FY 2012 BLI	CIP #	CIP Name
1A12D	G05A.02-02	NextGen – CATM – Flight & State Data Mgmt – Advanced Methods
1A12E	G05A.02-03	NextGen – CATM – Flight & State Data Mgmt – Flight Object
1A12F	G05A.02-04	NextGen – CATM – Flight & State Data Mgmt – Concept Dev for Integrated NAS Design and Procedure Planning
1A12G	G05A.04-01	NextGen – CATM – Capacity Management – Dynamic Airspace
1A12H	G05M.02-01	NextGen – CATM – Joint Collaborative Information Management (CIM)
1A12X	G05M.03-01	NextGen – CATM – Sys Dev – Information Management
1A13A	G06A.01-01	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD)
1A13B	G06A.01-02	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Arrivals (WTMA)
1A13C	G06A.02-01	NextGen – FLEX – Surface/Tower/Terminal Systems Engineering – Tower Flight Data Manager (TFDM)
1A13D	G06C.01-01	FLEX – Flight & State Data Mgmt – Future Comm Infra
1A13E	G06N.01-01	NextGen – FLEX – Separation Mgmt – Approaches, Ground Based Augmentation System
1A13F	G06N.01-02	NextGen – FLEX – Separation Mgmt – Closely Spaced Parallel Rwy Ops
1A13G	G06N.01-03	NextGen – FLEX – Separation Mgmt – Approaches, NextGen Nav Init
1A13I	G06N.02-01	NextGen – FLEX – Trajectory Mgmt – Arrivals
1A13J	G06N.02-02	FLEX – Trajectory Mgmt – Reduced RVR Minima
1A13X1	G06A.03-01	NextGen – FLEX – Terminal Flight Data Manager (TFDM)
1A15A	G03M.02-01	NextGen – Networked Facilities – Integration, Development, & Operations Analysis Capability
1A16	G03F.01-01	FAC – Future Facilities Investment Planning
1A17	G08M.01-03	Demonstration and Infrastructure Development – JPDO Program Office
1A18	G05N.01-01	NextGen – Collaborative ATM (CATM) – NextGen Performance Based Navigation - Metroplex Area Navigation (RNAV)/Required navigation Performance (RNP)
2A01	A01.10-01	En Route Automation Modernization (ERAM)
2A02	G01A.01-04	TBO – Separation Mgmt – En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements
2A18	G08M.03-01	Colorado Wide Area Multilateration (WAM)
2A18X	G08M.03-02	Colorado WAM – MLAT Services
2A20	G02A.01-03	HD Trajectory management – Time Based Flow Management (TBFM)
2A20X	G02A.01-07	HD Trajectory Mgmt – TBFM – Tech Refresh
2B04	A04.07-01	Terminal Automation Modernization – Replacement (TAMR) – Phase 3 – Segment 1
2B04X	A04.07-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 3 – Segment 2
2D02	N03.01-00	Instrument Landing Systems (ILS)
2D06	N09.00-00	Sustain Distance Measuring Equipment (DME)
2D11	N12.03-01	GPS Civil Requirements
3A03	M21.04-01	Logistics Support Systems & Facilities
4A10	M51.01-01	Terminal PCS Moves

– **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 2012 BLI	CIP #	CIP Name
1A01F	M46.01-01	Strategy and Evaluation – ATDP

– **FAA Performance Target 3:** Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.

FY 2012 BLI	CIP #	CIP Name
1A13X2	G06N.01-06	NextGen – Separation Management – Alternative Positioning Navigation and Timing (APNT)
2A03	A01.12-02	En Route Communication Gateway – Technology Refresh
2A04	W02.02-01	NEXRAD – Legacy, Icing & Hail Algorithms
2A04X	W02.02-02	NEXRAD – Technical Refresh
2A06	F06.01-00	ARTCC Plant Modernization/Expansion – ARTCC Modernization
2A08	C04.01-01	Radio Control Equipment (RCE) – Sustainment
2A08	C06.01-00	Communications Facilities Enhancement – Expansion
2A09	S04.02-03	LRR Improvements – Infrastructure Upgrades/Sustain
2A10	C01.02-04	Voice Switching and Control System (VSCS) – Tech Refresh – Phase 3
2A12	C21.01-01 C21.02-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 1a and Segment 2
2A12	C06.04-00	Communications Facilities Enhancement – Ultra High Frequency Radio Replacement
2A16	W04.03-01	Weather and Radar Processor (WARP) Sustain
2A19	C28.01-01	Automated Terminal Information Services (ATIS)
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)
2B05	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
2B11A	S03.02-04	Terminal Radar (ASR) Program – ASR-11 – Tech Refresh – Segment 1
2B11B	S03.02-06	Terminal Radar (ASR) Program – ASR-11 – Mobile Airport Surveillance Radar (MASR)
2B11X	S03.02-05	Terminal Radar (ASR) Program – ASR-11 – Tech Refresh – Segment 2
2B13	G03C.01-01	Networked Facilities – NAS Voice System
2B14	A03.05-01	Integrated Display System (IDS) – Replacement
2B14X	A03.05-02	Integrated Display Systems (IDS) – Replacement – Tech Refresh
2B15	M07.04-01	Remote Monitoring and Logging System (RMLS) – National RMM Network
2B15X	M07.04-02	Remote Monitoring and Logging System (RMLS) – Tech Refresh

FY 2012 BLI	CIP #	CIP Name
2B16	S03.01-08	MODE S SLEP, Phase 2
2B17	S03.05-02	ASR-8 Relocation Bizmark ND, ear mark
2B19X	W07.01-02	ITWS – ITWS Technical Refresh & Disposition
2B20X	A04.05-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 2 Tech Refresh
2C01	W01.02-02	Automated Surface Weather Observation Network (ASWON) – ASOS – Pre-Planned Product Improvements (P3I)
2C02	F05.04-01	Alaska Flight Station Modernization (FSAM)
2C02	F05.04-02	Alaska Flight Service Facility Modernization (AFSFM)
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
3A03X	M21.04-02	Logistics Support Systems & Facilities (LSSF) – Logistics Center Support System (LCSS) – Technical Refresh
3A05	F24.00-00	Facility Security Risk Management (FSRM)

- **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 and maintain through FY 2013.

FY 2012 BLI	CIP #	CIP Name
2A07	A05.01-12	TFM Infrastructure – Tech Refresh
2A07	A05.01-10	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1
2A11	A10.03-00	Advanced Technologies and Oceanic Procedures (ATOP)
2A14	G02S.01-01	Automatic Dependent Surveillance – Broadcast (ADS-B) – National Implementation – Segment 1 and 2
2A14X	G02S.01-02	Automatic Dependent Surveillance Broadcast (ADS-B) – Future Segment
2A17	G05A.05-01	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2
2A17	G05A05-02	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)
4A08	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 compounded annually through FY 2013 from the calendar year 2005

FY 2012 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

  - **FAA Performance Target 2:** Improve aviation fuel efficiency by 2 percent per year, through FY 2015, as measured by the calendar year 2010 fuel burned per revenue mile flown, relative to the calendar year 2000 baseline.

FY 2012 BLI	CIP #	CIP Name
1A08E	G06M.02-01	NextGen – Systems Dev – Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction
1A08H	G07M.02-02	NextGen – Systems Dev – Operational Assessments

3. STRATEGIC GOAL: INTERNATIONAL LEADERSHIP

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

- **FAA Objective 1:** Promote improved safety and regulatory oversight in cooperation with bilateral, regional, and multilateral aviation partners.
  - **FAA Performance Target 1:** Work with the Chinese aviation authorities and industry to adopt 27 proven Commercial Aviation Safety Team (CAST) safety enhancements by FY 2011. This supports China's efforts to reduce commercial fatal accidents to a rate of 0.030 fatal accidents per 100,000 departures by FY 2012.
  - **FAA Performance Target 2:** By 2014, arrange commitments for external funding for at least 35 aviation development projects (7 per year).
  - **FAA Performance Target 3:** By 2014, work with at least 18 countries or regional organizations to develop aviation leaders to strengthen the global aviation infrastructure.

FY 2012 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 2014, expand the use of NextGen performance-based systems and concepts to five priority countries.

FY 2012 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 2012 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 2012 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
2E09	F20.01-01	FAA Employee Housing and Life Safety Shelter System Services

  - **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 2012 BLI	CIP #	CIP Name
		Currently no Capital projects are required to support this Target

  - **FAA Performance Target 4:** Maintain the air traffic control workforce at, within 2 percent, above or below, the projected annual totals in the Air Traffic Controller Workforce plan.

FY 2012 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 plan.

FY 2012 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 2012 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:** Cost Control – Organizations throughout the agency will continue to implement cost efficiency initiatives in 2011 such as:

$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.

FY 2012 BLI	CIP #	CIP Name
1A02 / 1A03	F14.00-00	System Support Laboratory Sustained Support
1A04A	F16.00-00	William J. Hughes Technical Center Building and Plan Support
1A04B	F16.01-01	William J. Hughes Technical Center Bldg & Plant Sppt – Technical Support Space Utilization Strategy
1A13H	G06N.01-04	NextGen – FLEX – Separation Mgmt – Approaches, Optimize Nav Tech
1A15B	G03M.03-01	Test Bed Demonstration Sites
2A05	F28.01-01	ATCSCC – Relocation
2A13	G05C.01-01	System-Wide Information Management (SWIM) – Segment 1
2A13	G05C.01-04	System Wide Information Management (SWIM) – Segment 2
2D08	A14.02-02	Instrument Flight Procedures Automation (IFPA) – Tech Refresh
2E06	F26.01-01	Decommissioning
3A01	F13.02-00	Environmental Cleanup / HAZMAT
3B01	F18.00-00	Aeronautical Center Infrastructure Modernization
3B02	M10.00-00	Distance Learning
4A01A	M03.03-01	Systems Engineering & Development Support – SE2020
4A01B	M08.01-00	Provide ANF/ATC Support (Quick Response)
4A02	M08.06-00	Program Support Leases
4A03	M05.00-00	NAS Regional/Center Logistics Support Services
4A04	F19.00-00	Mike Monroney Aeronautical Center – Leases
4A05	M22.00-00	NAS Implementation Support Contract (NISC)
4A06	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 2012 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 2012 BLI	CIP #	CIP Name
1A01G	M47.01-01	Dynamic Capital Planning

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

FY 2012 BLI	CIP #	CIP Name
4A07	M08.14-00	Resource Tracking Program (RTP)

  - **FAA Performance Target 3:** Achieve zero cyber security events that disable or significantly degrade FAA mission critical Line of Business systems.

FY 2012 BLI	CIP #	CIP Name
3A06A	M31.00-00	NAS Information Security – Information Systems Security
3A06B	M31.01-01	NAS Information Security – NAS Enterprise Information System Security (NEISS)
3A09	F30.01-01	Data Center Optimization

- **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 2012 BLI	CIP #	CIP Name
1A14	G07A.01-01	SSE – Security Integrated Tool Set (SITS)
3A04	C18.00-00	Command & Control Communications (C3)

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix B

Fiscal Years 2012 – 2016

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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) Strategic Plan 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 BLI consistent with the fiscal year (FY) 2012 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 2012 through 2016 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 FY12 through FY16. The example below shows the new format.

BLI numbers with an X (i.e., 1A09X) or project titles with X before the name (X, NEXRAD – Technical Refresh, W02.02-02) 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 2012-2016 Performance Output Goals, with the exception of the following:

- Programs/projects that fund support contracts (such as CAASD, SE2020 and NISC) or fund program support leases.

Where, 'None' is reflected in the FY 2012-2016 Performance Output Goals sections, it denotes that no funding was allocated for that fiscal year.

BUDGET LINE ITEM (BLI) FUNDING REQUESTS

To spur job growth and allow States to initiate sound multi-year investments, the Budget includes a $50 billion boost above current law spending for roads, railways and runways. The Budget requests a one-time $250 million in mandatory General Fund appropriation to advance FAA's next generation air transportation system (NextGen) and make near-term improvements in FAA's air traffic control infrastructure. $200 million will be used to accelerate applied research, advance development, and implement engineering solutions for NextGen technologies, applications, and procedures; and $50 million will be used to upgrade FAA capital infrastructure such as power systems and air traffic control centers and towers.

Within this Appendix and Appendix C, BLIs that support the mandatory General Fund appropriation request will include a breakout of the funding amount for Mandatory, Discretionary and Total request as shown below, dollars are in Millions.

FY 2012 Discretionary $M
FY 2012 Mandatory $M
FY 2012 Total Request $M

EXAMPLE

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

2B12, RUNWAY STATUS LIGHTS (RWSL)

FY 2012 Request $29.8M

- 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 ……..

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 installations of RWSL will contribute toward reducing the rate of runway incursions by showing pilots a direct warning that it is unsafe to enter a runway.

Program Plans FY 2012 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Complete installation at 4 of 23 operational sites.
- Achieve IOC at 9 of 23 (43%) operational sites.

Program Plans FY 2013 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Achieve IOC at 2 of 23 (52%) operational sites.

Program Plans FY 2014 – Performance Output Goals
- Start construction at 6 of 23 operational sites.
- Complete installation at 4 of 23 operational sites.
- Achieve IOC at 2 of 23 (61%) operational sites.

Program Plans FY 2015 – Performance Output Goals
- Start construction at 1 of 23 operational sites.
- Complete installation at 6 of 23 operational sites.
- Achieve IOC at 6 of 23 (87%) operational sites.

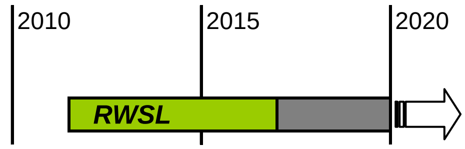
Program Plans FY 2016 – Performance Output Goals

- Complete installation at 1 of 23 operational sites.
- Achieve IOC at 3 of 23 (96%) operational sites.

System Implementation Schedule

Runway Status Lights (RWSL)

First site IOC: May 2011 -- Last site IOC: September 2017



PROGRAM PLANS FY 2012 – PERFORMANCE OUTPUT GOALS

For FY 2012 and for only selected programs, program output goals for the base funding (discretionary) and the mandatory funding are shown separately. For example, if the total funding would allow the purchase of 20 units and 15 are funded by discretionary funds and 5 are funded by mandatory funds, the program output goals for 2012 would show this particular output as:

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Purchase 15 units

Mandatory

- Purchase 5 units

BLIs that support the mandatory General Fund appropriation request will list all FY 2012 in these two categories. BLIs with only base funding (discretionary) will list output goals without identifying a category.

Table of Contents

ACTIVITY 1: ENGINEERING, DEVELOPMENT, TEST AND EVALUATION

1A01, ADVANCED TECHNOLOGY DEVELOPMENT AND PROTOTYPING (ATDP)

FY 2012 Discretionary $31.9M
FY 2012 Mandatory $1.5M
FY 2012 Total Request $33.4M

- 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
- K, Flight Services Facilities – Flight Service Automation Modernization, F05.05-01
- 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 Strategic Plan, research emphasis will remain on technologies that provide for direct safety warnings to pilots and aircrews at large airports as well as those that can be applied cost effectively at small to medium airports. The program will test alternative 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, Runway Safety Assessment (RSA) studies, Final Approach Runway Occupancy Signal (FAROS) and Enhanced Final Approach Runway Occupancy Signal (e-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 program 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 2012 – Performance Output Goals

- Sustain RWSL test beds, LCGS pilot sites, and other test beds.
- Deliver e-FAROS modification kits to selected locations.
- Develop e-FAROS cost benefit analysis.
- Conduct testing/ evaluation of acoustical and other low cost Runway Incursion (RI) prevention alternatives.
- Support Engineering development testing of RI safety logic with LCGS surveillance input.
- Support Engineering development testing of ADS-B for use in low cost runway incursion prevention systems.
- Develop RWSL RIL cost benefit analysis and advisory circular.
- Develop legacy FAROS advisory circular.
- Conduct shadow operations of RWSL LED fixtures at San Diego (SAN).
- Conduct in cockpit simulations at MITRE CAASD human-in-the-loop (HITL) testing to respond to Human Factors (HF), safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete technical performance and user evaluations on the five LCGS pilot systems.
- Publish initial technical performance / User evaluation report on LCGS pilot systems.
- Document LCGS Pilot Program findings to Executive Council (EC).

Program Plans FY 2013 – Performance Output Goals

- Sustain RWSL test beds, LCGS pilot sites, and other test beds.
- Develop all artifacts required under the FAA Acquisition Management System to support investment decision for national LCGS deployment.
- Develop RIL requirement documents.
- Develop eFAROS requirements documents.
- Conduct initial testing of RI prevention logic using LCGS surveillance input at a LCGS pilot site.
- Conduct operational evaluation of RWSL LED fixtures at SAN.
- Conduct in cockpit simulations at MITRE CAASD HITL testing to respond to HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Conduct evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS.
- Test safety logic enhancements to any RI detection and prevention products or procedures.
- Support development, demonstration and testing of a direct to cockpit indication and alerting capability.

Program Plans FY 2014 – Performance Output Goals

- Sustain RWSL test beds, LCGS pilot sites, and other test beds.
- Conduct shadow operations testing of RI prevention logic using LCGS surveillance input at a LCGS pilot site.
- Conduct in cockpit simulations at MITRE CAASD HITL testing to respond to HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Conduct evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS.
- Test safety logic enhancements to any RI detection and prevention products or procedures.
- Support development, demonstration and testing of a direct to cockpit indication and alerting capability.

Program Plans FY 2015-2016 – Performance Output Goals

- Sustain RWSL test beds, LCGS pilot sites, and other test beds.
- Conduct evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS.
- Test safety logic enhancements to any RI detection and prevention products or procedures.
- Support development, demonstration and testing of a direct to cockpit indication and alerting capability.
- Conduct in cockpit simulators at MITRE CAASD HITL testing to respond to HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.

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 Strategic 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. In order for the fuel burn and emissions calculations in NexGen to function, they must be fed with the actual trajectories of traffic in the NAS along with aircraft type, speed, altitude and other factors. PDARS routinely records these data and is capable of dynamically applying the NexGen calculations to the actual operations in the NAS. 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 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 2012 – Performance Output Goals
- Expand PDARS network to at least six additional sites.
- Continue integration of data from new ADSE-X sites with ARTS/STARS data.
- Develop specific metrics for each site and end to end calculations among the network.
- Automate fuel burn and emissions function programmed in FY 2011.

Program Plans FY 2013 – Performance Output Goals
- Continue expanding ASDE-X capability to at least the busiest Airports.
- Initiate connectivity to ERAM and other NexGen technologies.

Program Plans FY 2014 – Performance Output Goals
- Continue ASDE-X expansion as needed.
- Continue developing connectivity to ERAM and other NexGen technologies.
- Expand PDARS analysis capabilities to include NexGen technologies as they come on line.
- Incorporate noise profiling technology via the Aviation Environmental Design Tool (AEDT) module.

Program Plans FY 2015 – Performance Output Goals
- Continue ASDE-X expansion as needed.
- Complete connectivity to ERAM.
- Continue developing connectivity to NexGen technologies.
- Provide baseline data for before/after analysis of NexGen programs.
- Incorporate noise profiling technology via the AEDT module.

Program Plans FY 2016 – Performance Output Goals
- Transition PDARS data into the primary data source for operational performance.
- Support Future Airport Capacity Task (FACT) reports via surface date and demand files from En Route and Terminal data.
- Coordinate methodology internationally to standardize measurement of system capacity and efficiency.

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.

This project partially supports work by RTCA, a non-profit association that develops standards based on manufacturers, government, and aviation operator inputs. RTCA also recommends operational improvements to increase the efficiency of air transportation.

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 include 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, increasing capacity and efficiency and;
- Alternative automation, display, and facility configuration to increase productivity and hence capacity.

Program Plans FY 2012-2016 – Performance Output Goals

- Continue RTCA support.
- Continue to develop and sustain cognitive and analytic models to support assessments of new air traffic control operational concepts.
- Continue collaboration between the Single European Sky ATM Research (SESAR) and NextGen Program by working with the SESAR Joint Undertaking to coordinate concept development, validation, and measurement methodologies.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.

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

Program Description

This program develops mission need and concept and requirements development for initial investment decisions for aviation weather sensors, forecasting capability, dissemination systems, and integration of improved weather capability into the NAS. The focus is on NextGen including collaboration with Single European Sky ATM Research (SESAR) and the International Civil Aviation Organization (ICAO) for advanced aviation weather standards. This work is done to reduce the economic impact of weather on NAS operations, including delays and accidents. The purposes of this program are to reduce the number of weather related accidents, aviation flight delays, diversions and cancellations; improve operational efficiency of the NAS; and harmonize ICAO standards with US practices in weather.

This program is composed of three elements:

1. Concept Identification and Development
2. Global Harmonization
3. System Performance

1. <u>The Concept Identification and Development</u> component is concerned with the generation, analysis, management, allocation, and validation of requirements in the NextGen aviation weather portfolio. There are currently three Concept Maturity and Technology Development (CMTD) sub-projects: "TRACON Wind Compression", "Terminal Haze", and "TRACON Area Forecast". In addition, this program funds contract support to formulate agreements between government and industry stakeholders on policies needed to meet requirements for airborne weather observations, including cost sharing, data access and distribution, data reporting frequency, aircraft equipage, and other technical issues.

2. The <u>Global Harmonization</u> component arises out of FAA's official role as the U.S. Meteorological (MET) Authority to ICAO. The goal of this program is to promote global harmonization through the development of ICAO Standards and Recommended Practices (SARPs) and/or Manuals/Guideline documents for surface and airborne observations/forecasts and global dissemination of aviation weather information.

3. The System Performance component funds contract support to develop metrics that provide a framework for enabling the FAA to measure the benefits of weather information for air traffic operations. In addition, this program provides funds for contract support to maintain standards for surface observations.

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 measuring weather-related delays and improving prediction of those delays.

Program Plans FY 2012 – Performance Output Goals

- Develop and produce an interagency agreement on roles and responsibilities for airborne observation operations. Obtain signed MOUs between government and industry. Complete on an airline-by-airline basis.
- Direct the verification of the new ice, turbulence, and convective forecasts so that they meet ICAO Standards and Recommended Practices (SARPs) for High and Medium Level Significant Weather (SIGWX) Charts, and for the icing to meet the functional and performance requirements in support of Extended-range Twin-engine Operational Performance Standards (ETOPS).
- Finalize the Conops with associated performance operational requirements for space weather products in support of high latitude and polar operations.
- Continue development of operational requirements for the provision of meteorological services for the terminal area and TRACON airspace.
- Conduct Safety Management System (SMS) for Ceiling and Visibility Analysis (CVA), World Area Forecast (WAFS) products, deicing changes and Terminal Forecast (TAF) Changes.
- Complete Manual on Meteorological Services in support of Air Traffic Management Performance Plan.
- Support AJW on planned termination of the International Satellite Communication System and transition all users under International Satellite Communication System (ISCS) to the World Area Forecast System (WAFS) File Server to access aviation weather data in support of flight planning by the Public Internet.
- Conduct requirements allocation.
- Develop framework and estimate the cost of avoidable delay opportunities in adverse weather.

Program Plans FY 2013 – Performance Output Goals

Concept Identification and Development

- Conduct Service Needs analysis for aviation weather concepts.
- Development of a CRD plan as part of the CMTD process to receive approval to move TRACON area forecast project into CRD phase. The project will develop a CRD for use of improved forecasts covering the TRACON area and in so doing, assess previous research on this subject, perform necessary User Needs Analyses and ConUses, define and validate requirements, assess gaps between NextGen requirements (in various stages) and current capability, and develop alternatives for production and dissemination of the improved forecasts.
- Policy analyses will be conducted and policy artifacts developed related to roles and responsibilities for the provision and use of weather state information in the NAS.
- Agreements will be produced between the Government and stakeholders in the aviation industry formalizing roles and responsibilities regarding requirements for airborne weather observations, including cost sharing, data access and distribution, data reporting frequency, aircraft equipage.
- Conduct Requirements Validation

Global Harmonization

- Lead global alignment of ICAO SARPS with US current and Next Gen weather standards:
    - Develop SARPS for MET in support of ATM Performance Based Navigation
    - Develop SARPS for the provision of Volcanic Ash information in graphics and performance metrics for enhanced forecast & modeling
    - Develop SARPS for the provision of Space Weather in graphics and performance metrics for polar operations
- Reduce ICAO Annex 3 differences through global harmonization of services.

System Performance

- Continue to extend the modeling capabilities to enable different service units to measure and monitor their programs, e.g., investment analysis and performance monitoring.
- Continue development and enhancement of Weather Impact Traffic Index (WITI) concepts.
- Assess avoidable delays by weather conditions to Decision Support Tools (DSTs) that contribute to ATM weather impact mitigation.
- Conduct annual Service Standards process.
- Conduct Safety Assessments for needed changes to operational weather products.

Program Plans FY 2014-2016 – Performance Output Goals

Concept Identification and Development

- Continue to conduct requirements validation workshops, demonstrations and simulations.
- Continue to conduct the program to determine the quality of weather products in the NAS.
- Continue to allocate requirements to the weather research program.
- Continue to identify needed modifications to requirements to support the implementation of decision support tools.
- Continue to identify, plan for, demonstrate and evaluate weather impact methodologies for decision support tools development.
- Complete on-going safety studies on weather products, demonstrations and evaluations.
- Continue to evaluate new Qualified Internet Communications Provider (QICP) applications and assess semi-annual QA reports from current QICP entities.
- Update relevant Research Evolution Planning documents.
- Continue to conduct Service Needs analysis for aviation weather concepts.

Global Harmonization

- In coordination with EUROCONTROL, obtain ICAO agreement on global weather standards for NextGen and SESAR.
- Continue to reduce ICAO Annex 3 differences.
- Present US policy and positions at the con-joint ICAO/ World Meteorological Organization (WMO) Divisional Meeting.
- Consolidation of MWO.
- Requirements for the New Terminal Forecast (NTF).
- Manual of MET in support of Global ATM.

System Performance

- Produce annual Service Standards report.
- Continue to extend the modeling capabilities to enable different FAA service units to measure and monitor their programs (e.g., investment analysis and performance monitoring).
- Continue development and enhancement of WITI concepts.
- Assess avoidable delays by weather conditions to DSTs that contribute to ATM weather impact mitigation.
- Organize and conduct annual Technical Interchange Meetings.

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 have increased emphasis at both 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 a sector's area or adjustments to facility boundaries. Transition to a new configuration after airspace redesign is implemented requires 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.

Implementation of Airspace Redesign is broken down in phases and as each portion of airspace is unique, the amount of work and the approach can be different. Generally the phases are described as follows:

- Phase I – Characterize the issue and Perform Initial Evaluation.
- Phase II – Initiate Airspace Study and Conduct Airspace Study.
- Phase III – Summarize and Present Results. Implementation.
- Phase IV – Post/Evaluate 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

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 2012 – Performance Output Goals

- Implement New York/ New Jersey / Philadelphia (NY/NJ/PHL) Metropolitan Airspace Redesign, phase III.
- Implement Chicago Airspace Project, next phase (III).
- Implement initial design of Western Corridor Airspace Redesign.
- Support and complete Environmental Analysis on the different alternatives.

Program Plans FY 2013 – Performance Output Goals

- Implement Western Corridor Airspace Redesign phase II.
- Implement NY/NJ/PHL Redesign, final phases III.
- Implement Chicago Airspace Project, final phases IV.
- Implement additional terminal/en route/oceanic changes.

Program Plans FY 2014 – Performance Output Goals

- Implement Western Corridor Airspace Redesign phase III.
- Implement NY/NJ/PHL Redesign, final phases III and IV.
- Implement Chicago Airspace Project, 1 year review.
- Conduct new airspace redesign reviews.

Program Plans FY 2015 – Performance Output Goals
- Implement Western Corridor Airspace Redesign final phase.
- Implement NY/NJ/PHL Redesign, 1year review.

Program Plans FY 2016 – Performance Output Goals
- Implement Western Corridor Airspace Redesign 1 year review.
- Implement NY/NJ/PHL Redesign, final phases (III and IV).

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

Program Description

The FAA's Office of Systems Analysis is responsible for developing and maintaining mathematical models of the National Airspace System (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 shortfalls and better support other organizations within FAA that perform capacity-related 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, the impact of air travel demand changes, and ATM technology insertions. 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 for evaluating infrastructure changes. The model will also be used by aviation consultants and the academic community, and provide a de facto standard for airport capacity analyses. A Beta version of this model has been delivered to the FAA.

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 will use the model. The model is being developed in a "spiral" fashion, which adds enhancements to the initial model as they are completed. Components of the new model are currently being used by FAA and contractors to support ongoing analyses.

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 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.*

Relationship to Performance Target

In order to achieve this and other capacity targets, the FAA is undertaking a considerable investment in NextGen, a wide-ranging transformation of the air transportation system. Numerous cost-benefit and engineering trade studies are required to support this massive undertaking. 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 legacy models are not capable of evaluating proposed operational improvements such as optimized profile descents, oceanic en trail procedures, trajectory-based operations, surface traffic management, collaborative ATM, etc. New and improved models are needed to provide the analytical capabilities required to support these NAS improvements and help us realize our capacity objectives.

Program Plans FY 2012 – Performance Output Goals

- Airport Capacity Model
  - Software maintenance and user support (model development will have been completed)
- System-Wide NAS Model
  - Update Graphical User Interface (GUI) input/output views
  - Expand GUI to accommodate multiple scenarios
  - Update output processor
  - Implement initial Monte Carlo simulation capability
  - Begin software parallelization
  - Begin to implement new en route capacity representation
  - Begin to implement new airport capacity representation
  - Software maintenance and user support

Program Plans FY 2013 – Performance Output Goals

- Airport Capacity Model
  - Software maintenance and user support
- System-Wide NAS Model
  - Update GUI to support Monte Carlo capability
  - Update output processor
  - Complete Monte Carlo simulation capability
  - Complete software parallelization
  - Complete implementation of new en route capacity representation
  - Complete implementation of new airport capacity representation
  - Software maintenance and user support

Program Plans FY 2014-2016 – Performance Output Goals

- None.

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 existing tools are being upgraded to address the following focus areas: determining and validating quantitative economic value and internal benefits for capital projects; tracking milestones and schedule modeling; performance measurement; auditing expenditures and trend analysis; earned value monitoring for the 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.

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 Plans FY 2012 – Performance Output Goals

- Provide program management and obtain the property transfer of the JAWS display network from the National Center for Atmospheric Research (NCAR).

Program Plans FY 2013-2016 – Performance Output Goals

- None.

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 (TCAS Resolution Advisory (RA) Monitoring Systems (TRAMS)). 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 2012 – Performance Output Goals

- Complete Contractor Acceptance Inspection (CAI) Report Checklist on 20 TCAS Resolution Advisory (RA) Monitoring Systems (TRAMS).
- Finalize the development of an integrated approach between separation assurance and collision avoidance.
- Continue to monitor and access TCAS operations to ensure that approved changes to logic have no adverse effect on the NAS.
- Complete the transition of 20 TCAS Resolution Advisory (RA) Monitoring Systems (TRAMS) to service unit for operational maintenance.
- Develop metrics analysis on collected data.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

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

Program Description

The Operational Modeling Analysis and Data program provides a central database of models and corresponding inputs, assumptions, and results of ATO modeling activities. 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 providing a central repository of modeling resources as well as standardization of modeling resources. 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 2012 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 2012 – Performance Output Goals

- Complete survey of existing modeling tools and practices within the ATO.
- Deliver final report on survey of modeling efforts within the ATO.
- Identify solutions to issues identified in the modeling survey.
- Initiate work on solutions to modeling issues.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

K, FLIGHT SERVICES FACILITIES – FLIGHT SERVICE AUTOMATION MODERNIZATION, F05.05-01

Program Description

Flight Service Automation Modernization (FSAM) program is developing alternatives for the automation platform for all FAA facilities. Options including integrating graphical and text-based weather products and other aeronautical information for use in pilot briefings; integrating aeronautical data updates with NOTAM and flight plan data into FSAM; and the development of a web portal that will provide both FAA users and aviation community users with access to the same data, improving access to consistent and accurate flight service information. In addition there will be consideration of an automatic capability to provide pilots with critical updates that occur after having received preflight briefings, and to monitor VFR aircraft in order to be more proactive in search and rescue efforts.

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

A. FSAM will provide better awareness for pilots by automatically providing critical updates on changing weather conditions, allowing pilots to make decisions sooner to avoid hazardous weather.
B. Expedited Search and Rescue (ESAR) will take a proactive approach to rapidly finding VFR aircraft that prematurely stop on their route of flight. Pilots that crash are often alive, but do not survive because it takes so long to find them. One reason is that the FAA doesn't start looking for the aircraft until 30 minutes after the pilot's Estimated Time of Arrival. ESAR will trigger alerts as soon as the pilot stops prematurely.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Complete Alaska Service Delivery Analysis.

Program Plans FY 2013-2016 – Performance Output Goals
- See activities under 2C02A.

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 (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 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.

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 FY2020 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 Plans FY 2012-2014 – Performance Output Goals
- None.

Program Plans FY 2015 – Performance Output Goals
- Begin Technology Refresh.

Program Plans FY 2016 – Performance Output Goals
- Continue Technology Refresh.

1A02/1A03, NAS IMPROVEMENT OF SYSTEM SUPPORT LABORATORY AND WILLIAM J. HUGHES TECHNICAL CENTER FACILITIES
FY 2012 Request $16.0M

- 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 and NextGen systems. The WJHTC provides the FAA's centralized set of laboratories that are used to develop prototype systems and NextGen solutions 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 development and test necessary changes to 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;
- Integration and Interoperability Facilities;
- Traffic Management Systems,
- Weather Systems;
- Communications Systems;
- Radar Systems;
- Navigation and Tracking Systems;
- Target Generator Facility;
- Cockpit and Tower Simulation Facilities;
- Human Factors Laboratory; and
- Flying Laboratories, which are specially instrumented test 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 such as:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 acquisition program need not establish and maintain separate laboratory facilities to support research, development, test, evaluation, and field support for their program. It also enables the FAA to evaluate concepts and programs that span more than one domain of the NAS and integrate NextGen solutions into the NAS. This reduces the overall cost to the FAA and helps critical acquisition programs maintain cost and schedule targets. This results in overall operational efficiency to the FAA.

Program Plans FY 2012 – Performance Output Goals
- Develop the capability to test NextGen concepts and supporting equipment.
- Complete 90% of the laboratory improvement targets and milestones identified to achieve 75% NextGen readiness.
- Integrate the Florida Test Bed into the WJHTC NextGen R&D Domain.
- Complete 70% of Phase 1 of the Laboratory Infrastructure improvements identified in the 20-Year Master Plan.
- Complete 3 cockpit simulators to full capability level.
- Continue to sustain the existing NAS laboratory platform and provide support services.

Program Plans FY 2013 – Performance Output Goals
- Develop the capability to test NextGen concepts and supporting equipment.
- Complete 90% of the laboratory improvement targets and milestones identified to achieve 80% NextGen readiness.
- Complete the balance of Phase 1 of the Laboratory Infrastructure improvements identified in the 20-Year Master Plan.
- Complete 2 cockpit simulators to full capability level.
- Continue to sustain the existing NAS laboratory platform and provide support services.

Program Plans FY 2014 – Performance Output Goals
- Develop the capability to test NextGen concepts and supporting equipment.
- Complete 90% of the laboratory improvement targets and milestones identified to achieve 85% NextGen readiness.
- Complete 25% of Phase 2 of the Laboratory Infrastructure improvements identified in the 20-Year Master Plan.
- Complete 3 cockpit simulators to full capability level.
- Continue to sustain the existing NAS laboratory platform and provide support services.

Program Plans FY 2015 – Performance Output Goals
- Develop the capability to test NextGen concepts and supporting equipment.
- Complete 90% of the laboratory improvement targets and milestones identified to achieve 90% NextGen readiness.
- Complete the integration of Dallas, Aviation Research and Technology Park, and remote partners into the NextGen R&D Domain.
- Complete 50% of Phase 2 of the Laboratory Infrastructure improvements identified in the 20-Year Master Plan.
- Complete final 2 cockpit simulators to full capability level.

- Continue to sustain the existing NAS laboratory platform and provide support services.

Program Plans FY 2016 – Performance Output Goals

- Develop the capability to test NextGen concepts and supporting equipment.
- Complete 90% of the laboratory improvement targets and milestones identified to achieve 95% NextGen readiness.
- Continue to sustain the existing NAS laboratory platform and provide support services.

1A04, WILLIAM J. HUGHES TECHNICAL CENTER INFRASTRUCTURE SUSTAINMENT

FY 2012 Discretionary $7.5M
FY 2012 Mandatory $4.9M
FY 2012 Total Request $12.4M

- A, William J. Hughes Technical Center Building and Plant Support, F16.00-00
- B, William J. Hughes Technical Center Building and Plant Support – Technical Support Space Utilization Strategy, F16.01-01

A, 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 4.1 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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

Infrastructure Modernization 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 2012 – Performance Output Goals

<u>Discretionary</u>

- Building 300 Roof and Skylight Replacement – Phase 2 (construction).

<u>Mandatory</u>

- Structural Deficiency Remediation.
- Substation 2 Replacement in Building 300.
- Building 287 Roof Replacement and Mechanical Upgrade.

Program Plans FY 2013 – Performance Output Goals

- Life Safety Improvements to Eleven Facilities.
- Building 303 Chiller Replacement.
- Building 301 Mechanical Remediation.
- Mechanical & Electrical Improvements to Six Facilities.
- Electrical & Mechanical Upgrades to Building 300.
- Roof Replacement at Five Facilities.

Program Plans FY 2014 – Performance Output Goals

- Center Facility System Improvements (Year 3 of 20 year plan).
- Building Fire Detection/Suppression/Annunciation System Upgrades.
- Main Electrical Substation Upgrades.
- Building 301 Roof Replacement.

Program Plans FY 2015 – Performance Output Goals

- Center Facility System Improvements (Year 4 of 20 year plan).
- Building 316 Roof Replacement.
- Primary Electrical Feeder Replacement to Buildings 315 and 316.
- Overhead Electrical Distribution System Refurbishment.

Program Plans FY 2016 – Performance Output Goals

- Center Facility System Improvements (Year 5 of 20 year plan).
- Preliminary Site Development at the Center's Main Entrance.
- Center-wide Building automation system Expansion.
- Central Utilities Plant Chiller Replacement.
- Storm Water System Remediation.

B. WILLIAM J. HUGHES TECHNICAL CENTER BUILDING AND PLANT SUPPORT T – TECHNICAL SUPPORT SPACE UTILIZATION STRATEGY, F16.01-01

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 Inclusive of multiple laboratories, critical and operational facilities. The Strategic Space Utilization Strategy recognizes the need to upgrade our computer systems for 24/7 operations 365 days a year. Our current facilities do not adequately support round the clock operations. The Technical Center is currently hosting systems which perform functions over and above the original Test, Research and Development (R&D) functions for which the Technical Center's was originally designed. Up until now, when systems requiring a 24/7/365 operating environment are installed, we have modified existing equipment to approximate 24/7/365 operating environmental criteria. To develop the long term solution an investment analysis is in progress to determine the most effective solution for meeting these requirements.

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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

Strategic Space Utilization Strategy at the WJHTC will control costs while delivering quality customer service by increasing the reliability/availability/maintainability of operational and critical systems hosted at the technical center. 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 power/cooling/communications loads of the critical systems. Proper design and implementation will leverage the current resources of the Technical Center and provide a robust infrastructure for the implementation of future systems.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Develop initial design as determined by Investment Analysis.
- Begin Final Design Package.

Program Plans FY 2013-2016 – Performance Output Goals
- TBD, output goals depend upon FAA Management approval.

1A05, NEXTGEN NETWORK ENABLED WEATHER (NNEW)
FY 2012 Request $27.4M

- Reduced Weather Impact – NextGen Network Enabled Weather (NNEW) – Segment 1, G04W.01-01

Program Description

NNEW will define and provide the FAA's infrastructure required to provide a cost effective weather dissemination system that enables interoperability with NextGen partners and allows dynamic propagation of scalable areas (e.g., geographic area, route, specific location) of weather information. NNEW is the FAA's link with the 4-Dimentional Weather Data Cube (4-D Wx Data Cube) from NOAA/NWS Which provides all categories of weather users with improved access to timely and accurate weather information to support improved decision making, while enhancing safety. Together NNEW and NWS's 4-d weather cube meets aviation's expanding need for improved weather in maintaining capacity and achieving efficiency in all weather conditions.

The initial NNEW requirements and architecture will be developed and the NNEW capability will 1) deliver cost effective universal access to a single source of weather information through standardization of weather services (independent of system or platform); 2) implement open system data standards to enable weather interoperability with NextGen partner agencies; 3) provide the ability for the user to obtain weather information based on operational specific parameters (i.e., extraction/filter capability) and reduces bandwidth constraint; and 4) provide adaptors to ensure that the legacy systems are not required to change their system interfaces. 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 assign the operational benefits of a network-enabled weather environment to the FAA. An initial operational capability for NNEW is planned for FY 2015.

NNEW will also build on opportunities to realize full operational connectivity with the NOAA/NWS 4-D Wx Data Cube. NNEW will work in collaboration with SWIM to provide the extraction/filter capability, the OCG Service Standards and weather data format standards, the ISO Registry Implementation, and the infrastructure for this capability.

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 will enable 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 will enable 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 will enable 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 2012 – Performance Output Goals
- Complete Initial Investment Decision (IID) activities.
- Obtain IID for NNEW Segment 1.

Program Plans FY 2013 – Performance Output Goals
- Complete FID for NNEW Segment 1.
- Initiate Solution Implementation for Segment 1.

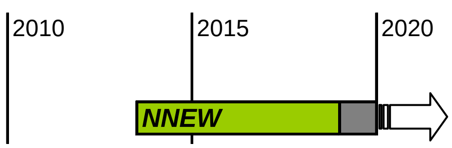
Program Plans FY 2014 – Performance Output Goals
- Continue Solution Implementation activities for Segment 1.
- Conduct Operational Test and Evaluation.

Program Plans FY 2015 – Performance Output Goals
- Achieve Initial Operating Capability for Segment 1.
- Begin transition NNEW Segment 1 to operations.

Program Plans FY 2016 – Performance Output Goals
- Continue transition NNEW Segment 1 to operations.

System Implementation Schedule

NextGen Network Enabled Weather (NNEW)
First site IOC: September 2015 -- Last site IOC: December 2018



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

FY 2012 Discretionary $143.0M
FY 2012 Mandatory $7.2M
FY 2012 Total Request $150.2M

- NextGen Data Communications – Segment 1a, G01C.01-01
- X, NextGen Data Communications – Segment 1b, G01C.01-02
- NextGen Data Communications – Segment 2, G01C.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.

Initially, Data Communications (Data Comm) will be used with current traffic control strategies to reduce controller workload by automating repetitive exchanges. As controllers become more productive, sector capacity will grow without the need to assign additional resources. Data Comm benefits will be realized in Tower, Ground, En Route, and TRACON operations as controllers' workloads are reduced enabling them to spend more time moving traffic efficiently. The busiest positions, whether in en route feeder sectors in metro corridors, terminal approach sectors, or airport ground control at OEP airports, will see the most dramatic results.

New services enabled by Data Comm will contribute even more dramatically to air traffic capacity. Advanced 4-D 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. For example, Continuous Descent Approaches will enable pilots to throttle back to idle on their descent to the airport, reducing noise, emissions, and fuel consumption. Data Comm, by allowing exchange of data to carefully coordinate the aircraft's position in time and space, will allow the Agency to effectively employ these approaches even in congested airspace.

These improvements to the Agency's air traffic management services will be delivered by the Data Communications project in two 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. This delivery will occur in multiple phases. Initial tower service delivers the basic log-on capability required to initiate all data communications, and revised departure clearances (DCL) for Future Air Navigation Systems (FANS). The next phase will deliver core En Route FANS services for Controller-Pilot Data Link Communication (CPDLC), which includes transfer of communications and initial check-in/out for aircraft flying into and out of sectors, direct-to-fix flight paths, altimeter settings, etc. A subsequent phase will allow implementation of the remaining enhanced En Route services. Segment 2 will enable more advanced NextGen operations to include initial trajectory-based operations, which would not be possible using the existing voice systems.

To implement these capabilities Data Comm is procuring software upgrades to the FAA Tower Data Link Services (TDLS) and En Route Automation Modernization (ERAM) systems. Hardware updates will be required to create a protocol and security gateway (PGW) function with expanded FAA Telecommunications Infrastructure (FTI) capacity. In addition the Data Comm Integrated Services (DCIS) contract will be awarded and it will provide a Very High Frequency Digital Link (VDL Mode-2) air/ground network, integration and engineering services, and avionics equipage.

Some of the steps in the initial Data Comm implementation (Segment 1 Phase 1 (S1P1)) are identified below:

- Avionics prototyping and validation as well as avionics integration with Data Comm services.
- Tower Data Link Services (TDLS) hardware and software enhancements to enable Revised Departure Clearance (DCL) services.
- Software development of ERAM for aircraft log-on capability.
- Continue ERAM software development for En Route Computer-Human Interface upgrades, and begin requirements / design of En Route Controller Pilot Data Link Communications (CPDLC) applications.
- Plan for and begin William J. Hughes Technical Center (WJHTC) integration and test planning, lab development, and test equipment procurement.
- Contract award for Data Comm Integrated Services (DCIS) to include integration, networking, and avionics equipage incentives.
- Continue preparations for and conduct of Final Investment Decision for Segment 1.
- Trials for the revised Departure Clearance service.

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

- *FAA Strategic Goal 2 – Greater Capacity.*
- *FAA Objective 1 – Increase capacity to meet projected demand and reduce congestion.*
- *FAA Performance Target 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 (Terminal Radar Approach Control), 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 FOCUS (formerly 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.

Program Plans FY 2012 – Performance Output Goals
Discretionary

- Final Investment Decision for Segment 1 services.
- Data Comm Integrated Services (DCIS) Contract Award.
- Complete Tower Data Link Systems (TDLS) Design Review.
- Complete En Route Automation Modernization (ERAM) Preliminary Design Review.
- Initiate Departure Clearance trials.

Mandatory

- En Route Automation Engineering.

Program Plans FY 2013 – Performance Output Goals

- Complete modification of DCIS to include Data Communications Network Service (DCNS).
- Deliver initial data communications networking services capability to test environments.

Program Plans FY 2014 – Performance Output Goals

- Complete software enhancements for TDLS.
- Complete ERAM supplier developmental testing for log-on capability.

Program Plans FY 2015 – Performance Output Goals

- Complete Tower Development Testing (DT) of TDLS for Future Air Navigation System.
- Complete Data Comm system level integration and test.
- Complete Data Comm system level Operational Test and Evaluation (OTE) for revised departure clearance service.
- Complete deployment of Data Comm protocol gateway and log-on services to national centers.

Program Plans FY 2016 – Performance Output Goals

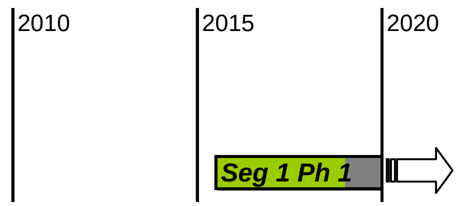
- Complete Initial Operational Capability at key site for DCL Tower Services.
- Initiate/support Independent Operational Assessment (IOA) activities for DCL Services (S1P1).

System Implementation Schedule

Data Communications in support of NextGen

Segment 1 Phase 1 Service – Tower Log-on for FANS 1/A+ with DCL

First site IOC: 2015 -- Last site ORD: 2018



1A07, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – DEMONSTRATIONS AND INFRASTRUCTURE DEVELOPMENT
FY 2012 Discretionary $16.9M
FY 2012 Mandatory $8.1M
FY 2012 Total Request $25.0M

- NextGen – Demonstrations & Infrastructure Development, G08M.01-01

Program Description

Over the next couple of years, there is a need to show how NextGen research and development (R&D) initiatives might be accelerated, and the benefits of system improvements demonstrated and validated. By examining proposed NextGen technologies, procedures, equipment and automation in integrated test bed environments with targeted demonstrations the FAA will quickly increase understanding of possible early benefits of NextGen Operational Improvements (OIs) and will identify risk areas for that require additional work. Demonstrations are also used to prove concept feasibility and support both validation and fast-time modeling. Furthermore, demonstrations provide data to support business case and investment decisions tied to the decision points in the NAS architecture. Also, demonstrations can promote industry involvement. Rigorous demonstrations will help to improve the integration and interoperability of systems, the timely introduction of necessary rulemaking and required policy changes, and effective training.

NextGen Demonstration and Infrastructure Development generally supports 4-5 projects a year. Demonstrations normally last about 24 – 30 months. When the demonstration project is completed, the results will be assessed to determine whether to proceed, and the demonstrated capabilities will be included in solution sets for further engineering and maturation.

During the FY 2012 to FY 2016 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 as described below.
- 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.

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).

RNAV-RNP Terminal Area Demonstration – This project is intended to demonstrate the safe and effective integration of public RNP operations in a mixed-equipage traffic environment using Traffic Management Advisor (TMA), an existing software tool, to sequence traffic in a way that can produce immediate and measurable reductions in CO2 emission, fuel burn, and noise. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

Airborne Access to SWIM – This demonstration will begin validation of the preliminary requirements for Airborne SWIM and show the capability for the FAA system and airborne aircraft to communicate non-safety critical information via an airborne network. This capability should provide information such as traffic management with the capability to communicate data essential to system efficiency. Additionally, using this link, the flight crew could use this capability to communicate Estimated Time of Arrivals (ETAs), 4D Intent information, and negotiated reroutes back to the FAA system. In addition to air traffic data, the link can be used to transmit weather data / information such as updates.

Airborne Execution of Flow Strategies – This project will begin field demonstration of Airborne Execution of Flow Strategies to support development of final procedures and information exchange. Also, this project will demonstrate the use of electronic negotiation to coordinate and execute reroutes of airborne flights. Demonstration will show the capability to define airborne flights to be rerouted by region, destination, or flow. With the current flight(s) defined, demonstrate the capability for Traffic Management to electronically negotiate the initiative with the Airline Operation Center in a timely manner. Negotiation may include the ability for the user to substitute flights to meet their business needs. Once the reroute(s) is finalized, demonstrate the capability to transfer the reroute to the flight deck and the downstream controller's workstation. If possible, the reroute will be uploaded to the flight deck via data communications. Other possible procedures include transmission through ATC voice communications or data transmission relayed through the AOC.

GBAS Demonstration – This project is intended to demonstrate use of GBAS to support rapid recovery of Cat I instrument approach capability, the safe and effective integration of public RNP operations in a mixed-equipage traffic environment, the measurable reductions in CO2 emissions, fuel burn, and noise with the implementation of GBAS enable approaches to all runways at the project airport. Additionally, the project will characterize the impact of the equatorial ionospheric environment on GBAS operations. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

Future Planning – During the FY 2012 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 provides integrated demonstration and end-to-end demonstration activities, near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and/or emerging customers' NAS initiatives, and mid-term development to better understand future operational concepts. The initial segment also provides integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration 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 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 2012-2016 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 2012 – Performance Output Goals
International Air Traffic Interoperability
Discretionary

- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation / development for NextGen transformational technologies to assure timely implementation into the NAS.
- Continue to conduct Oceanic Optimization demonstrations in the Atlantic and Pacific
- Continue to conduct Flight Data Object (FDO) information exchange demonstration in the Pacific (e.g., SWIM, FDO, etc)

Mandatory

- Continue to conduct Gate-to-Gate demonstration over the Atlantic.

RNAV-RNP Terminal Area Demonstration
Discretionary

- None.

Mandatory

- Integrate RNP procedures with complementary RNAV arrivals
- Consult with the PBN user community
- Design, develop and deploy comprehensive, public -use RNAV and RNP AR flight segments at trial airports
- Develop CONOPS and Coordinate with stakeholders
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS
- Maintain and support flight procedures for the duration of the phase
- Measurement of pre-and post-implementation fuel consumption, CO2 emission, noise, and other relevant metrics

Airborne Access to SWIM
<u>Discretionary</u>
- Demonstration Plan
- Test Bed Requirements
- Safety Analysis

<u>Mandatory</u>
- Memorandum of Agreements

Airborne Execution of Flow Strategies
<u>Discretionary</u>
- Develop program plan for linking ground-based ANSP flow strategies with flight operator planning
- Conduct analysis of relationship, including potential impact, to both other flow strategies (for example, airborne metering and interval management) and leveraging of planned, advanced flight information availability (through, for example, flight object or SWIM capabilities)

<u>Mandatory</u>
- Develop engineering assessment of potential alternatives

GBAS Demonstration
<u>Discretionary</u>
- Planning and coordination
- Develop Concept of Operations (CONOPS) for rapid recovery operations.
- Coordinate with stakeholders
- Instrument flight procedures
- Design, develop, and deploy comprehensive, public-use Area Navigation-Required Navigation Performance (RNAV/RNP) AR flight segments at Guam International Airport.
- Integrate RNP procedures with complementary RNAV arrivals.
- Consult with the Performance Based Navigation (PBN) user community.
- Maintain and support flight procedures for the duration of the phase
- Staged deployment at the trial site
- Data collection and analysis to characterize the effects on GBAS accuracy in the equatorial ionosphereic environment.
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS

<u>Mandatory</u>
- Benefits measurement
- Measurement of pre- and post-implementation fuel consumption, CO_2 emission, noise, and other relevant metrics.
- Establish benefits case for rapid recovery GBAS system

Future Planning
<u>Discretionary</u>
- Continue planning for future demonstration activities such as enhanced vision on surface in low visibility conditions and navigation.

<u>Mandatory</u>
- Support OMB 300 preparation/development for NextGen transformational technologies.

Program Plans FY 2013 – Performance Output Goals
- Continue demonstration activities for enhanced avionics capabilities.
- Continue demonstration activities for enhanced navigation capabilities.
- International Air Traffic Interoperability – continue demonstration activities of collaborative end-to-end domain systems.
- Continue standards and alternatives development.
- Conduct demonstration of Airborne Access to SWIM.
- Conduct demonstration of Airborne Execution of Flow Strategies.
- Continue to support OMB 300 development for NextGen transformational technologies.

Program Plans FY 2014 – Performance Output Goals
- Continue demonstration activities for enhanced avionics capabilities.
- Continue demonstration activities for enhanced navigation capabilities.
- Demonstration of mid term end-to-end trajectory based operations.
- Continue standards and alternatives development.
- Continue to support OMB 300 development for NextGen transformational technologies.

Program Plans FY 2015 – Performance Output Goals
- Continue demonstration activities for enhanced avionics capabilities.
- Continue demonstration activities for enhanced navigation capabilities.
- Continue demonstration activities of mid term end-to-end trajectory based operations.
- Continue standards and alternatives development.
- Continue to support OMB 300 development for NextGen transformational technologies.

Program Plans FY 2016 – Performance Output Goals
- Continue demonstration activities for enhanced avionics capabilities.
- Continue demonstration activities for enhanced navigation capabilities.
- Continue demonstration activities of mid term end-to-end trajectory based operations.
- Continue standards and alternatives development.
- Continue to support OMB 300 development for NextGen transformational technologies.

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

FY 2012 Discretionary $90.0M
FY 2012 Mandatory $19.0M
FY 2012 Total Request $109.0M

- A, ATC/Tech Ops Human Factors, G01M.02-01
- B, New ATM Requirements, G01M.02-02
- C, Ops Concept Validation Modeling, G01M.02-03
- D, Staffed NextGen Towers (SNT), G03M.04-01
- E, Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction, G06M.02-01
- F, Wake Turbulence Re-Categorization, G06M.02-02
- G, Systems Safety Mgmt Transformation, G07M.02-01 and X, Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS), G07A.02-01
- H, Operational Assessments, G07M.02-02

A, ATC/TECH OPS HUMAN FACTORS, G01M.02-01

Program Description

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

Research will examine the roles of ANSP and facilities maintenance personnel to ensure safe operations at increased capacity levels and the way the roles would be best supported by allocation of functions between humans and automation. The success of new NextGen technologies hinge upon the actions of air traffic service providers using new decision support tools or automation to achieve the operational improvement. The effectiveness of each of these solutions is contingent upon the proper human engineering of the new capability. This human engineering is not just the visible interface, but the characteristics of the tool and how the tool is used in the context of the work.

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 human factor guidance and requirements to support the changes in roles and responsibilities between pilots and controllers and between humans and automation required to implement NextGen.

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis.

Mandatory

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis.

Program Plans FY 2013 – Performance Output Goals

- Investigate controller roles in a simulated strategic air traffic environment for en route and terminal domains.
- Demonstrate controller procedures in use of workstation tools for weather including mixed equipage.

Program Plans FY 2014 – Performance Output Goals

- Investigate Human Factors aspects of weather information requirements for en route and terminal domains.

Program Plans FY 2015 – Performance Output Goals

- Demonstrate controller use of NextGen concepts, capabilities and procedures.

Program Plans FY 2016 – Performance Output Goals

- Demonstrate increased controller efficiencies through the use of new NextGen tools during simulations.

B, NEW ATM REQUIREMENTS, G01M.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; and
- Identify information distribution requirements for non-command and control information transmitted by airborne System-Wide Information Management (SWIM).
- Determine technology and requirements for Weather Radar Replacement (WRR).
- Development of industry standards/requirements and to evaluate the benefits associated with the current phase.
- Availability of ADS-B data matching or exceeding coverage from the five current Long Range Radars along the proposed RNAV routes.
- Development of ADS-B only RNAV routes along the East Coast and the Caribbean.

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 Plans FY 2012 – Performance Output Goals
<u>Discretionary</u>

- <u>Develop an integrated approach between separation assurance and collision avoidance, with special attention to the safety case;</u>
    - Develop and execute implementation plan for NextGen Traffic Alert and Collision Avoidance System (TCAS).
    - Develop standards and guidance for advanced safety assurance methods and simulation.
- <u>Common Trajectory Requirements and Implementation Strategy;</u>
    - Continue analysis to allocate functions to systems, ground and airborne.
    - Lab demonstration and fast time modeling of common trajectory.
    - Continue risk assessment.
- <u>RNAV/RNP via Data Communications;</u>

    - Delivery across data communications.
    - On the fly development, evaluation and delivery.
- New Radar Requirements (Surveillance and Weather);
    - Surveillance & Weather Radar Replacement (SWRR) - Analyze Phase 1 technology maturity and deliver recommendation.
    - SWRR - Phase 2 concept demonstrator procurement preparation and contract award.
    - SWRR - provide for best practices.

Mandatory
- New Radar Requirements (Surveillance and Weather);
    - Complete CRDR artifacts for wind-shear detection services work package 1 (NAS EA DP WxA).
- Development of industry standards/requirements and to evaluate the benefits associated with the current phase.
- Availability of ADS-B data matching or exceeding coverage from the five current Long Range Radars along the proposed RNAV routes.
- Development of ADS-B only RNAV routes along the East Coast and the Caribbean.

Program Plans FY 2013 – Performance Output Goals
Weather Radar Replacement (WRR)
- Complete Technology Demonstration development and conduct evaluations.
- Continue WRR Investment Analysis (IIA) activities (e.g. OMB300, BCAR, Market Survey).
- Perform acquisition planning and preparation for WRR prototype development.

Trajectory Modeling
- Determine conflict resolution approaches using aircraft intent data.
- Develop evaluation model to assess common trajectory.
- Evaluate techniques to deliver RNAV/RNP approaches using Datacomm.

Airborne Access to SWIM
- Conduct validation activities for Airborne Access to SWIM.

Program Plans FY 2014 – Performance Output Goals
Weather Radar Replacement
- Initiate WRR prototype(s) development.
- Continue Investment Analysis (IIA) activities (e.g. OMB300, BCAR, Market Survey).

Trajectory Modeling
- Develop safety assessment of common trajectory.
- Develop common trajectory demonstration strategy.
- Develop ConUse for delivering RNAV/RNP approaches using Datacomm.

Airborne Access to SWIM
- Conduct industry day.
- Develop high level requirements.

Program Plans FY 2015 – Performance Output Goals
Weather Radar Replacement
- WRR prototype demonstration.
- Complete investment analysis for WRR.

Trajectory Modeling
- Develop high level requirements for RNAV/RNP approaches using Datacomm.
- Develop common trajectory demonstration strategies.

Program Plans FY 2016 – Performance Output Goals
Trajectory Modeling
- Conduct common trajectory demonstration.
- Update common trajectory Concept of Use.
- Develop safety assessment of RNAV/RNP approaches using data communication.
- Develop high level architecture artifacts for RNAV/RNP approaches using data communication.

C, OPS CONCEPT VALIDATION MODELING, G01M.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.

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

Program Plans FY 2012 – Performance Output Goals
Discretionary
- Development of high priority Mid Term operational concepts.
- Validation of operational concepts through simulation including Human In The Loop and modeling to validate concepts described in NAS Concept of Operations documents and scenarios.
- Develop engineering and business case documentation required to support transition of initial concept level requirements to the operational service units.
- Research to reduce implementation risk of NextGen concepts.

Mandatory
- Conduct modeling to assess NextGen Mid Term benefits.

Program Plans FY 2013 – Performance Output Goals
- Revise iteration of The Concept of Operations document based on concept validation activities.
- Conduct simulation including Human In The Loop and modeling to validate concepts described in NAS Concept of Operations documents and scenarios.
- Develop and evaluate benefits, requirements, human factors and safety issues associated with NextGen concepts.
- Develop engineering and business case documentation required to support transition of initial concept level requirements to the operational service units.

Program Plans FY 2014-2016 – Performance Output Goals
- Revise iteration of The Concept of Operations document based on concept validation activities.
- Conduct simulation including Human In The Loop and modeling to validate concepts described in NAS Concept of Operations documents and scenarios.
- Develop benefits associated with NextGen concepts.
- Develop engineering and business case documentation required to support transition of initial concept level requirements to the operational service units.

D, STAFFED NEXTGEN TOWERS (SNT), G03M.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, the Staffed NextGen Tower (SNT) concept provides for a shift from using the out-the-window (OTW) view as the primary means for providing tower control services to using certified surveillance for providing these services. SNT is planned for high density airports as these airports are likely to have the surveillance infrastructure and most aircraft equipped with avionics that will support SNT operations.

In the near-term, this project will provide the necessary requirements, operational procedures, and supporting documentation leading to certification of a surface surveillance system. This will provide for improved safety and increased capacity at night and during periods of inclement weather when impaired visual observation from an air traffic control tower results in delays or a reduced level of access to the airport. The application of SNT for small and medium airports (SNT-SMA) is under concept exploration and development. The development of both SNT and SNT-SMA is planned as part of this project.

In the out years, a key component of this work, certified surface surveillance, may be leveraged to support remote operations. Additional concept engineering will be needed to validate the remote operations aspects of the concept. The necessary requirements, specifications, and supporting documentation to assess remote operations and to support an investment decision 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 is planned. Automated NextGen Towers (ANT), a companion vision to SNT, is planned for non-towered airports in the far-term.

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 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 that do not currently have service and extension of services when towers close.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- Analyses in support of surface surveillance certification.
- Procedures development in support of surface surveillance certification.
- System safety analysis and documentation in support of surface surveillance certification.
- Requirements for certified surface surveillance.
- Analyses for surveillance to support SNT-SMA.

Mandatory
- Maintain SNT equipment at Dallas/Ft. Worth (DFW) (field test site).

Program Plans FY 2013 – Performance Output Goals
- Analyses in support of surface surveillance certification.
- Procedure development in support of surface surveillance certification.
- System safety analysis and documentation in support of surface surveillance certification.
- Updated requirements for certified surface surveillance.
- Draft requirements for SNT-SMA.

Program Plans FY 2014 – Performance Output Goals
- Analyses in support of surface surveillance certification.
- Procedure development in support of surface surveillance certification.
- System safety analysis and documentation in support of surface surveillance certification.
- Updated requirements for certified surface surveillance.
- Refinement of requirements for SNT-SMA.

Program Plans FY 2015 – Performance Output Goals
- Continue analysis and documentation for surface surveillance certification.
- Conduct analysis/simulation for SNT-SMA.
- Conduct concept validation for remote operations.
- Conduct analyses needed for investment analysis.
- Develop investment decision documentation;
    - Requirements document
    - Business Case Analysis Report
    - Updated Enterprise Architecture products and amendments

Program Plans FY 2016 – Performance Output Goals
- Complete analysis and documentation for surface surveillance certification.
- Conduct analysis/simulation for SNT-SMA.
- Conduct concept validation for remote operations.
- Conduct analyses needed for investment analysis.
- Update investment decision documentation;
    - Requirements document
    - Business Case Analysis Report
    - Updated Enterprise Architecture products and amendments
- Support the development of concepts of operations for ANT and validation of ANT.

E, ENVIRONMENT & ENERGY – ENVIRONMENTAL MGMT SYS & NOISE/EMISSION REDUCTION, G06M.02-01

Program Description

Aviation growth will likely result in increases in aircraft noise, fuel burn, and emissions. Environmental impacts could restrict capacity growth and prevent full realization of mobility envisioned by the NextGen. NextGen environmental goals are to reduce the system wide aviation environmental impacts in absolute terms notwithstanding the growth of aviation. Environmental impacts of aviation can be reduced 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 associated with NextGen. This 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 2015 and 2025. There are two environmental projects under this program.

<u>Environment and Energy – Environmental Management System</u>
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.

<u>Environment and Energy – Advanced Noise and Emission Reduction</u>
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 2 percent per year, through FY 2015, as measured by the calendar year 2010 fuel burned per revenue mile flown, relative to the calendar year 2000 baseline.*

Relationship to Performance Target

The focus of this Research and Development program is to assess the NAS-wide impact of solutions that mitigate environmental risks while supporting NextGen projected capacity growth.

Program Plans FY 2012 – Performance Output Goals
Discretionary

- Implement enterprise level EMS framework.
- Integrate environmental information into key decision processes.
- Initiate targeted EMS Communications and outreach initiatives.
- Conduct second phase of pilot studies based on outcomes from the first phase (2010-2011).
- Initiate NextGen EMS implementation efforts at priority stakeholder organizations with significant near-term environmental issues.
- Assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for noise and emissions.
- Significant exploration and demonstration of environmental control algorithms for surface and terminal operational procedures.
- Analyze environmental impacts of CLEEN technologies on the NAS and assess approaches to optimize aircraft system environmental performance.
- Analyze environmental impacts of alternative fuels on the NAS and assess approaches to optimize aircraft system environmental performance.
- Investigate impact on NAS wide operations of market based options, including Cap and Trade and carbon charges, to limit aircraft greenhouse gas emissions.

Mandatory

- Perform analysis for EMS Environmental Impacts and Metrics.
- Finalize NextGen EMS implementation in initial FAA organizations.
- Analyze National Environmental protection Act (NEPA) compliance within the EMS framework.
- Coordinate NextGen data management with NextGen planners and developers.
- Significant exploration and demonstration of environmental control algorithms for en route operational procedures to reduce aircraft fuel burn, emissions and noise.
- Investigate potential operational changes required to optimize aircraft operations for greenhouse gas reductions.

Program Plans FY 2013 – Performance Output Goals
Environmental Management System (EMS)

- Continue next phase of EMS pilot studies.
- Expand research into environmental impact sources for other airport pilot locations.
- Develop potential reward (non-financial) incentive program options for EMS adoption.
- Expand targeted EMS communications and outreach initiatives including website and workshop.
- Evaluate FAA NextGen capabilities to identify those with potential significant environmental aspects.
- Expand and formalize NextGen EMS coordination activities with FAA organizations.
- Integrate environmental information into key NextGen Planning (i.e., NSIP).
- Begin scoping for a system to track NextGen environmental performance (e.g. business practices, automation capabilities, and interfaces with other automation systems).
- Identify potential mission-level NextGen decision support capabilities.
- Analyze NEPA compliance within the EMS framework.

Advanced Noise and Emission Reduction

- Analyze environmental impacts of CLEEN technologies on the NAS.
- Analyze environmental impacts of alternative fuels on the NAS.
- Continue significant exploration and demonstration of environmental control algorithms for gate-to-gate operational procedures.
- Support ATO for environmental analysis of operational procedures.
- Assess the impacts of environmental standards on NAS wide operations.

- Investigate the impact of policy options and market based measures on NAS.

Program Plans FY 2014 – Performance Output Goals
Environmental Management System (EMS)
- 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.
- Develop and implement plans for next phase of EMS development and deployment.
- Analyze NEPA compliance within the EMS framework.
- Assess EMS performance towards meeting NextGen environmental goals.

Advanced Noise and Emission Reduction
- Advance integration and assessment of CLEEN technologies and alternative fuels.
- Explore and demonstrate environmentally efficient gate-to-gate operational procedures.
- Support ATO on environmental analysis of operational procedures.
- Investigate and assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for aircraft noise and emissions.
- Investigate NAS-wide impacts of environmental standards, market based options (including Cap and Trade, carbon charges, etc.), and other policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2015 – Performance Output Goals
Environmental Management System (EMS)
- 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.
- Develop and implement plans for next phase of EMS development and deployment.
- Analyze NEPA compliance within the EMS framework.
- Assess EMS performance towards meeting NextGen environmental goals.
- Initiate demonstration of integrated Nextgen EMS.

Advanced Noise and Emissions Reduction
- Advance integration and assessment of CLEEN technologies and alternative fuels.
- Explore and demonstrate environmentally efficient gate-to-gate operational procedures.
- Support ATO on environmental analysis of operational procedures.
- Investigate and assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for aircraft noise and emissions.
- Investigate NAS-wide impacts of environmental standards, market based options (including Cap and Trade, carbon charges, etc.), and other policy measures to limit aircraft emissions and noise and increase fuel efficiency.

Program Plans FY 2016 – Performance Output Goals
Environmental Management System (EMS)
- 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.
- Develop and implement plans for next phase of EMS development and deployment.
- Analyze NEPA compliance within the EMS framework.
- Assess EMS performance towards meeting NextGen environmental goals.
- Continue demonstration of integrated NextGen EMS.

Advanced Noise and Emission Reduction
- Advance integration and assessment of CLEEN technologies and alternative fuels.
- Explore and demonstrate environmentally efficient gate-to-gate operational procedures.

- Support ATO on environmental analysis of operational procedures.
- Investigate and assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for aircraft noise and emissions.
- Investigate NAS-wide impacts of environmental standards, market based options (including Cap and Trade, carbon charges, etc.), and other policy measures to limit aircraft emissions and noise and increase fuel efficiency.

F, WAKE TURBULENCE RE-CATEGORIZATION, G06M.02-02

Program Description

This research and development program focuses on increasing capacity to meet the 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. 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 provided a set of recommendations for international review that focused on changes to the present static standards. To accomplish this, the program developed enhanced analysis tools to link observed wake behavior to standards and determined safety risk associated with potential new standards relative to existing standards. Future work will encompass the modeling and simulation work by EUROCONTROL in validating potential improved wake mitigation processes and standards; 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 Turbulence Re-Categorization program is now underway. By 2014, it will develop sets of tailored leader aircraft and follower aircraft wake mitigation separation standards whose application would depend on flight conditions and aircraft performance. This will result in being able to get more aircraft into and out of airports within 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 "wake 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 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 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, its rebalancing the wake turbulence separation standards to address today's mix of aircraft utilizing the nation's busiest 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 FY 2012 – Performance Output Goals

Discretionary

- Engineering and analysis necessary to determine system implementation feasibility of the Leader/Follower wake turbulence mitigation separation processes and procedures being developed by the project.
- Continued collection of aircraft wake turbulence data to achieve statistical confidence in the Leader/Follower separations being proposed.
- Determine best methods for incorporating key weather and aircraft performance parameters into determination of safe and capacity efficient separation processes and procedures.

Mandatory

- Develop framework structure for dynamic wake mitigation processes and procedures.

Program Plans FY 2013 – Performance Output Goals

- Continue development of additional sets of Leader/Follower aircraft wake mitigation separation standards.
- Initiate high level design of the changes to FAA air traffic control systems required to implement the Leader/Follower tailored aircraft wake separation standards.

Program Plans FY 2014 – Performance Output Goals

- Complete development of the Lader/Follower tailored aircraft wake separation standards along with the planning for implementing the associated procedures and processes.
- Coordinate the required changes to FAA ATC automation platforms to implement the Leader/Follower based wake separation standards.

Program Plans FY 2015 – Performance Output Goals

- Continue to support development of the required changes to FAA ATC automation platforms to implement the Leader/Follower based wake separation standards.
- Initiate the development of detailed concept of use for dynamically adjusted wake separation minima per aircraft pair.

Program Plans FY 2016 – Performance Output Goals

- Complete detail concept of use description for dynamically adjusted wake separation minima, vet it with the aviation stakeholder community.
- Support the implementation of the Leader/Follower wake separation standards on the FAA ATC automation platforms.

G, SYSTEMS SAFETY MANAGEMENT TRANSFORMATION, G07M.02-01 AND X, AVIATION SAFETY INFORMATION ANALYSIS AND SHARING (ASIAS), G07A.02-01

Program Description

This program provides research leading to a comprehensive and proactive approach to aviation safety especially as it relates to the implementation of NextGen capacity and efficiency capabilities. Safety programs require the capability to merge and analyze diverse sets of aviation information to expose and track precursors to incidents/accidents. This allows 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 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 to monitor operational safety and determine the safety implications of operational changes (primarily NextGen related) to the air transportation system.

The activities included in the Systems Safety Management Transformation program include:

Aviation Safety Information Analysis and Sharing (ASIAS)

- The research will continue to develop ASIAS capabilities to include enhancements that build upon and extend existing capabilities for managing and processing aviation performance data,
- Developing tools that convert both textural and numeric data into information, and creating visualization capabilities that aid causal/contributing factor analyses and risk assessment.

System Safety Assessment (SSA)

- Continue a demonstration of a National Level System Safety Assessment working prototype that will proactively identify emerging risk across the proposed NextGen.

Safety Management Systems (SMS)

- Continue 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.

Safety Risk Management (SRM)

- Refine a system-wide risk analysis of the NAS that will lead to definition of system and user requirements to transition the baseline risk and forecasting capability into the base platform.

The ASIAS program is an information safety analysis and data sharing system involving industry and government collaboration to proactively analyze extensive data to advance aviation safety. The primary objective of ASIAS is to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS leverages internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data to identify safety trends in the National Airspace System (NAS), that could affect implementation of NextGen capacity and efficiency capabilities. ASIAS will focus on potential high risk safety issues that might otherwise remain hidden until uncovered in post-incident investigations. New automated processes will facilitate advanced analysis of comprehensive data. Safety information discovered through ASIAS analytic activities will be used across the FAA and industry to drive improvements and support Safety Management Systems (SMS).

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 2012 – Performance Output Goals

Discretionary

- Annual system-level safety assessment capability is productized, and validated.
- Transition to steady state operations for analysis of known risks, safety enhancements, and benchmarks.

Mandatory

- Continue to evolve ASIAS ability to automatically monitor for unknown risk based on complex text mining capabilities and seamless data sources.
- The FAA-wide SMS capability is matured with ASIAS and SSA providing operational and data support for interoperability among SMS programs within the FAA, and with stakeholders.

Program Plans FY 2013 – Performance Output Goals

Aviation Safety Information Analysis and Sharing (ASIAS)

- Initiate the capability to query multiple databases with one search directive.
- Expand ASIAS to include national Airspace System facility performance data.
- Expand ASIAS to include General Aviation (GA) digital flight data

System Safety Assessment (SSA)

- System baseline analysis data and software requirements are implemented through a system acquisition. SSA will acquire, implement and validate the ability to calculate periodic system risk baselines for all phases of flight, implemented incrementally on an annual basis.
    - 2013 – Risk Analysis function for surface operations (all 35 major airports in US).
    - 2013 – Integrated system risk analysis program – potential impacts of other domestic safety initiatives and SESAR (where relevant).

Safety Management Systems (SMS)

- Method for Design Approval Holder (DAH) capability (developed in 2010-2012) is implemented with hazard tracking oversight software and technology for notification of hazards to all participants in the SMS process.
- Methods for Information-sharing process for SMS participants at OEM is developed.

Safety Risk Management (SRM)

- Annual FAA-wide safety risk management training requirements, implementation and coordination workshop. Guidance materials developed in 2012 are delivered to relevant program offices for integration into annual training activities – coordination conference among all operational LOBs (Air Traffic Organization (ATO), Aviation Safety, Office of Commercial Space Transportation and Office of the Associate Administrator for Airports) is held to produce an integrated SRM practice manual.

Program Plans FY 2014 – Performance Output Goals

Aviation Safety Information Analysis and Sharing (ASIAS)

- ASIAS architecture evolves toward a more centralized model to achieve operational cost efficiencies.
- ASIAS web portal allows full collaboration among stakeholders, including access to selected aggregated fused data sets and expanded analytical capabilities by ASIAS participants for their internal analysis.
- Data standards are fully embodied within the ASIAS community including the implementation of a new Flight Operational Quality Assurance (FOQA) data standard and standards for voluntarily submitted text reports.

System Safety Assessment (SSA)

- System baseline analysis data and software requirements are implemented through a system acquisition. SSA will acquire, implement and validate the ability to calculate periodic system risk baselines for all phases of flight, implemented incrementally on an annual basis.
    - 2014 – Risk Analysis function for terminal area operations (all CONUS TRACON facilities and FAA command center operations.
    - 2014 – Integrated system risk analysis program – covering impacts of potential impacts of other domestic safety initiatives and SESAR (where relevant) is extended to include component level risks;
        - Human performance
        - Vehicle performance
        - Infrastructure performance

Safety Management Systems (SMS)
- Method for DAH capability (developed in 2010-2012) is implemented with hazard tracking oversight software and technology for notification of hazards to all participants in the SMS process.
- Methods for Information-sharing process for SMS participants at OEM is developed.

Safety Risk Management (SRM)
- Annual FAA-wide safety risk management training requirements, implementation and coordination workshop.

Program Plans FY 2015 – Performance Output Goals
Aviation Safety Information Analysis and Sharing (ASIAS)
- ASIAS methodologies adapted to ingest/explore simulation data in support of new NextGen technologies coming online.
- Data fusion refined and expanded to include the integration of voluntarily submitted text safety reports from both FAA and ASIAS participants with digital flight data and FAA surveillance data.

System Safety Assessment (SSA)
- System baseline analysis data and software requirements are implemented through a system acquisition. SSA will acquire, implement and validate the ability to calculate periodic system risk baselines for all phases of flight, implemented incrementally on an annual basis.
    - 2015 – Risk Analysis function for enroute and oceanic operations (all CONUS US, FAA command center and oceanic systems).
    - 2015 – Integrated system risk analysis program – complete model-based coverage integrating results of surface, terminal, enroute and oceanic analysis capability – covering impacts of NextGen alpha and bravo and charlie segments as well as potential impacts of other domestic safety initiatives and SESAR (where relevant) and is standardized into a product and delivered to other FAA subscribers.
        - ATO Office of Safety, ATO NextGen and Operations Planning, Office of the Associate Administrator for Airports, Office of Commercial Space Transportation, and Aviation Safety (AVP200).

Safety Management Systems (SMS)
- Method for DAH capability (developed in 2010-2012) is implemented with hazard tracking oversight software and technology for notification of hazards to all participants in the SMS process.
- Methods for Information-sharing process for SMS participants at OEM is developed.

Safety Risk Management (SRM)
- Annual FAA-wide safety risk management training requirements, implementation and coordination workshop.

Program Plans FY 2016 – Performance Output Goals
Aviation Safety Information Analysis and Sharing (ASIAS)
- Complete evolution of ASIAS architecture to selected alternative including all proprietary data available on secure network under a centralized network and the integration of internal FAA databases with ASIAS databases.
- ASIAS analysis capabilities expanded to include voice recognition techniques implemented for ATC voice archives.
- Methods for automated vulnerability assessment capability introduced into ASIAS.

System Safety Assessment (SSA)
- By 2016 system risk analysis baseline capability is implemented for all NAS-systems; in 2016 the program will be transitioned into a 'near real-time' look ahead capability providing operational units with diagnostics of potential risk issues 15 minutes to 24 hours before operations occur.
    - 2016 – Near real-time diagnostic function developed for integrated risk analysis for single terminal area prototype.

- 2016 – Integrated system risk analysis program – covering impacts of NextGen and SESAR segments as relevant to domestic operations improved through metaware to support data exchange with analysis functions in AJP.

Safety Management Systems (SMS)

- Method for DAH capability (developed in 2010-2012) is implemented with hazard tracking oversight software and technology for notification of hazards to all participants in the SMS process.
- Methods for Information-sharing process for SMS participants at OEM is developed.

Safety Risk Management (SRM)

- Annual FAA-wide safety risk management training requirements, implementation and coordination workshop.

H, OPERATIONAL ASSESSMENTS, G07M.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 2 percent per year, through FY 2015, as measured by the calendar year 2010 fuel burned per revenue mile flown, relative to the calendar year 2000 baseline.*

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 Plans FY 2012 – Performance Output Goals
Discretionary

- Continue Aviation Environmental Design Tool (AEDT) and Aviation Portfolio Management Tool (APMT) enhancements for NextGen local to NAS-wide environmental analysis.
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support.
- Continue exploration of options to integrate environmental assessment capability with NextGen NAS models.
- Enhance Operational Performance Model to support NextGen Operational Assessments.

Mandatory

- Enhance Safety Model to support NextGen Operational Assessments.
- Apply models to assess NAS wide impacts of Task Force recommendations.
- Perform NAS-wide environmental assessment of the current aviation system.

Program Plans FY 2013-2016 – Performance Output Goals

- Develop, evaluate and implement enhancements in AEDT to cover study fidelity for local airport to regional NAS-wide NextGen environmental analyses
- Develop, evaluate and implement enhancements in APMT-Economics for domestic/ regional NAS-wide NextGen environmental analysis
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support
- Integrate AEDT environmental assessment capabilities with NextGen NAS simulation models
- Enhance Safety Model to support NextGen Operational Assessments.
- Enhance Operational Performance Model to support NextGen Operational Assessments.

1A09, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – TRAJECTORY BASED OPERATIONS (TBO)

FY 2012 Discretionary $9.3M
FY 2012 Mandatory $13.7M
FY 2012 Total Request $23.0M

- A, Separation Mgmt – Modern Procedures, G01A.01-01
- B, Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt, G01A.02-02
- C, Trajectory Mgmt – Conflict Advisories, G01A.02-03
- D, Capacity Mgmt – NextGen DME, G01N.01-01

A, SEPARATION MGMT – MODERN PROCEDURES (SEPARATION AUTOMATION ENHANCEMENTS), G01A.01-01

Program Description

This project will perform pre-implementation activities necessary for Separation Management automation enhancements. The Separation Management automation enhancements were 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 Plans FY 2012 – Performance Output Goals

Discretionary

- Continue evolving en route NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis includes:
  - Conformance monitoring for Area Navigation / Required Navigation Performance (RNAV/RNP) flights on RNAV/RNP routes based on the performance criteria adapted for the route.
  - Integration of manual trial planning on the radar console.

Mandatory

- Continue evolving en route NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis include:
  - Automation support for clearances that include vectors.
  - Introduction of wake vortex separation indicator.

Program Plans FY 2013 – Performance Output Goals

- Perform pre-implementation activities to validate the requirements for enhancements to the strategic conflict detection and prediction algorithms and the trajectory model to enable their use in 3-nmi separation areas where controllers are currently providing 3-nmi separation. Modifying these algorithms for use in 3-nmi separation areas will support the performance target by allowing controllers to make fuller use of the airspace.

Program Plans FY 2014 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Enhancements to strategic conflict detection and prediction supporting automated conflict resolution that assists in meeting projected demand;
  - Extending automated conflict resolution capabilities to include a flight management computer (FMC) route offset option for aircraft with performance based navigation capabilities. The FMC route offset option supports more efficient routing for higher performance aircraft;
  - Controller-to-controller coordination of automated conflict resolution capabilities; and
  - Selectively removing altitude restriction in the transition from en-route to terminal airspace. Removing an altitude restriction increases the efficiency of the transition by reducing the number of aircraft maneuvers.

Program Plans FY 2015 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Enhancements to reduce the trajectory conformance bounds for aircraft with performance based navigation capabilities. Reduced trajectory conformance bounds supports fuller use of available airspace through closer spacing of performance based navigation routes;
  - Extending the automated conflict resolution capabilities to support metering and other traffic management initiatives designed to make fuller use of available airspace; and
  - Start pre-implementation activities associated with capabilities identified for NextGen Segment Bravo

Program Plans FY 2016 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Extending the automated conflict resolution capabilities to support increased use of high altitude airspace;
  - Continue pre-implementation activities for capabilities identified for NextGen Segment Bravo; and
  - Extending the automated conflict resolution and routing capabilities to utilize data communications. Use of data communications enables the use of complex clearances, accommodating increase demand in a more efficient manner than clearances issued by voice.

B, TRAJECTORY MGMT – OCEANIC TACTICAL TRAJECTORY MGMT, G01A.02-02

Program Description

The Oceanic Tactical Trajectory Management program is a critical NextGen capability that addresses current performance gaps in the oceanic environment. Separation in oceanic airspace is handled by controllers using display screens showing aircraft locations to visualize trajectories and make prudent operational judgments. 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 the 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, the upgraded oceanic automation system (including the transition of Oceanic Separation Below 30/30) and possible expansion to other FAA-controlled airspaces. ICAO approval of ADS-C CDP adoption will be requested, and approval of expansion of this service to other ICAO states. Outcome of work will assist in meeting a FAA near term Operational Improvement.

2) Pre-departure 4D-OTM: Planning for FY 2012 operational trials will be initiated based on work completed in FY 2010-2011. 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 and continue in FY 2012. Analysis work will include developing strategies and methodologies for data collection, baselining, modeling 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

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 re-routed or delayed to avoid them.

Program Plans FY 2012 – Performance Output Goals
<u>**Discretionary**</u>

- <u>Automatic Dependent Surveillance-Contract (ADS-C) Climb Descent Procedures (CDP):</u>
  - Functional Requirements
  - Implementation Funding Request Package

- <u>Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):</u>
  - Preliminary Requirements (Pre-Departure)
  - Lab Demonstration (Pre-Departure)
  - Integrate with Oceanic Conflict Advisory Trials (OCAT) (Web-Enabled CTP)
  - Plan for Future Enhancements (Web-Enabled CTP)

- <u>In-Flight Operations:</u>
  - Finalize Benefits Cost Report for Automation for Trajectory Optimization (Vertical, speed, lateral)
  - Initiate Operational Trial for Trajectory Feedback (OCAT)
  - Data collection & Analysis Report for Trajectory Feedback (OCAT)

- Operational Capabilities for Strategic Trajectory Coordination:
  - Scenarios and simulations
  - Initial Benefits Analysis
  - Preliminary Operational Requirements

Mandatory

- None

Program Plans FY 2013 – Performance Output Goals

ADS-C Climb Descent Procedures (CDP):

- Service Level Agreement.
- Funding Approval/Decision Point

Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):

- Finalize Core Algorithm (Pre-Departure).
- Initiate Operational Trial (Pre-Departure).

In-Flight Operations:

- Complete Investment Analysis Plan (ConUse, Prelim. Requirements, Roles, Schedule) for Automation for Trajectory Optimization (Vertical, speed, lateral).
- Implementation Funding Request Package for Trajectory Feedback (OCAT).

Program Plans FY 2014 – Performance Output Goals

Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):

- Complete Operational Trial Data Collections & Analysis Report (Pre-Departure).
- Refine Requirements (Pre-Departure).
- Initiate Implementation Funding Request Package (Pre-Departure).

In-Flight Operations:

- Prepare for the IA Readiness Decision for Automation for Trajectory Optimization (Vertical, speed, lateral).

Program Plans FY 2015 – Performance Output Goals

Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):

- Finalize Implementation Funding Request Package (Pre-Departure)

Program Plans FY 2016 – Performance Output Goals

- Develop funding request packages for the capabilities for the Portfolio of Controller Enhancements and the Operational Capabilities for Strategic Trajectory Coordination.

C, TRAJECTORY MGMT – CONFLICT ADVISORIES, G01A.02-03

Program Description

This project provides the analysis, development and pre-implementation activities required to reduce en route controller workload by assisting controllers in determining conflict resolutions. It produces computer generated conflict resolution advisories, which are transmitted 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 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Continue software development for operational use.
- Software development activities including an engineering analysis and prototype development.
- Conduct preliminary safety and human factor analyses.
- A technology transfer of previous collected work on conflict advisories from MITRE/CAASD.
- Continue refinement of cost/benefit analysis of the technology.
- Update of Concept of Operations, functional and nonfunctional requirements documentation for automation based on broader subject matter expert input and experimental results.

Program Plan FY 2013-2016 – Performance Output Goals
- None.

D, CAPACITY MANAGEMENT – NEXTGEN DME, G01N.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 decommission the Very High Frequency (VHF) Omni-directional Range (VOR) network in accordance with the NAS Enterprise Architecture. Decommissioning is made possible by a partial 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. Aircraft equipped with the appropriate level of RNP will be able to use RNAV routes which 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 because they are based on using equipment with less accuracy than satellite navigation. 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), ATC 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 routes and approaches 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.

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 potentially increase the service volume by providing coverage in non surveillance areas and consequently increasing the availability for additional routes and trajectories. High power DME provides:

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

Program Plans FY 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Procure and install five DME systems.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

1A10, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – REDUCE WEATHER IMPACT

FY 2012 Discretionary $14.6M
FY 2012 Mandatory $18.4M
FY 2012 Total Request $33.0M

- A, Weather Observation Improvements, G04W.02-01
- B, Weather Forecast Improvements, G04W.03-01

A, RWI – WEATHER OBSERVATION IMPROVEMENTS, G04W.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 aviation weather observation sensor network, transition of weather research to operations, development of weather impact metrics, support development of weather decision support tools, support 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 and analysis activities leading to an implementation of operational capabilities throughout NextGen near, mid and far term.

RWI-Weather Observation Improvements is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. A consistent and effective aviation 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. Improvements to the aviation weather observation sensor network will be a collaborative effort between the FAA and other NextGen partners to include the National Oceanic and Atmospheric Administration (NOAA), and Department of Defense (DoD).

Most sensor technology currently fielded is based on old technology. While the current observation network performs adequately, there are many significant gaps that exist between current observation performance and the requirements established for the NextGen environment. Many of these gaps can be filled by a combination of modern sensor technologies and net-centric infrastructure to link all sensors to the NextGen NAS environment. Extensive research has been conducted by NOAA's Earth Sciences Research Laboratory (ESRL) Global Sciences Division (GSD) that conclusively shows that more observations are needed both in time and space in order to produce forecasts accurate enough to ensure aircraft safety and still support increased capacity in the NextGen environment. Additionally the currently fielded observation network lacks the capability to resolve and identify some types of precipitation (e.g., sleet, freezing drizzle). Especially lacking is the ability to determine the amount of liquid water contained in frozen precipitation which is critical to determining deicing hold-over times. This impacts the efficiency of winter weather deicing operations and safety.

The current ground based observation network includes surface sensor systems such as the Automated Surface Observation Systems (ASOS, AWOS and AWSS), Low Level Wind-Shear Alert System (LLWAS), and Runway Visual Range System (RVR). Other dedicated ground weather sensing systems include the NEXRAD, Terminal Doppler Weather Radar (TDWR). All of these systems represented a substantial capital investment at the time of their procurement and will require additional funds to sustain them throughout their life cycle. These systems are nearing the end of their design service lives and are requiring Service Life Extension Programs to keep them operating at an acceptable level. All of these systems will eventually require replacement and the RWI Weather Observation Improvements will insure that FAA buys the best technology set and most advanced and efficient sensing capabilities.

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 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Document methodology and process for conducting sensor siting optimization surveys for OEP terminals.
- Complete initial wireless communications study for weather sensors in super density operations (SDO) airspace.
- Deliver report on state of the science sensing capabilities to support legacy sensor network tech refresh and improved NextGen capabilities.
- Complete NextGen Surface Observing Sensor Collector capability design document, a NextGen capability that consolidates output from existing ground based weather observation systems (ASWON, LWAS, RVR, etc) and increases availability of such observations via SWIM/NNEW.
- Complete NextGen Surface Observing Sensor Collector system engineering demonstration that integrates solution with legacy sensor capabilities.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

B, RWI – WEATHER FORECAST IMPROVEMENTS, G04W.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 aviation weather observation sensor network, transition of weather research to operations, development of weather impact metrics, support development of weather decision support tools, support 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 and analysis activities leading to an implementation of operational capabilities throughout NextGen near, mid and far term.

The RWI Weather Forecast Improvements addresses the need to improve weather decision making and use of weather information in the transformed NAS. This includes: 1) providing weather information translated into aviation constraints for integration into decision support tools and systems for NextGen operations, 2) implementing improved weather/traffic forecasts by transitioning advanced forecast capabilities from aviation weather research, 3) developing and using metrics to evaluate the effectiveness of weather improvements and their translation to fleet impact in the NAS, 4) developing probabilistic forecasts of adverse effect of weather on scheduled operations 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 term which will include a recommendation for transition of FAA legacy systems.

RWI Weather Forecast Improvements will enhance capacity by better integration of weather information in operational decision making and by improvements in weather forecasting technologies. RWI Weather Forecast Improvements will enable optimal selection of usable en route airspace and help determine precise spacing for arriving and departing aircraft by: 1) improving forecasting of how phenomena such as thunderstorms, windshear, obstructions to vision, turbulence, volcanic ash, icing, and winds aloft affect flight operations; 2) development of probabilistic forecast techniques to provide users better information of the likelihood of how weather will impact airspace availability; and 3) providing weather impact translation techniques which automatically identify the airspace areas that are potentially constrained by weather. The combination of better forecasts, probabilistic forecasts and translation of these better forecasts into direct airspace constraints, will allow users to identify the best routes to fly for their aircraft type, flight plan and flying preferences, and for traffic flow management to optimize the airspace capacity given the weather constraints and demand.

NextGen Weather Processor (NWP) Work Package 1 (WP1) will provide the initial architecture that integrates NextGen weather capabilities (i.e., 0-8 hour convective weather forecast), legacy NAS weather capabilities (i.e., WARP radar mosaics), and techniques to translate the impact of weather information into potential NAS constraints (i.e., Convective Weather Avoidance Model), as services, that are adaptable and expandable to meet users needs, in a network-enabled 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

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 2012 – Performance Output Goals
Discretionary
- Complete NWP document package for Initial Investment Decision.
- Obtain IID for NWP WP1
- Develop NWP document package towards Final Investment Decision.
- Convective Weather 0-8 hour Forecast Government Furnished Information (GFI) package ready for NWP acquisition.
- Radar Mosaic GFI package ready for NWP acquisition.
- Convective Weather Avoidance Model (CWAM) GFI package ready for NWP acquisition.
- Complete NWP Request for Offer (RFO) Package.
- Update NWP Project Management Best Practices Documentation.
- Analyze 2011 Consolidated Storm Prediction for Aviation (CoSPA) prototype user feedback and deliver report.
- Maintain CoSPA prototype operations at selected ATC facilities to support TFM.
- Update NAS EA Weather Roadmap.
- Enhance manual Quality Management System (QMS) to include operational aviation weather products.
- Develop metrics methodology to monetize avoidable and unavoidable weather impacts.
- Validate NextGen Radar Mosaic (I.e., Multi Radar Multi Sensor (MRMS)) quality editing schemes for NAS compliance (DSR, ERAM).
- Finalize requirements for selected set of ATM-Wx translation technologies.
- Concept Maturity Assessment Plan, initial ConOps for turbulence product (Graphical Turbulence Guidance 3D (forecast)/Graphical Turbulence Guidance Nowcast (GTG3/GTGN)), and access to EDR data.
- Provide for RWI best practices (Program management, Risk management, Program/Strategic Planning).

Mandatory
- Complete development of CWAM in support of mid-term Decision Support Tools (DSTs).
- Develop selected set of AMT-Wx translation technologies.
- System Engineering support for Segment Bravo.
- Conduct CoSPA lab based low-fidelity evaluation for mid-term capability.
- Develop functional requirements for automated QMS.
- Develop metrics application to assess improvements in convection observations, analyses and forecasts.
- Deliver update release – enhanced metrics capability for Weather Analysis and Visualization Environment (WAVE) tool and the WITI-based Dynamic Airspace Rerouting Tool (DART).

- Demonstrate MRMS mosaic with TDWR and Canadian weather radar data on DSR, ERAM.
- Concept Maturity Assessment Plan and initial ConOps for Forecast Icing Product (FIP).
- Conduct maturity assessment and safety management process for turbulence product (GTG3/GTGN).
- Concept Maturity Assessment Plan and initial ConOps for C&V Forecast (CVF).

Program Plans FY 2013 – Performance Output Goals
- Complete FID activities for NWP WP1.
- Obtain FID for NWP WP1.
- Initiate solution implementation of NWP WP1.
- Award NWP Contract.
- Initiate solution development for NWP WP1.
- Execute Project Management Best Practices for NWP.

Program Plans FY 2014 – Performance Output Goals
- Continue solution development activities for NWP WP1.
- Continue Project Management Best Practices for NWP WP1.

Program Plans FY 2015 – Performance Output Goals
- Continue Solution Development activities for NWP WP1.
- Continue Project Management Best Practices for NWP WP1.

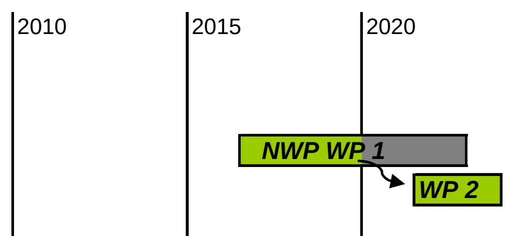
Program Plans FY 2016 – Performance Output Goals
- Continue Solution Development activities for NWP WP1.
- Continue Project Management Best Practices for NWP WP1.

System Implementation Schedule

NextGen Weather Processor (NWP) Work Package 1 and 2

WP 1 First site IOC: September 2016 -- Last site ORD: September 2019

WP 2 First site IOC: September 2021 -- Last site ORD: September 2023



1A11, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – ARRIVALS/ DEPARTURES AT HIGH DENSITY AIRPORTS

FY 2012 Discretionary $14.3M
FY 2012 Mandatory $13.7M
FY 2012 Total Request $28.0M

- A, Trajectory Mgmt – Surface Tactical Flow, G02A.01-01
- B, Trajectory Mgmt – Surface Conformance Monitor, G02A.01-02
- C, Trajectory Mgmt – Surface Traffic Data Sharing, G02A.01-05
- D, Trajectory Mgmt – Time Based Flow Management (TBFM) Work Package 3, G02A.01-06
- E, Capacity Mgmt – Integrated Arrival & Departure Operations, G02M.02-01

A, TRAJECTORY MGMT – SURFACE TACTICAL FLOW, G02A.01-01

Program Description

The Trajectory Management – Surface Tactical Flow project is focused on improving the delivery of aircraft to and from the runway. It leverages the development efforts of the NASA Surface Management System (SMS) which provided the technical foundation for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This system is required to safely improve the use of airport capacity.

The Joint Planning and Development Office (JPDO) NextGen Concept of Operations 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 in the flight operator and Air Traffic Control Tower (ATCT) environments, advances in supporting automation systems and collaboration between ATC and the flight operators.

This project will demonstrate and document requirements for a series of capabilities that allow 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.

This effort will not procure any new system but rather will result in the transfer of mature concepts and supporting documentation to the Tower Flight Data Manager effort. That effort will develop and implement a new system, which will host these surface-based capabilities.

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

Aircraft will move to and from the runway in a more efficient, predictable, and coordinated manner (complying with Traffic Management Initiatives and supporting user preferences), increasing efficiency and capacity while reducing controller workload through the automated assignment of runways, taxi routes, and departure queues.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- Deploy Interim Surface Solution at 2 additional select MetroPlex Airports to support Task Force 5 recommendations.
- Continue support to 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 for the Deice Tool, 2D Taxi Route Generation, and Collaborative Departure Scheduling.
- Continue Human in the Loop (HITL) simulations of Collaborative Departure Scheduling and Time-Based Taxi Route Generation tools.

Mandatory
- Conduct field evaluation of Time-Based Taxi Route Generation tool.
- Complete Mid- to Far-Term STBO Requirements Development for Data Communications, Surveillance, Navigation, Weather, and NAS Data Systems.

Program Plans FY 2013 – Performance Output Goals
- Deploy Interim Surface Solution at 2 additional select MetroPlex Airports to support Task Force 5 recommendations.
- Continue STBO field evaluations at Memphis and Orlando.
- Continued field evaluations of Collaborative Departure Scheduling.
- Continued field evaluations of Time-Base Taxi Route Generation Tool.
- Complete HITL of Collaborative Departure Scheduling.
- Complete HITL of Time-Based Taxi Route Generation Tool.
- Begin HITL simulation of STBO Taxi Route Generation.
- Support TFDM program AMS effort.
- Support tech transfer of mature surface capabilities to TFDM system.

Program Plans FY 2014 – Performance Output Goals
- Deploy Interim Surface Solution at additional select MetroPlex Airports to support Task Force 5 recommendations.
- Continue STBO field evaluations at Memphis and Orlando.
- Continue field evaluation of Collaborative Departure Scheduling.
- Continue field evaluation of Time-Based Taxi Route Generation Tool.
- Continue HITL of STBO Taxi Route Generation.
- Support TFDM program AMS effort.
- Support tech transfer of mature surface capabilities to Tower Flight Data Manager (TFDM) system.

Program Plans FY 2015 – Performance Output Goals
- Deploy Interim Surface Solution at additional select MetroPlex Airports to support Task Force 5 recommendations.
- Continue STBO field evaluations at Memphis and Orlando.
- Continue field evaluation of Collaborative Departure Scheduling.
- Continue field evaluation of Time-Based Taxi Route Generation Tool.
- Continue HITL of STBO Taxi Route Generation.
- Support TFDM program AMS effort.
- Support tech transfer of mature surface capabilities to Tower Flight Data Manager (TFDM) system.

Program Plans FY 2016 – Performance Output Goals
- Continue STBO field evaluations at Memphis and Orlando.
- Continue field evaluation of Collaborative Departure Scheduling.
- Continue field evaluation of Time-Based Taxi Route Generation Tool.
- Continue HITL of STBO Taxi Route Generation.
- Support TFDM program AMS effort.
- Support tech transfer of mature surface capabilities to Tower Flight Data Manager (TFDM) system.

B, TRAJECTORY MGMT – SURFACE CONFORMANCE MONITOR, G02A.01-02

Program Description

The Surface Conformance Monitoring (SCM) – 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, SCM 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 SCM environment.
- Evaluate performance of prototype surface conformance algorithms.
- Demonstrate TBO on the airport surface.

This effort will not procure any new system but rather will result in the transfer of mature concepts and supporting documentation to the Tower Flight Data Manager effort. That effort will develop and implement a new system, which will host this surface-based capability.

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

An automated means to monitor surface conformance and alert controllers to deviations from the expected taxi route will reduce controller workload, thereby freeing up controllers to manage more aircraft on the surface environment, resulting in improved capacity and efficiency.

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Conduct 1 HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures.
- Conduct 1 field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures.

Mandatory

- Conduct 2nd HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures.
- Conduct 2nd field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures.

Program Plans FY 2013 – Performance Output Goals

- Conduct two HITL simulations of 2D Surface Conformance Monitoring.
- Conduct two field evaluation of 2D Surface Conformance Monitoring at Orlando.
- Update Concept of Use, Requirements and ATC Procedures from results of HITLs and Field Evaluations.
- Tech transfer of 2D Surface Conformance Monitoring Concept of Use, Requirements, ATC Procedures to TFDM program.

Program Plans FY 2014 – Performance Output Goals

- Conduct two HITL simulation of Time-Based STBO Surface Conformance Monitoring.
- Conduct initial field evaluation of Time-Based STBO Surface Conformance Monitoring.
- Update Concept of Use, Requirements and ATC Procedures from results of HITLs and Field Evaluations.
- Conduct final field evaluation of 2D STBO Surface Conformance Monitoring.
- Develop initial Concept of Use, Requirements, ATC Procedures for STBO Surface Conformance Monitoring.
- Tech transfer of Concept of Use, Requirements, ATC Procedures to TFDM program.

Program Plans FY 2015 – Performance Output Goals

- None.

Program Plans FY 2016 – Performance Output Goals

- None.

C, TRAJECTORY MGMT – SURFACE TRAFFIC DATA SHARING, G02A.01-05

Program Description

Adopting a service-oriented approach to data dissemination, the Surface Traffic Data Sharing initiative 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 FY 2012 – Performance Output Goals

Discretionary

- None

Mandatory

- Complete the deployment of the initial surface traffic data sharing capability.
- Deployment of longer term surface traffic data sharing capability.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

D, TRAJECTORY MGMT – TIME BASED FLOW MANAGEMENT (TBFM) WORK PACKAGE 3, G02A.01-06

Program Description

Trajectory Management – Time Based Flow Management (TBFM) will modernize and enhance the current Traffic Management Advisor (TMA) System. TMA is an automation system currently available at all twenty Air Route Traffic Control Centers that enables the use of time-based metering to optimize the flow of aircraft as they approach congested airspace and airports. TBFM will replace obsolescent TMA hardware and support NextGen capabilities. It improves the management of traffic flow by using point-in-space metering or extended metering, and it increases airspace capacity utilization through flexible scheduling. TBFM shares metering data with other tools/stakeholders, and enables use of Area Navigation/Required Navigation Performance (RNAV/RNP) routes. It enables more efficient departure operations with the integrated departure and arrival concept and it increases an FAA traffic manager's awareness of severe weather within their area of responsibility.

The TBFM Program is divided into three (3) segments:

Segment I modernized TMA with agreed upon near-term enhancements and deployments. This segment was completed in April 2009. The program Final Investment Decision has been completed and the next phase of TMA and the transition to implementation of TBFM has been initiated.

Segment II is the TBFM Program. This is an upgrade of TMA that will fulfill operational user needs and NextGen goals. The TBFM program will incorporate NextGen concepts such as RNP/RNAV route selections, weather integration, and accelerated arrivals/flexible schedule. A Final Investment Decision for this segment was achieved in April 2010.

Segment III (TBFM Work Package 3, G01A.01-06) will prepare for the follow-on phase, 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 Optimized Profile Descents, integration of surface information, and terminal time based metering.

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

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

Relationship to Performance Target

The TBFM Work Package 3 will, along with the other two segments of TBFM, provide complete time based metering solutions across all phases of flight. This will increase daily airport capacity by reducing the last minute maneuvering of aircraft as they approach their destination airport and will improve controller efficiency in organizing the arrival stream for maximum use of that airport capacity.

Program Plans FY 2012 – Performance Output Goals

- Continue to develop and refine concept for the TBFM WP 3.
- Develop documentation to support TBFM WP3 acquisition management system requirements. This documentation will include solution alternatives, concept of use documentation, preliminary requirements, benefits information, cost data, and architecture artifacts.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

E, CAPACITY MGMT – INTEGRATED ARRIVAL & DEPARTURE OPERATIONS, G02M.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, 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 effort will not procure any new system but rather will result in the transfer of mature concepts, requirements, and supporting documentation to other programs, namely the Terminal Automation Modernization Program, Traffic Flow Management System, the Time-Based Flow Management program, and the NextGen Facilities program.

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, 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 Plans FY 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Continue airspace design and analysis, transition strategy plans, and procedures development for initial selected locations.
- Initial Automation System Requirements Definition.
- Support to related program Investment Analysis Activities.
- Automation system requirements definition and studies to analyze design and integration feasibility.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

1A12, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – COLLABORATIVE AIR TRAFFIC MANAGEMENT (CATM)

FY 2012 Discretionary $28.0M
FY 2012 Mandatory $25.0M
FY 2012 Total Request $53.0M

- A, Flow Control Mgmt – Strategic Flow Mgmt Integration, G05A.01-01
- B, Flow Control Mgmt – Strategic Flow Mgmt Enhancement, G05A.01-02
- C, Flight & State Data Mgmt – Common Status & Structure Data, G05A.02-01
- D, Flight & State Data Mgmt – Advanced Methods, G05A.02-02
- E, Flight & State Data Mgmt – Flight Object, G05A.02-03
- F, Flight & State Data Mgmt – Concept Dev for Integrated NAS Design and Procedure Planning, G05A.02-04
- G, Capacity Management – Dynamic Airspace, G05A.04-01
- H, Joint Collaborative Information Management (CIM), G05M.02-01
- X, System Development – Information Management, G05M.03-01

A, FLOW CONTROL MGMT – STRATEGIC FLOW MGMT INTEGRATION, G05A.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.

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 Plans FY 2012 – Performance Output Goals
Discretionary
- Conduct studies and analyses as required.
- Develop HITL evaluation plan.
- Conduct HITL evaluation of Traffic Management and Controllers.

Mandatory
- Conduct studies and analyses as required

Program Plans FY 2013 – Performance Output Goals
- Analyze final set of system requirements for the initial increment.
- Develop investment artifacts.

Program Plans FY 2014 – Performance Output Goals
- Conduct safety assessment.
- Initial deployment of Strategic Flow Management – Integration for airborne flights.

Program Plans FY 2015 – Performance Output Goals
- Conduct analysis and generate initial requirements for automation and DST in support of airborne reroute.

Program Plans FY 2016 – Performance Output Goals

- Conduct safety assessments, HITL and assess interface requirements.

B, Flow Control Mgmt – Strategic Flow Management Enhancement, G05A.01-02

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.

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 (FY 2012-2018) 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.

Current Traffic Flow Management System (TFMS) projects identify, analyze, model, and prototype various aspects of the NextGen capabilities. In addition, a TFM Roadmap and initial TFM Gap Analysis have been developed to assess the need for additional concept engineering activities. Collaborative Air Traffic Management Technology (CATMT) Work Package 4 (WP-4) will be the vehicle for deploying NextGen mid-term TFMS capabilities. These enhancements will be integrated with Time-Based Flow Management Work Package 3 as well as with mid-term enhancements envisioned in terminal and en route 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 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 Plans FY 2012 – Performance Output Goals
Discretionary
- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012.

Mandatory
- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012.

Program Plans FY 2013 – Performance Output Goals
- Start developing the following to support IARD:
  - Preliminary program requirements document; and
  - Enterprise architecture products and amendments.

Program Plans FY 2014 – Performance Output Goals
- Continue developing the following to support IARD:
  - Preliminary program requirements document; and
  - Enterprise architecture products and amendments.

Program Plans FY 2015 – Performance Output Goals
- Complete development of the following to support IARD:
  - Preliminary program requirements document;
  - Enterprise architecture products and amendments; and
  - Signed plan for investment analysis.
- Conduct IARD

Program Plans FY 2016 – Performance Output Goals
- Complete development of the following to support IID:
  - Updated Program Requirements Document;
  - Initial Business Case;
  - Initial Implementation Strategy and Planning Document; and
  - Plan for Final Investment Analysis

C, Flight & State Data Mgmt – Common Status & Structure Data, G05A.02-01

Program Description

The Common Status and Structure program provides the mission analysis and pre-implementation support for developing 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 Plans FY 2012 – Performance Output Goals
<u>Discretionary</u>

- Collect WAAS Airport Survey from the authoritative source of information.
- Demonstrate ability to receive Special Activity Airspace schedules digitally from the Department of Defense.

<u>Mandatory</u>

- Integrate AIM Mapping Services in AIM One Stop Shop.
- Develop Concept of Operations and Enterprise Architecture products for National Special Activity Airspace (SAA).
- Conduct a demonstration of the capability to provide a standardized, consistent, and managed digital SAA definition for external stakeholders and users.

Program Plans FY 2013 – Performance Output Goals

- Demonstrate prototype Advanced Dynamic Airspace Management (ADAM)/Editor.
- Reach final investment decision for AIM Modernization Segment 2.
- Develop concept of operations for the collection and dissemination of SOP/LOA to decision support tools for performing flight planning and providing situation awareness.
- Demonstrate limited SOP/LOA capture and dissemination capabilities in line with the concept of operations.

Program Plans FY 2014 – Performance Output Goals

- Expand SOP/LOA capability to a wider range of stakeholders and SOP/LOA scenarios to support the final investment decision for AIM Modernization future segment.
- Reach final investment decision for AIM Modernization future segment.

Program Plans FY 2015 – Performance Output Goals
- Develop cross-domain requirements for baselines outside of the AIM program that will supply or consume aeronautical information via the Aeronautical Common Services.
- Perform safety assessments.

Program Plans FY 2016 – Performance Output Goals
- Continue cross domain analysis and requirements.
- Continue safety assessments.

D, FLIGHT & STATE DATA MGMT – ADVANCED METHODS, G05A.02-02

Program Description

The project objective is to provide well defined and well understood methodologies to enhance Traffic Flow Management (TFM) capabilities. In the area of TFM, capabilities to be developed in this program include: Probabilistic TFM, Unified Flight Planning and Filing, and the Common Reference (Hypercube) concepts. These tools will help solve the issues of how to guide flights in capacity-constrained scenarios.

Probabilistic TFM will develop usable algorithms for predicting which aircraft are most likely to arrive at fixed points at their estimated times. The activity includes the decomposition of strategic planning of air traffic flow functions. This will be followed by analyses of current operational procedures of aircraft trajectories against forecast data such as weather and demand. 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 improve the TFM DST will include the analysis of weather and other dynamic airspace constraints against the demand and produce optimal recommendations to implement TFM initiatives (TIM) 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 concept of Unified Flight Planning and Filing (UFPF) objective is to enhance and streamline the flight planning and filing processes. In doing so, more accurate and timely demand forecast can be formulated in support of Air Navigation Service Providers (ANSP) services, and National Airspace (NAS) users will benefit from a more efficient process to manage their flights.

The Hypercube will become a common information reference for the NAS that will serve as an information management tool, which would use capabilities of spatial database technology and would be managed by Geographic Information Systems (GIS). The Hypercube concept is planned to be a multi-dimensional, including three dimensions and one temporal dimension.

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 Plans FY 2012 – Performance Output Goals

Discretionary

- Demonstrate the improvements identified in FY 2011 in a simulation environment.
- Analyze and report improvements as a result of demonstration.
- Identify opportunities for enhancement.

Probabilistic TFM Area Flow Program

- Analyze results of initial demonstration of data-link scenario.

Unified Flight Planning Filing

- Conduct second demonstration that addresses the refined concept.

Advanced Planning

- Identify additional attributes for incorporation into 3D Hypercube demonstration capability.

Mandatory

Integration of Weather into ATM

- Solicit and incorporate comments on standard exchange formats from FAA and international organizations.

Probabilistic TFM Area Flow Program

- Prepare draft ConUse of the data-link usage and other integration opportunity with NextGen enabled capabilities.
- Conduct initial demonstration of the data-link scenario in the simulation environment.

Unified Flight Planning Filing

- Refine the concept of advanced flight planning and filing method based on the initial demonstration.
- Prepare draft ConUse and draft ConOps documents.

Advanced Planning

- Conduct initial demonstration of 3D Hypercube by implementing the data objects identified in FY 2011 work.
- Analyze initial demonstration and identify the area that should be improved.

Program Plans FY 2013 – Performance Output Goals

Probabilistic TFM Area Flow Program

- Addresses shortfalls identified in FY 2012 demonstration.
- Refine ConUse document of data-link usage and add/create other usage that integrate into NextGen enabled capabilities.
- Develop initial functional requirements for TFM Area Flow.

Unified Flight Planning Filing

- Revise ConUse document for the advanced flight planning and filing method.
- Develop initial functional requirements.
- Continue to identify issues and conduct fast time and human in the loop simulation.

Advanced Planning

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

Program Plans FY 2014 – Performance Output Goals

Probabilistic TFM Area Flow Program

- Develop final ConUse document of data-link usage and add/create other usage that integrate into NextGen enabled capabilities.
- Refine functional requirements.
- Conduct demonstration to validate ConUse describing the integration into NextGen enabled capabilities.

Unified Flight Planning Filing

- Complete ConUse document for the advanced flight planning and filing method.
- Refine functional requirement describing the function that were studied.
- Conduct demonstration addressing issues identified in FY 2013.

Advanced Planning

- Conduct the 3rd demonstration of 3D Hypercube by implementing the additional data attribute identified in FY 2013 work and identify the area that should be improved.
- Identify issues and additional attributes for incorporation into 3D Hypercube demonstration capability.
- Revise ConUse and draft ConOps documents.

Program Plans FY 2015 – Performance Output Goals

Probabilistic TFM Area Flow Program

- Conduct demonstration that shows the integration to NextGen enabled capabilities.
- Prepare final functional requirements for the demonstrated capabilities.

Unified Flight Planning Filing

- Conduct demonstration addressing issues identified in FY 2014.

Advanced Planning

- Conduct demonstration addressing issues identified in FY 2014.

Program Plans FY 2016 – Performance Output Goals

Probabilistic TFM Area Flow Program

- Provide demonstration analysis that shows the integration to NextGen enabled capabilities.
- Prepare final functional requirements for the demonstrated capabilities.

Unified Flight Planning Filing

- Provide demonstration analysis addressing issues identified in FY 2015.

Advanced Planning

- Conduct demonstration addressing issues identified in FY 2015.

E, FLIGHT & STATE DATA MGMT – FLIGHT OBJECT, G05A.02-03

Program Description

The Flight Object is a compilation 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 to all subscribers of the data for better planning and execution
- 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 Plans FY 2012 – Performance Output Goals

Discretionary

- Building on the End-to-End International Flight Data Object (IFDO) system integration activities of FY 2011, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:
  - Submit IFDO standard petition via continued coordination with international stakeholders.
  - Continue coordinating with TBO Oceanic/ Tailored Arrival/Surface, ATOP, ERAM, and SWIM.

Mandatory

- Continue development of system alternatives and allocation.
- Continue fast time modeling/simulation of Flight Object.
- Continue Information modeling of Flight Object.
- Enhance Flight Object exchange model.
- Building on the End-to-End IFDO system integration activities of FY 2011, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:
  - Continue IFDO End-to-End system demonstration.
  - Start to perform End-to-End IFDO Operational Evaluation.

Program Plans FY 2013 – Performance Output Goals

- Continue to perform end-to-end IFDO Operational Evaluation.
- Continue to monitor IFDO standards.
- Develop flight object risk mitigation for implementation.
- Conduct analyses of 4D trajectory definition for the flight object.
- Conduct analyses of the flight object management system.

Program Plans FY 2014 – Performance Output Goals

- Develop gap analysis of flight data management system.
- Conduct analyses of users and systems constraint data for the flight object.
- Conduct analyses of prioritized 4D trajectories definition within the flight object.
- Develop high level architecture for flight object management system.
- Develop risk mitigation plan for flight object management system.

Program Plans FY 2015 – Performance Output Goals
- Continue development of architecture artifacts for flight object management system.
- Develop flight object management evaluation model.
- Conduct flight object management system risk mitigation analyses.
- Conduct analyses of airframe certification data and flight object.

Program Plans FY 2016 – Performance Output Goals
- Develop flight object management system prototype.
- Perform demonstration of flight object management system prototype.

F, FLIGHT & STATE DATA MGMT – CONCEPT DEV FOR INTEGRATED NAS DESIGN AND PROCEDURE PLANNING, G05A.02-04

Program Description

The program objective is to develop and assess airspace procedure that would allow implementation of NextGen's best equipped best served concept of operations. This concept would allow FAA to use certain altitudes and routes for those aircraft with the navigational system accuracy and the flight performance to comply with traffic management efforts to maximize the use of airspace capacity. It would also refine airport approach procedures so well equipped aircraft use more efficient descent profiles.

When some aircraft are NextGen equipped and others are not, both types of aircraft can use the airspace in different ways. To accommodate this many challenges must be addressed. It may be possible to vary separation standards based on the accuracy with which equipped aircraft can fly approaches and departures.

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 significant increases in 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 FY 2012 – Performance Output Goals
<u>**Discretionary**</u>
- Adapt existing automation displays to provide airport surface surveillance.
- Develop "Blended Airspace" procedures.
- Design best equipped best serve (BEBS) Airspace and Procedures for Generic Metropolitan Area.
- Test Clean Slate BEBS Airspace and Procedures Design.

Mandatory

- Conduct research and analysis to determine the feasibility of allowing an aircraft on a RNP AR (Authorization Required) approach to independently descend over an aircraft executing an ILS approach to another airport.
- Conduct feasibility Assessment of Simultaneous ILS, RNP AR Descent.
- Conduct research and analysis associated with the feasibility of the elimination of the requirement of 1000’ of altitude separation during simultaneous turn on to final approach.

Program Plans FY 2013 – Performance Output Goals

- Determine whether procedures allow the concepts to be implemented.
- Enhance fast time models to incorporate procedures and complete analysis.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

G, CAPACITY MANAGEMENT – DYNAMIC AIRSPACE, G05A.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 reconfigure airspace to expand or contract control sectors to match the overall level of activity in the facility’s airspace 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, so that it can be applied across time horizons of varying scale – from year to month to day to hours. It will allow adjacent facilities to transfer airspace when that would improve efficiency of 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

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 Plans FY 2012 – Performance Output Goals
Discretionary

- Analyses of DataComm requirements.
- Analyses of voice switch requirements.

Mandatory

- Developed Preliminary requirements.
- Safety Management System.
- Refined airspace configurations and boundaries adjustment.
- Analyses of SWIM requirements.

Program Plans FY 2013 – Performance Output Goals
- Identify adaptation requirements for DataComm analysis, surveillance, etc.
- Analyze Dynamic Spectrum coverage for communication.

Program Plans FY 2014 – Performance Output Goals
- Identify adaptation requirements for DataComm analysis, surveillance, etc.
- Analyze reallocation for flight information for airspace amongst the position of an ATRCC.

Program Plans FY 2015 – Performance Output Goals
- Identify adaptation requirements for DataComm analysis, surveillance, etc.
- Conduct and evaluation of navigation coverage to support the previous work from FY 2013 and FY 2014.

Program Plans FY 2016 – Performance Output Goals
- Develop initial requirements based on analyses in FY 2013-2015.

H, JOINT COLLABORATIVE INFORMATION MANAGEMENT (CIM), G05M.02-01

Program Description

Network Enabled Operations (NEO) is an information sharing capability that promotes inter-agency communication and collaboration through the use of modern network enabled tools, technologies, and operational procedures; envisioned to provide the stakeholders with the connectivity and interoperability necessary to rapidly and dynamically share information**.**

- Spiral 1 Plus:
  - Led five interagency (FAA, DoD, DHS, JPDO) program planning workshops to plan activities for NEO Spiral 2
  - Led the development of vendor's planning and engineering deliverables
  - Toward the end of the program planning workshops, DoD and DHS expressed interest in Command and Control (C2) Gap Filler program led by DoD (Air Force), which consists of R&D activities similar to NEO
  - NEO Spiral 1 Plus contract ended on June 3, 2009
- Spiral II:
  - In response to congressional direction, the NEO program will leverage existing net-centric information sharing capabilities and extend to support Unmanned Aerial System (UAS).
- Spiral III:
  - In response to congressional direction, the NEO program will work closely with industry and other federal agencies to examine emerging technologies and standards.

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 Plans FY 2012 – Performance Output Goals
<u>Discretionary</u>
- None.

<u>Mandatory</u>
- Develop ConOps / Concept of Use for the net-enabled applications.
- Develop Web service Description document for the net-enabled applications.
- Conduct feasibility, technical and operational issues study of net-enabled applications.
- Develop Demonstration Plan and Procedures.
- Conduct demonstration to show NEO benefits to the stakeholders.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

X, SYSTEM DEVELOPMENT – INFORMATION MANAGEMENT, G05M.03-01

Program Description

The Information Management Program addresses issue that arise when an agency moves from managing and sharing information in a legacy environment which is controlled through a physical connection into a network environment which only requires a simple subscription. Recent experience in sharing surface data information with users in the new service-oriented architecture approach using the FAA's FTI network capability highlighted the need to move from data sharing to full information management. This includes allocating information service by type and amount needed based on a business case analysis, establishing performance requirements for the delivery of the information and monitoring performance, establishing common protocols and standards across classes of information, and establishing the governance of how and when the information is provided. Information management is necessary to ensure the efficient use of FTI and SWIM as conduits of information.

The research on Information management will identify the shortfalls in moving from data sharing to a network environment including: governance and evaluation techniques, criteria for managing standards, and performance monitoring techniques and policies to ensure compliance. After this analysis is complete, the activities will shift to development and implementation of the required capabilities and governance.

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 goal is to ensure that in the transformation to NextGen, the necessary and required information sharing to improve situational awareness and planning, is supported in a cost-effective manner with guaranteed performance.

Program Plans FY 2012 – Performance Output Goals
- None

Program Plans FY 2013 – Performance Output Goals
- Identify data that needs to be shared to meet NextGen concept.
- Develop a standard frame work to capture requirements for the sharing of data including required performance to achieve the expected operational outcome.
- Establish an initial shortfall with respect to information management based on this analysis.

Program Plans FY 2014 – Performance Output Goals

- Develop Concept of Use for Information Management and governance.
- Develop Functional Description for implementing information management.
- Conduct the detailed analysis and allocate the responsibility for publishing the initial set if information that will be shared.
- Establish Information Management Governance.
- Investigate information performance monitoring methods to ensure delivery of agreed service performance.

Program Plans FY 2015 – Performance Output Goals

- Complete analysis and allocate the responsibility for publishing additional sets of information that may be required by most sophisticated users.
- Continue Information Management Governance.

Program Plans FY 2016 – Performance Output Goals

- Develop and implement information performance monitoring.

1A13, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – FLEXIBLE TERMINAL ENVIRONMENT

FY 2012 Discretionary $36.3M
FY 2012 Mandatory $21.8M
FY 2012 Total Request $58.1M

- A, Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD), G06A.01-01
- B, Separation Mgmt – Wake Turbulence Mitigation for Arrivals (WTMA), G06A.01-02
- C, Surface/Tower/Terminal Systems Engineering – Tower Flight Data Manager (TFDM), G06A.02-01
- D, Flight & State Data Mgmt – Future Communication Infrastructure, G06C.01-01
- E, Separation Mgmt – Approaches, Ground Based Augmentation System, G06N.01-01
- F, Separation Mgmt – Closely Spaced Parallel Runway Operations, G06N.01-02
- G, Separation Mgmt – Approaches, NextGen Navigation Initiatives, G06N.01-03
- H, Separation Mgmt – Approaches, Optimized Navigation Technology, G06N.01-04
- I, Trajectory Mgmt – Arrivals, G06N.02-01
- J, Trajectory Mgmt – Reduced RVR Minima, G06N.02-02
- X1, Terminal Flight Data Manager (TFDM), G06A.03-01
- X2, Separation Management – Alternative Positioning Navigation and Timing (APNT), G06N.01-06

A, SEPARATION MGMT – WAKE TURBULENCE MITIGATION FOR DEPARTURES (WTMD), G06A.01-01

Program Description

The Wake Turbulence Mitigation for Departures (WTMD) project will place a weather information supported decision support tool into FAA air traffic control towers (ATCTs) to allow more efficient use of an airport's closely spaced parallel runways for aircraft departure operations. WTMD applies NASA research along with 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 an airport's Closely Spaced Parallel Runways (CSPR). WTMD alerts ATC supervisors when these favorable meteorological conditions would allow reduced departure spacing. The ATC supervisors use WTMD inputs and other operational decision aids to decide if and 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 departure capacity at airports with CSPR. Nine of the 30 busiest airports are candidates for WTMD, based on potential capacity benefit for those airports. Benefits range between 2 to 8 more departures per hour, weather permitting, through the use of the WTMD capability and associated departure procedures.

The WTMD project is a multi-year development project that in Phase 1 has developed and built the WTMD Operational Demonstration prototypes and installed one at Houston George Bush International Airport (IAH) for a minimum of one year operational evaluation. In FY 2012, the WTMD Operational Demonstration prototypes – enhanced with any improvements developed from the WTMD use at IAH – will be installed at Memphis International Airport (MEM) and at San Francisco International Airport (SFO) ATCTs for a minimum one year evaluation at each airport. This then completes the WTMD project Phase 1. If the WTMD evaluations at IAH, MEM and SFO indicate that the WTMD does deliver the expected departure capacity increase for these airports, the second and final stage of WTMD development and implementation (WTMD project Phase 2) will be done in FY 2013 and FY 2014 to implement WTMD at the remaining six candidate airports.

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 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 8 more departures per hour for an airport that uses its closely spaced parallel runways for departures and has a significant percentage of Boeing 757 and heavier aircraft traffic. The project will allow airports to have an incremental increased departure capacity without having to invest in runway or taxiway expansions. FAA and air carrier analyses have projected that even 2 more departures per hour at an airport will have a beneficial cascading effect during periods of heavy demand at the airport by reducing the time spent of every aircraft (and passengers) in the runway departure queue and by reducing the missed connections at the next airport. WTMD is also one of the first steps by NextGen in using weather information (in this case airport winds – actual and predicted) to provide enhanced capacity efficient air traffic control services. Results from the WTMD development can be used in subsequent NextGen era air traffic control decision support tools to service more flights into and out of capacity constrained airports and associated airspace.

Program Plans FY 2012 – Performance Output Goals

<u>Discretionary</u>

- Accomplish any WTMD rework required based on the ongoing WTMD operational evaluation at IAH.
- Provide WTMD training for SFO personnel.
- Maintain and provide corrective maintenance to the IAH, SFO, and William J. Hughes Technical Center (WJHTC) WTMD systems.
- Complete regional service center engineering and installation of WTMD components in SFO's ATCT.
- Install data links necessary for WTMD operation at SFO.
- Setup data collection equipment, processes and procedures for the SFO operational evaluations.
- Assist SFO in developing modifications to their departure procedures to incorporate the WTMD.

<u>Mandatory</u>

- Provide WTMD training for MEM personnel.
- Maintain and provide corrective maintenance to the MEM WTMD system.
- Complete regional service center engineering and installation of WTMD components in MEM's ATCT.
- Install data links necessary for WTMD operation at MEM.
- Setup data collection equipment, processes and procedures for the MEM operational evaluations.
- Assist MEM in developing modifications to their departure procedures to incorporate the WTMD.

Program Plans FY 2013 – Performance Output Goals

- WTMD Operational Demonstration prototype one year operational evaluations (WTMD Phase 1) are completed at MEM and SFO.
- IAH, SFO, and MEM WTMD Operational Prototype Systems (Phase 1) are upgraded on-site to WTMD Phase 2 systems. WTMD operation at IAH, SFO, and MEM continues.
- WTMD Phase 2 hardware subsystem unique components will be bought for the identified 7 remaining NextGen core airports.
- Complete regional service center engineering and installation of WTMD Phase 2 hardware and associated data links in the next 3 airport ATCTs.
- Accomplish airspace evaluation and departure operations analysis for next 3 airports, providing recommendations to the airports for obtaining the most benefit from use of WTMD Phase 2.
- Provide WTMD training for next 3 airport's personnel.
- Provide corrective maintenance for all installed WTMD systems.

Program Plans FY 2014 – Performance Output Goals

- WTMD operations continue at all installed airports.
- Complete regional service center engineering and installation of WTMD Phase 2 hardware and associated data links in the remaining 3 airports.
- Accomplish any WTMD rework required based on the ongoing WTMD operational use.
- Accomplish airspace evaluation and departure operations analysis for remaining 3 airports, providing recommendations to the airports for obtaining the most benefit from use of WTMD Phase 2.
- Provide WTMD training for the remaining 3 airport's personnel.
- Transition WTMD operational support and corrective maintenance to the FAA operational support organization.

Program Plans FY 2015-2016 – Performance Output Goals

- None – this project completes in FY 2014.

B, SEPARATION MGMT – WAKE TURBULENCE MITIGATION FOR ARRIVALS (WTMA), G06A.01-02

Program Description

This program will evaluate air traffic control decision support tool capabilities and associated prototypes as possible enablers to safely meet the predicted NextGen demand for additional flights in the nation's air transportation system. If the capabilities demonstrated by the prototypes are evaluated to be beneficial and are incorporated into the terminal automation systems, more flights can be accommodated in the existing airspace due to the required wake mitigation separations between aircraft being safely reduced. This program is taking the results of technology research and development and new wake separation concept modeling and simulation efforts; and, evaluating 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 2012 will provide an evaluation of the WTMA as its component pieces would be implemented on the candidate FAA terminal automation platform. The project will provide a set of design requirements for engineering changes needed in a future software release to integrate the WTMA decision support tool capability into the FAA automation platforms.

The WTMA decision support tool capability, when implemented, will provide an economic boost to the nation's aviation system by restoring part of the airport landing capacity lost when an airport has to change its operation from visual approach operations to instrument approach operations and apply its attendant required wake mitigation separation minima between landing aircraft. High level analyses have indicated that the current air traffic control wake mitigation separations process, aided by technology, can be more capacity efficient while at the same time remain safe. It is expected that the project's WTMA evaluation and requirements development products will allow a rapid integration of the WTMA capability into the NextGen era FAA automation 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 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 decision support tools evaluated by this project will reduce the gap between an airport's visual operations landing capacity and its instrument operations landing capacity. The WTMA decision support tool capability would allow controllers to use dependent 1.5 nautical mile wake separations during instrument approach operations to an airport's closely spaced parallel runways when crosswinds are favorable – resulting in 8 to 10 more landings per hour than the airports can currently achieve during instrument operating conditions. The WTMA incremental capacity improvement can be achieved without any changes to the aircraft fleet's equipage and has a compounding beneficial flight delay reduction effect when weather conditions would otherwise have more severely cut an airport's capacity to accept flights.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- Completion of more extensive HITL evaluation of the WTMA process and procedures and associated prototype ATC decision support tool software.
- Begin development of documentation necessary to incorporate the WTMA capability into FAA automation platforms – completion of effort early FY 2013.
- Begin planning the evaluation of the single runway application (WTMSR) of the WTMA developed technology.

Mandatory
- Contractual support to design and develop the software modification to the WJH Technical Center automation test bed to allow evaluation of the single runway application (WTMSR) of the WTMA technology.

Program Plans FY 2013-2016 – Performance Output Goals
- Not Applicable – work will resume in this project in 2017.

C, SURFACE/TOWER/TERMINAL SYSTEMS ENGINEERING – TOWER FLIGHT DATA MANAGER (TFDM), G06A.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 Manager (TFDM) Engineering Development Model, to include Arrival/Departure Management Tool (A/DMT) functionality.

- 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 data exchange 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 that would reduce time to communicate taxi instructions to pilots,
- Conformance monitoring of surface traffic movement to ensure pilots are following taxi instructions, 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 Plans FY 2012 – Performance Output Goals

<u>Discretionary</u>

- Based on the IID decision, initiate RFP Documentation.
- Receive final investment decision to initiate procurement.
- Validate detailed TFDM requirements via prototype demonstrations/evaluation in the field, in support of TFDM acquisition.

<u>Mandatory</u>

- Support Technology Transfer of advanced TFDM capabilities from R&D.
- Define Terminal Architecture enhancements for NextGen.

Program Plans FY 2013 – Performance Output Goals

- Continue risk mitigation of TFDM-1 via prototype development and demonstration of Decision Support Tools and external data exchange.
- Develop Concept of Operations for TFDM Phase 2
- Identify and refine operational benefits for TFDM Phase 2.
- Develop evaluation plan for TFDM Phase 2.
- Develop high level architecture and requirements for TFDM Phase 2.
- Obtain TFDM Final Investment Decision.

Program Plans FY 2014 – Performance Output Goals

- Refine functional / operational requirements.
- Develop artifacts for TFDM Phase 2 investment.
- Develop validation plan for TFDM Phase 2.
- Develop operational evaluation model.

Program Plans FY 2015 – Performance Output Goals

- Develop TFDM Phase 2 prototype.
- Conduct demonstrations of TFDM Phase 2.

Program Plans FY 2016 – Performance Output Goals

- Develop demonstration reports.
- Update TFDM Phase 2 requirements.
- Update artifacts for investments.

D, FLIGHT & STATE DATA MGMT – FUTURE COMMUNICATION INFRASTRUCTURE, G06C.01-01

Program Description

The FAA must continue developing the capabilities needed to support NextGen solution sets. These capabilities are highly dependent on technologies that accurately predict and monitor the location and intent of aircraft and provide this information to other pilots, controllers, and other stakeholders. Some of the aspects of the NextGen Concept of Operations depend upon the aircraft as a participant in efficient, safe air traffic management both in flight and on the airport surface. These capabilities also rely on procedures that keep traffic flowing smoothly in all weather and visibility conditions both in flight and on the airport surface. It is expected that the future NextGen communications needs could be met by a globally harmonized standard based on the C-band (Aeronautical Mobile Airport Communications System (AeroMACS)) system. This project will address C-Band communications as follows:

C-Band Communications Standard

- Determine IEEE 802.16e C-Band standard best suited for airport surface wireless mobile communications.
- Conduct evaluation of an aviation specific standard to support wireless "mobile" communications in relevant airport surface environments.
- Develop a channelization methodology for allocation of safety and regularity of flight services in the band to accommodate a range of airport classes, configurations, and operational requirements.

In addition, the following research and development is also scheduled:

C-Band Communications

- Evaluate selected ATS mobile application of the AeroMACS.
- Investigate and resolve remaining issues between FAA - RTCA and SESAR - EUROCAE affecting the final AeroMACS profile inputs to the Minimum Operational Performance Standards (MOPS) process;
    - Evaluate Mobile Fast Hand-Off between Base Station sectors via firmware upgrade (compatible with Worldwide Interoperability for Microwave Access (WiMAX) Forum release 1.5).

- Evaluate and recommend mobile Subscriber Station Multi-Input Multi-Output (SS MIMO) antenna configurations for mobile SSs.
- Optimize AeroMACS system-level performance (Quality of Service (QoS), data throughput, latency, error rate) within International Telecommunication Union (ITU) limitations on radiated power.
- Resolve channel Bandwidth (BW) and center frequency spacing plans to satisfy US and European objectives while preserving Spectrum Office flexibility and compatibility with WiMAX Forum practices.

- Augment C-Band channel plan for allocation of safety and regularity of flight services via the AeroMACS within the additional Aeronautical Mobile (R) Service (AM(R)S) spectrum proposed by the US;
  - Validate that the proposed AeroMACS complies with interference requirements for the US proposed allocation at World Radiocommunications Conference in 2012.
- Support harmonization and parallel research efforts for pending Action Plan 30.

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

Neither the current voice-oriented air/ground communications capabilities, nor the air/ground data communications capabilities of Segments 1 and 2 of the Data Communications Program are expected to provide the long-term NextGen data communications needs of the large number and categories of users in the airport surface environment. These long-term NextGen communications needs could be met by globally harmonized standards based on AeroMACS that would support future increases in capacity.

Program Plans FY 2012 – Performance Output Goals

- Develop and validate aeronautical mobile airport communications system (AeroMACS) Standard and Recommended Practices (SARPS) at the International Civil Aviation Organization (ICAO) level to support global harmonization and interoperability of the system.
- Develop and validate a method for segregation and reliable delivery of ATS and AOC services on AeroMACS,
- Develop secure and reliable methods for Private Key Management and synchronization across all AeroMACS AAA sites.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

E, SEPARATION MGMT – APPROACHES, GROUND BASED AUGMENTATION SYSTEM, G06N.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 a very 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. Funding and implementation of the JPALS system will be primarily dependent on moving forward with the FAA's GBAS program.

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 Plans FY 2012 – Performance Output Goals

Discretionary

- Requirements development – finalize CATIII ground facility specification.
- AMS Documentation – In addition the team will complete the preparation for a JRC presentation to seek a program decision.
- Following a favorable JRC decision, the team will proceed with the source selection activities leading to a contract award for Cat III GBAS systems.

Mandatory

- Operational Implementation – Conduct preliminary planning to field and implement CAT III GBAS.
- Procure Equipment/Solution Development – Complete technical validation necessary to achieve a low technical risk for acquisition. Complete avionics prototype development

Program Plans FY 2013 – Performance Output Goals

- Complete prototype and requirements development and validation.
- Obtain Final Investment Decision.
- Prepare procurement package for contract award for Federal procurement of CAT-III GBAS.
- Support operational implementation activities and data collection for Cat I systems in the NAS.

Program Plans FY 2014 – Performance Output Goals

- Finalize procurement package for Cat III federal acquisition.
- Continue operational implementation support for Cat I fielded systems, data collection, and industry proof of concept projects for Cat III GBAS.

Program Plans FY 2015 – Performance Output Goals

- Continue operational implementation support for Cat I fielded systems, data collection, and industry proof of concept projects for Cat III GBAS.
- Conduct studies for Cat III multi-constellation GNSS interoperability and requirements formulation.

Program Plans FY 2016 – Performance Output Goals

- Continue operational implementation support for Cat I fielded systems, data collection, and industry proof of concept projects for Cat III GBAS.
- Update acquisition documentation and procurement package for Cat III federal acquisition.

F, SEPARATION MGMT – CLOSELY SPACED PARALLEL RUNWAY OPERATIONS, G06N.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 Plans FY 2012 – Performance Output Goals
Discretionary
- Update CSPO Program Plan and detailed schedule.
- Deliver Test report for FY 2011 HITL 2-11 test.
- Perform data collection and analysis reports to support reduced separation standards in runway spacing.
- Develop Safety Management System requirements for approaches at reduced separations standards in runway spacing.
- Develop performance requirements for independent and paired approaches.

Mandatory
- Develop final Simplified Aircraft-based Paired Approach (SAPA) system description for avionics integration and installation in FAA simulators and flight test aircraft.
- Refine Non Transgression Zone (NTZ), Normal Operating Zone (NOZ) and other assumptions via modeling and analyses.

Program Plans FY 2013 – Performance Output Goals
- Update CSPO Program Plan and detailed schedule.
- Determine minimum spacing for Simultaneous Independent Approaches.
- Conduct demonstrations to validate concept and requirements and obtain buy in from all stake holders.
- Develop and coordinate Safety Risk Management Document (SRMD) for approaches at reduced separation standards for runway spacing.
- Finalize development of CSPO advanced concept of operations for reduced separation standards for minimum runway spacing and deliver to NextGen Integration and Implementation group, as well as service units for consideration.

Program Plans FY 2014 – Performance Output Goals
- Continue CSPO blunder model enhancements.
- Continue HITL activities to support CSPO.
- Implement procedures for CSPO at additional airports.

Program Plans FY 2015 – Performance Output Goals
- Continue CSPO blunder model enhancements.
- Continue HITL activities to support CSPO.
- Continue to implement procedures for CSPO at additional airports.

Program Plans FY 2016 – Performance Output Goals
- Continue CSPO blunder model enhancements.
- Continue HITL activities to support CSPO.
- Continue to implement procedures for CSPO at additional airports.

G, SEPARATION MGMT – APPROACHES, NEXTGEN NAVIGATION INITIATIVES, G06N.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) is "Enhanced Low Visibility Operations". This program 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. For example, lower takeoff minimums could achieve a 17% increase in throughput for San Francisco International Airport (SFO). This effort is in the implementation phase and will have near-term NextGen operational benefits by increasing NAS capacity and throughput. Work is ongoing to develop the benefit-cost analysis to propose this as a NAS-wide implementation, beginning 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 horizontal visibility, a 25% improvement for these runways over the prior 2400-foot requirement.

The second program element (P2) is "Terminal RNAV DME-DME". This program supports the use of DME-DME area navigation (RNAV) down to 2000 feet above ground level (AGL) without the need for an inertial reference unit (IRU) in the aircraft. 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. Implementing DME-DME RNAV currently requires the spectrum office to perform case-by-case analysis 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.

The third program element (P3) is "Surface Navigation". This program is focused on developing a concept of operations (CONOPS) to provide pilots with the ability to navigate from the runway to the gate during low visibility/ceiling and/or heavy traffic conditions using aircraft equipped with advanced Global Navigation Satellite System (GNSS) augmented navigation systems, Heads-Up Displays (HUD), Enhanced Flight Vision Systems (EFVS), Synthetic Vision Systems (SVS), Advanced Vision Systems and other cockpit-based technologies. The program will be associated with, but not limited to, low visibility surface operations. The program will also support the vision of providing safe surface operations during high traffic density and complex airport layout conditions.

This program element will leverage the capabilities of existing systems to the extent possible and 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 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 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;
- Environmental benefits through lower carbon footprint;
- 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 Plans FY 2012 – Performance Output Goals

- Enhanced Low Vis Ops - Initiate Work at 2 Sites and finish FY 2010 work.
- Terminal RNAV DME-DME-Initiate at OEP Airport.
- Surface Situational Awareness-Finalize Coordination of CONOPS.

Program Plans FY 2013 – Performance Output Goals

- P1: Enhanced Low Visibility Operations; Initiate Work at 2 Sites and finish FY 2011 work.
- P2: Terminal RNAV DME-DME: Update National Standard for increased coverage if not yet accomplished. Finalize site determination.
- P3: Surface Navigation: Finalize operational and performance requirements. Conduct initial project demonstration in preparation for alternative analysis.

Program Plans FY 2014 – Performance Output Goals

- P1: Enhanced Low Visibility Operations; Initiate Work at 2 Sites and finish FY 2012 work.
- P2: Terminal RNAV DME-DME: Finalize and coordinate changes to National Standard (1982). Plan for training and implementation into NAS operations.
- P3: Surface Navigation: Conduct demonstration if not accomplished in prior year(s). Work to realize the CONOPS.

Program Plans FY 2015 – Performance Output Goals

- P1: Enhanced Low Visibility Operations; Initiate Work at 2 Sites and finish FY 2013 work.
- P2: Terminal RNAV DME-DME: Implement operations based on updated National Standard into the NAS.
- P3: Surface Navigation: Determine best alternative based on analysis and demonstration.

Program Plans FY 2016 – Performance Output Goals

- P1: Enhanced Low Visibility Operations; Initiate Work at 2 Sites and finish FY 2014 work.
- P2: Terminal RNAV DME-DME: Finalize move into NAS operations.
- P3: Surface Navigation: Finalize coordination of operational implementation into NAS.

H, SEPARATION MGMT – APPROACHES, OPTIMIZE NAVIGATION TECHNOLOGY, G06N.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.

The first initiative focuses on the 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 initiative is to replace the existing incandescent lamps with Light Emitting Diode (LED) technology, without modifying the rest of the MALSR system. A future 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 of existing MALSR.

The second 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 will 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

The older visual guidance systems are maintenance intensive, and use a large amount of electrical energy. This causes excessive downtime, and wastes electrical energy, which affects the life-cycle cost of lighting systems. The replacement and upgraded equipment will require less periodic 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 second 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 Plans FY 2012 – Performance Output Goals
- Complete MALSR LED/IR lamps prototype design.
- Complete functional configuration audit for LED PAPI.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

I, TRAJECTORY MGMT – ARRIVALS, G06N.02-01

Program Description

The enablers for Trajectory Management which are – RNAV/RNP (Area Navigation/Required Navigation Performance) 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 103,068 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 Plans FY 2012 – Performance Output Goals
Discretionary
- Continue evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival.
- Continue evaluation of DataComm for aircraft messaging for RTA, reroutes, and waypoint verification data integrity.
- Human factors analysis shifting to control by time of arrival through controller-in-the-loop simulations and field trials.
- Seek certification approval of initial TBO procedures/scenarios.
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed).

- Complete evaluating the advantages and disadvantages associated with imposing vertical constraints and required time of arrival in different congestion scenarios from the aircraft operator and ATM perspectives.

Mandatory
- Identify requirements for ground merging and sequencing tools.
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements).
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance.
- Perform initial 4D (geographical position, altitude, and time) FMS TBO concept validation and analyses of performance capabilities and standards.
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements).
- Conduct analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance.
- Seek certification approval of initial TBO procedures / scenarios.
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed).

Program Plans FY 2013 – Performance Output Goals
- Develop final plan for Implementation.
- Approve Safety Analysis.
- Approve new RNAV routes (needed to support implementation).
- Develop operational ground metering tool (build on TMA using downlink of FMS 4DT and precision RTA capability aircraft).
- Begin limited implementation of 4D FMS TBO using new ground automation support if available**.**

Program Plans FY 2014-2016 – Performance Output Goals
- None.

J, TRAJECTORY MGMT – REDUCED RVR MINIMA, G06N.02-02

Program Description

This program enhances low visibility operations by lowering required Runway Visual Range (RVR)-defined minimums during IMC and maximizing efficiency and use of existing aircraft capability and navaids infrastructure. It 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 developing the NAS-wide implementation of enhanced low visibility operations and will have near-term NextGen operational benefits by increasing NAS capacity and throughput. Additionally, an important benefit is a lower carbon footprint. If successful, this program element remains in a separate CIP line. The initial program element achieved use of Category I runway procedures using RVR minimums of 1800 feet horizontal visibility, a 25% improvement for these runways over the prior 2400-foot requirement. Special Authorization Cat II operations show benefits to operations with increased throughput during low visibility periods and benefits of $5M per year at major airports.

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

Enhanced low visibility operations will accrue benefits in the areas described above. This program supports the increased capacity goal by enabling an:

- Increased number of arrivals and/or departures at high density airports;
- Decreased fuel consumption;
- Greater passenger and cargo flow in weather conditions than today;
- Decreased number of flight delays, cancellations, and/or diversions that occur during IMC conditions;
- Increased capacity 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.

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Complete AMS documentation and work toward Final Investment Decision.

Mandatory

- Using benefit cost model screen NAS candidates for optimized low visibility enhancements that are both cost beneficial and address critical NAS choke points and throughput issues.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

X1, TERMINAL FLIGHT DATA MANAGER (TFDM), G06A.03-01

Program Description

Controllers currently rely on several data management systems in Air Traffic Control Towers (ATCTs) to provide flight data and traffic management tools in the terminal environment. These systems include, but are not limited to, Airport Resource Management Tool (ARMT), Flight Data Input Output (FDIO), Tower Data Link Services (TDLS), Integrated Display System (IDS), Electronic Flight Strip Transfer System (EFSTS), and Advanced Electronic Flight Strip (AEFS). In order to achieve the modernization of the NAS envisioned by NextGen, it is necessary to develop an integrated Terminal Flight Data Management (TFDM) platform that provides all of the functionality currently available to controllers as well as emerging capabilities anticipated in the modernization of the NAS such as Electronic Flight Strip (EFS) and Terminal Data Display System (TDDS). The first phase of TFDM is designed 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 and reduce ATO operating costs.

The TFDM program is an integrated approach to maximize the efficient collection, distribution, and update of data and improve access to information necessary for the safe and efficient control of air traffic. The system will collect and portray terminal flight data, as well as traffic management tools, on an integrated display; and will be connected to information and decision support tools.

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

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

Relationship to Performance Target

TFDM will automate manual processes; integrate existing terminal flight data systems and decision support tools, such as ARMT, FDIO, and TDLS, into a single platform; and provide new decision support capabilities. This will improve Air Traffic Control coordination and decision making to facilitate more efficient operations and increased capacity and it will reduce operating costs.

Program Plans FY 2012 – Performance Output Goals

- Obtain TFDM Initial Investment Decision.

Program Plans FY 2013 – Performance Output Goals

- Release Screening Information Request for TFDM acquisition.
- Obtain TFDM Final Investment Decision.

Program Plans FY 2014 – Performance Output Goals

- Award contract to begin development of the first article system.
- Conduct System Requirements Review.

Program Plans FY 2015 – Performance Output Goals

- Continue development of the first article system.
- Conduct Preliminary and Critical Design Reviews

Program Plans FY 2016 – Performance Output Goals

- Continue development of the first article system.
- Begin hardware unit testing and incremental software development testing of the first article system.

X2, SEPARATION MANAGEMENT – ALTERNATIVE POSITIONING NAVIGATION AND TIMING (APNT), G06N.01-06

Program Description

The FAA needs to provide an Alternative Positioning Navigation and Timing (APNT) service to minimize economic impacts from GNSS interference outages within the NAS. Alternative PNT (APNT) will provide a means to continue RNAV and RNP operations to a safe landing during periods when GNSS services are unavailable. APNT will also provide backup timing services for CNS and other aviation applications.

Many of the operation improvements necessary to meet the predicted capacity and efficiency improvements are dependent on widespread use of PNT services provided by global navigation satellite system (GNSS). GNSS PNT services utilizing the global positioning system (GPS) along with satellite-based augmentation systems (SBAS), and ground-based augmentation system (GBAS) are expected to be the primary enablers of performance-based navigation (PBN) and dependent surveillance (ADS-B) services that in turn enable trajectory-based operations, area navigation (RNAV), required navigation performance (RNP), precision approach, closely spaced parallel operations (CSPO), and other operational improvements.

The FAA currently relies on legacy VHF omni-directional radios (VOR), Non-directional radio beacons (NDB), and distance measuring equipment (DME) to provide alternative PNT service to GNSS users, even though the GNSS services were originally intended to replace these aging legacy navigation systems. The VOR and NDB systems support point-to-point navigation, but cannot support PBN operations for RNAV and RNP. The majority of Air Carriers are equipped to fly the published RNAV routes using GPS. Flight management systems (FMS) installed in aircraft use multiple DMEs to provide a position solution suitable for RNAV enroute and terminal operations at busy airports. However, most general aviation aircraft are not equipped with DME or inertial and therefore still rely on VORs and NDBs for alternate positioning. The VORs and NDBs are very old and if they are used to provide the necessary alternative PNT services the FAA will either need to replace these systems or implement a suitable alternative.

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 – 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 program supports the increased capacity goal by ensuring PNT services remain available during GNSS outages and for aircraft not equipped to use GNSS.

Program Plans FY 2012 – Performance Output Goals

- None.

Program Plans FY 2013 – Performance Output Goals

- Perform analyses to support initial investment decision by the fourth quarter of FY 2013, which will include the following activities and artifacts:
  - develop business case with stakeholder involvement
  - develop detailed program requirements
  - develop range of alternatives
  - assess risks
  - develop initial program budget profile

Program Plans FY 2014 – Performance Output Goals

- Perform analysis to support a final investment decision leading to program implementation, including:
  - Refine business case with stakeholder involvement
  - Finalize detailed program requirements
  - Validate range of alternatives/identify potential candidate(s) for FID
  - assess risks and develop potential mitigations
  - refine program budget profile

Program Plans FY 2015 – Performance Output Goals

- Further analyze potential candidates through tests and analysis and work with manufactures, flight standards and user groups to develop standards and procedures and implementation strategies.

Program Plans FY 2016 – Performance Output Goals

- Perform analysis to support final investment decision by the fourth quarter of FY 2016, which will include the following activities: refine business case with stakeholder involvement, refine program requirements and develop APNT team's recommended alternative.

1A14, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SAFETY, SECURITY AND ENVIRONMENT

FY 2012 Discretionary $5.0M
FY 2012 Mandatory $3.0M
FY 2012 Total Request $8.0M

- Security Integrated Tool Set (SITS), G07A.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 Plans FY 2012 – Performance Output Goals
Discretionary
- Obtain Final Investment Decision.

Mandatory
- Award contract for SITS development.
- Initiate development activities.

Program Plans FY 2013-2016 – Performance Output Goals
- None.

1A15, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – SYSTEM NETWORKED FACILITIES

FY 2012 Discretionary $9.0M
FY 2012 Mandatory $1.0M
FY 2012 Total Request $10.0M

- A, Integration, Development, & Operations Analysis Capability, G03M.02-01
- B, Test Bed Demonstration, G03M.03-01

A, INTEGRATION, DEVELOPMENT, & OPERATIONS ANALYSIS CAPABILITY, G03M.02-01

Program Description

The primary goal of 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. New infrastructure, automation, aircraft equipage, procedures, and regulations are designed to support this seamless operational concept which must evolve from a geographical focus to a broader air traffic management concept. It will be necessary to test the integration, development, and operations functions in a real-time and flexible environment to validate the broad framework of concepts, technologies, and systems introduced by NextGen.

This project develops a laboratory to assess NextGen technologies and concepts in an integrated environment. The NextGen concepts of operation and supporting technologies are not only sophisticated, but very complex. This laboratory allows 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.

Key characteristics of the laboratory 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 Plans FY 2012 – Performance Output Goals

- Continue development of the integration, development, and operations analysis capability.
- Integrate 3 additional capabilities into the NextGen Integration and Evaluation Capability (NIEC) display area:
  - Traffic Flow Management Capability (a.k.a. Mini TPC)
  - ERAM Evaluation System (a.k.a. ERAM in-the-Box)
  - Traffic Management Advisory (TMA) capability

Program Plans FY 2013-2016 – Performance Output Goals

- Continue to integrate additional capabilities into the NIEC display area.

B, TEST BED DEMONSTRATION, G03M.03-01

Program Description

The NextGen Test Bed program provides 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 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 also supports and validates large scale modeling and simulation.

The Test Bed demonstration sites are: 1) the Daytona Beach International Airport International Terminal; 2) the William J. Hughes Technical Center near Atlantic City, NJ; and 3) NASA's North Texas Facility near Dallas Ft. Worth (DFW), TX and will be integrated together in the next segment of the Test Bed Demonstration program. These three sites were chosen to leverage existing FAA research being conducted at these facilities. We will emphasize all aspects of flight, from departure to arrival (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 – will allow the FAA to investigate further information sharing capabilities that may give way to future potential NextGen enhancements.

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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 single purpose 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 Plans FY 2012 – Performance Output Goals
<u>Discretionary</u>
- Expand NextGen test bed capabilities in Florida.
- Establish information exchange capabilities with another NextGen Test Bed and stakeholder facility.
- Continue coordination with NASA North Texas Research Station (NTX) and William J. Hughes Technical Center.
- Perform site installation of equipment.
- Technology site refresh and maintenance at Florida Test Bed.
- Maintain East Coast Test Bed sites to allow continual NextGen demonstrations.

<u>Mandatory</u>
- Perform technology refreshes to install and evaluate arising NextGen technologies.
- Expand telecommunication infrastructure to allow improved live data capabilities. Begin expansion site integration capabilities among all three sites.

Program Plans FY 2013 – Performance Output Goals
- Establish information exchange capabilities with other NextGen Test Beds and stakeholder sites.
- Perform NextGen technology integration and demonstration activities in Florida.
- Expand inter-Test Bed capabilities with connectivity to key external industry partners.
- Continue to expand NextGen test bed capabilities in Florida to support future demonstrations.
- Establish telecommunication circuits for initial live data capability.
- Perform site installation and maintenance activities
- Perform technology site refresh at Test Bed sites.
- Provide initial governance documentation
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation / development for NextGen transformational technologies to assure timely implementation into the NAS.

Program Plans FY 2014 – 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.
- Continue demonstration of end-to-end (in all domains) 4-D trajectory management development and support of near-term emerging PATM capabilities.
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation / development for NextGen transformational technologies to assure timely implementation into the NAS.

Program Plans FY 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.
- Continue demonstration of end-to-end (in all domains) 4-D trajectory management – Interconnected among the Florida Test Bed, WJHTC, NASA NTX, academia/research labs, and industry labs, the Test Bed will have the capability of performing integrated demonstrations that utilize the capabilities at multiple facilities.
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation / development for NextGen transformational technologies to assure timely implementation into the NAS.

Program Plans FY 2016 – 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.
- Continue support of demonstration of NextGen capabilities.
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation / development for NextGen transformational technologies to assure timely implementation into the NAS.

1A16, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – FUTURE FACILITIES
FY 2012 Request $19.5M

- Future Facilities Investment Planning, G03F.01-01

Program Description

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

The NextGen Future Facilities Program is focused on developing and executing a long term strategy for meeting the FAA's facility needs of the future. The program is focused on defining criteria, soliciting requirements, developing and implementing plans for transforming the FAA's air traffic facilities and maximizing NextGen benefits and operational concepts. The program will deliver integrated, fit-for-purpose air traffic control facilities. These new and upgraded facilities will feature full range of required air traffic management services, provide enhanced amenities and improved infrastructure for air traffic operations, and enable the FAA to provide better services.

The future facilities will enable operational improvements by optimizing the use of NextGen technologies and capabilities, facilitating cultural integration across the FAA and rightsizing the scope and number of facilities.

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

The NextGen Facilities Special Program Management Office (SPMO) has been established to coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The SPMO will develop business cases for new facilities and/or alterations to existing facilities, and create transition and implementation plans. The SPMO will design FAA facilities that meet the needs of the future through a program that is consistent with facilities-oriented legislation within anticipated FAA Reauthorization.

In addition to the planning to develop NextGen facilities, this program will have to coordinate its activities with the ERAM, terminal automation, NAS Voice Switch and other infrastructure programs to ensure that equipment is available for any new facilities. A detailed transition plan will be necessary to transfer surveillance and communication inputs to the new location and new equipment.

The NextGen Facilities Program will manage the facility transformation effort by dividing it into six operational segments that correspond to service volumes within the National Airspace System (NAS). Each segment, beginning approximately every three years, will contain between approximately three to eight projects. The Program is developing a comprehensive process for planning, designing and implementing facility changes within each of the proposed six segments. Each segment will be managed as a portfolio of programmatic and operational decisions aligned to optimize our service delivery model. Transition risk management will be a paramount concern in this approach. In addition, the segmented approach will help mitigate operational, budgetary, technical, political, and economic risks, as lessons learned from implementation of earlier segments will be applied to later segments. The projects within each segment will themselves go through an individual final investment analysis decision. This approach is consistent with the rigorous analysis that large transformational programs of this magnitude deserve and aligned with the US Government requirement for capital investment plans. The multi-year transformation of FAA air traffic control facilities runs between now (2010) through 2025 and beyond.

The NextGen Facilities Program received approval from the JRC (IARD) to move to initial investment analysis for Segment 1 (of six segments) on September 15, 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 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 NextGen Future Facilities Program focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. Networked facilities will provide for expanded services; service continuity; and optimal deployment and training of the workforce all supported by cost-effective and flexible systems for information sharing and back-up. Traffic is assigned to facilities on both a long-term and daily basis with service continuity a foremost requirement. Business continuity is built into the system and provides for a more resilient infrastructure, better contingency operations, and a higher degree of service.

Program Plans FY 2012 – Performance Output Goals

- Critical business case development activities and support for the approval of the NextGen Facilities Segment 1 Project 1 Business Case Final Investment Decision (FID) by the Joint Resources Council (JRC) in August 2012 includes the development of:
    - Final Business Case Analysis Report (BCAR)
    - Final Implementation Strategy and Planning Document (ISPD)
    - Acquisition Program Baseline (APB)

    - OMB Exhibit 300
- Systems engineering services and engineering/architectural expertise needed to complete the business case artifacts and relating to the final Segment 1 Project 1 100% facility layout design activities. This includes the development of:
    - Final Program Requirements Document
    - Segment 1 Project 1 Transition Plans
    - Business Continuity Analysis, Human Factors and Safety Assessment Products
    - Operational Benefits Analysis
    - Enterprise Architecture Products
    - Site Selection Document
- Facilities planning and design for FY12 encompasses the 100% design for Project 1, as well as in-depth evaluation of potential acquisition alternatives for the construction for the first Project of Segment 1 and include ongoing support or development of the:
    - Segment 1 Project 1- 100% facility design
    - Acquisition Alternatives Analysis (PPP, shared-cost schemes, and other suitable contract types)
    - Initial Prequalified Bidders List
- Program Management incorporates all activities that support the development of the aforementioned artifacts, as well as the day-to-day functions of the SPMO and includes:
    - Development and maintenance of resource loaded Integrated Master Schedule (IMS))
    - Budget Artifacts (White Sheets, Resource Planning Documents (RPD), Project Level Agreements (PLA), Portfolio-Level Agreements (PfLA), 5-Year Plan)
    - Public Outreach, Stakeholder Engagement and Programmatic Communications
    - Quality Control / Quality Assurance
    - Strategic and Resource Planning
- Complete Segment 1 Project 1 100% Design & Procurement Specification.
- Achieve Segment 1 Project 1 Final Investment Decision (FID).

Program Plans FY 2013 – Performance Output Goals
- Complete Segment 1 Project 2 100% Design & Procurement Specification.
- Plan for Segment 1 Project 2 Final Investment Decision (FID).

Program Plans FY 2014 – Performance Output Goals
- Award Segment 1 Project 2 Final Investment Decision (FID).
- Plan for Segment 1 Project 3 Final Investment Decision (FID).

Program Plans FY 2015 – Performance Output Goals
- Pre-qualified bidders list
- Preparation of Segment 1 Project 1 Construction Contract
- Segment 1 Project 1 Request for Proposal and Proposal Evaluation
- Plan for Segment 1 Project 1 Construction Contract Award.
- Plan for Segment 1 Project 3 Final Investment Decision (FID).

Program Plans FY 2016 – Performance Output Goals
- Award Segment 1 Project 1 Construction Contract.
- Achieve Segment 1 Project 3 Final Investment Decision (FID).

1A17, Joint Planning and Development Office (JPDO)
FY 2012 Request $3.0M

- Demonstration and Infrastructure Development – JPDO Program Office, G08M.01-03

Program Description

The Joint Planning and Development Office (JPDO) was chartered by Congress in 2003 through the Vision 100 – Century of Aviation Reauthorization Act (Public Law 108-176). Section 709 of the Act directed the Secretary of Transportation to establish the JPDO within the Federal Aviation Administration (FAA) to manage work related to the NextGen initiative. The statute further specified that it would be the responsibility of the JPDO to:

- Create and carry out an integrated plan for NextGen
- Oversee the research and development of NextGen
- Create a transition plan for the implementation of NextGen
- Coordinate aviation and aeronautics research programs to achieve the goal of more effective and directed programs that will result in more applicable research
- Coordinate the goals, priorities, and research activities within the U.S. Federal government with U.S. aviation and aeronautical firms
- Coordinate the development and use of new technologies to ensure that, when available, the technologies may be used to their fullest potential in aircraft and in the air traffic control system
- Facilitate the transfer of technology from research programs, such as the National Aeronautics and Space Administration (NASA) program and the Department of Defense Advanced Research Projects Agency (DARPA) program to Federal agencies with operational responsibilities and to the private sector
- Review activities relating to noise, emissions, fuel consumption, and safety conducted by Federal departments and agencies

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 JPDO provides the multi-agency governance structure that guides the development of the nation’s air transportation system of 2025. The JPDO together with partner agencies defines the capabilities and mechanisms that build new capacity to accommodate a wide range of customers and address an even wider spectrum of issues. These include increasing mobility for private, commercial, civil, and military aviation, airport and airspace capacity that is adaptable to unforeseen changes in traveler and shipper needs, and capacity increases that are balanced within safety and security guidelines.

The JPDO maintains the plan and provides biennial reporting on the progress that participating agencies make in transforming the air transportation management system into a space-based system capable of avoiding future capacity gridlock regardless of weather The Inter-agency NextGen plan is captured in the Enterprise Architecture that describes the NextGen system and the Integrated Workplan that describes the transition plan.

Program Plans FY 2012 – Performance Output Goals

- Provide NextGen planning support to the development of the FY14 Enterprise Architecture and Integrated Workplan.

Program Plans FY 2013 – Performance Output Goals

- Provide NextGen planning support to the development of the FY15 Enterprise Architecture and Integrated Workplan.

Program Plans FY 2014 – Performance Output Goals
- Provide NextGen planning support to the development of the FY16 Enterprise Architecture and Integrated Workplan.

Program Plans FY 2015 – Performance Output Goals
- Provide NextGen planning support to the development of the FY17 Enterprise Architecture and Integrated Workplan.

Program Plans FY 2016 – Performance Output Goals
- Provide NextGen planning support to the development of the FY18 Enterprise Architecture and Integrated Workplan.

1A18, NEXTGEN PERFORMANCE BASED NAVIGATION (PBN) – METROPLEX AREA NAVIGATION (RNAV)/ REQUIRED NAVIGATION PERFORMANCE (RNP)
FY 2012 Request $26.2M

- Collaborative ATM – NextGen Performance Based Navigation (PBN) – Metroplex RNAV/RNP, G05N.01-01

Program Description

The Airspace Optimization Group will begin integrated airspace design and associated activities, including traffic flow analysis, arrival and departure route design and procedures optimization. This will lay the framework for accelerating PBN initiatives. Airspace and procedure integration allows a systems view that: examines using additional transition access/egress points not tied to ground-based navigation aids; considers concurrent development and implementation of arrival and departure procedures; ensures an integrated approach to optimizing procedures; decouples conflicting operations to and from primary and secondary/satellite airports serviced by the same complex terminal airspace; and develops high altitude routes through congested airspace to create more efficient routes between major metropolitan areas. Implementation of RNAV and RNP routes and procedures will address the RTCA Task Force 5 recommendations, maximize benefits, and accelerate NextGen concepts.

Airspace Redesign and procedure development will target specific Metroplex areas that have been designated as high priority through the use of quantitative and qualitative metrics. Results form Study Teams will be used to guide the implementation of those improvements that have the highest benefits. Design work will include analyses and simulations, assessments of alternatives, and modeling of projected airspace and procedures benefits.

All changes to the NAS require safety analyses and documentation. Funding will be used to obtain support services from the Aviation Safety organization to review and approve the implementation of these new flight procedures. Safety inspectors, engineers and other safety staff will be needed to support RNAV and RNP approvals and the associated surveillance techniques to ensure pilots follow the procedures. Safety personnel will also update standards to be consistent with modern aircraft capabilities. A contract will fund technical support and training material including course development, video production, maintenance of training equipment, and course 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

Developing performance based navigation in metroplex airspace will allow more efficient use of the airspace and increases in arrival and departure flows. Using the airspace more efficiently increases the capacity for the affected airports.

Program Plans FY 2012 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM)
- Initiate Study Team activities at 7 Metroplex locations.
- Initiate Design and Implementation activities at 6 Metroplex locations.
- Conduct safety assessments of RNAV/RNP.

Program Plans FY 2013 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM)
- Initiate Study Team activities at 7 Metroplex locations.
- Initiate Design and Implementation activities at 8 Metroplex locations.
- Conduct safety assessments of RNAV/RNP.

Program Plans FY 2014 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM)
- Initiate Design and Implementation activities at 4 Metroplex locations.
- Conduct safety assessments of RNAV/RNP.

Program Plans FY 2015 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM)
- Post Implementation complete at 7 Metroplex locations.
- Conduct safety assessments of RNAV/RNP.

Program Plans FY 2016 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM)
- Post Implementation complete at 6 Metroplex locations.
- Conduct safety assessments of RNAV/RNP.

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

A. EN ROUTE PROGRAMS

2A01, EN ROUTE AUTOMATION MODERNIZATION (ERAM)

FY 2012 Request $120.0M

- En Route Automation Modernization (ERAM), A01.10-01

Program Description

The baseline ERAM program (A01.10-01) 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 FY 2006. The second, ERIDS, was completed in FY 2008. ERAM Release 1 replaces the current Host Computer System with a new automation system that expands the Host's capability so the new system can handle additional airspace capacity, and improve efficiency and safety. From a functionality standpoint, Release 1 contains the capabilities and performance required to achieve acceptable operational suitability and effectiveness. ERAM Release 2 was a planned maintenance software release containing backlog problem trouble report (PR) fixes. Release 3 was planned to incorporate NextGen transformational program infrastructure into ERAM including interfaces with Automatic Dependent Surveillance – Broadcast (ADS-B) and Segment 1 of the System Wide Information Management (SWIM).

Releases 1-3 were programmed to be complete in FY 2011. However, there were challenges that were encountered once operational testing of the software at the key sites began in June 2009. These included the discovery of problems with interfaces with other facilities and other systems due to the limitations of the testing environments at the William J. Hughes Technical Center and at the contractor's facility not being fully representative of the actual complex operational environment at field facilities. Additionally, there were problems with some interfaces that are only needed during the transition from legacy to ERAM but go away once ERAM is fully operational. Also, because ERAM does some of its processing differently than HOST to enable it to serve as the infrastructure required for NextGen trajectory-based operations and provides a level of national standardization in some functionality that is higher than with HOST, system behaviors are different than what the field operators have been used to and were expecting, requiring additional familiarization time. These challenges have resulted in delaying the implementation of ERAM through FY 2014 and requiring additional acquisition funding in FY 2011 – FY 2014 of approximately $330M. As many of the required fixes were already developed in Release 2, the program decided to use Release 2 for the waterfall deployment of ERAM. The Salt Lake City (ZLC) key site has been successfully operating on ERAM Release 2 in a continuous Operational Suitability Demonstration (OSD) phase since October 19, 2010. Independent Operational Assessment (IOA) has been conducted at both the ZLC and Seattle (ZSE) key sites and an In-Service Decision was approved on March 29th with an Action Plan to address hazards documented through the IOA process. The action plan has a series of steps culminating with 7 sites achieving IOC and the action plan complete by September 2011. FY 2012 funding will complete software updates required for deployment to 6 sites with additional funding required to complete the waterfall deployment to the remaining 7 sites in FY 2013. ERAM Release 3 is planned to achieve key site initial operating capability (IOC) with ADS-B at the Houston ARTCC in September 2011. Release 3 is then planned to become the waterfall release for the remainder of the waterfall sites beginning in the 3rd quarter of FY 2013.

The current schedule calls for achieving IOC at 7 sites in FY 2011, 6 sites in FY 2012 and the remaining 7 sites in FY 2013. Last site operational readiness determination (ORD) is planned to be achieved prior to the end of FY 2014. The ERAM program is planning to re-baseline the cost and schedule portions of the Acquisition Program Baseline in June 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 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 65,536 (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 a maximum of 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 2012 – Performance Output Goals

Achieve IOC at (site locations subject to revision for operational needs) 6 sites as follows:

- 1st Quarter: Los Angeles, Oakland
- 2nd Quarter: New York, Indianapolis
- 3rd Quarter: Kansas City
- 4th Quarter: Miami

Program Plans FY 2013 – Performance Output Goals

Achieve IOC at (site locations subject to revision for operational needs) remaining 7 sites as follows:

- 1st Quarter: Washington, Boston, Cleveland
- 2nd Quarter: Memphis
- 3rd Quarter: Atlanta, Jacksonville
- 4th Quarter: Fort Worth

Program Plans FY 2014 – Performance Output Goals

- Complete ERAM deployment achieving last site ORD.

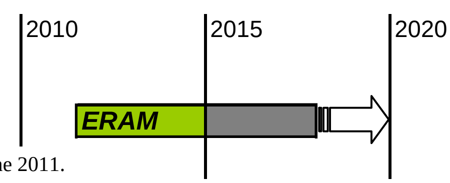
Program Plans FY 2015-2016 – Performance Output Goals

- None

System Implementation Schedule

En Route Automation Modernization (ERAM)

First site ORD: 2011 -- Last site ORD: 2014



*Note: Schedule dated February 2011, ERAM program re-baseline JRC is planned for June 2011.

2A02, EN ROUTE AUTOMATION MODERNIZATION (ERAM) – D-POSITION UPGRADE AND SYSTEM ENHANCEMENTS

FY 2012 Discretionary $0.0M
FY 2012 Mandatory $64.5M
FY 2012 Total Request $64.5M

- Separation Mgmt – En Route Automation Modernization (ERAM) D-Position Upgrade and System Enhancements, G01A.01-04

Program Description

The baseline ERAM program (A01.10-01) 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 that expands the Host's capability so the new system can handle additional airspace capacity, and improve efficiency and safety. From a functionality standpoint, Release 1 contains the capabilities and performance required for acceptable operational suitability and effectiveness. ERAM Release 2 was a planned maintenance software release containing backlog problem trouble report (PR) fixes. Release 3 will incorporate NextGen transformational program infrastructure into ERAM including interfaces with Automatic Dependent Surveillance – Broadcast (ADS-B) and Segment 1 of the System Wide Information Management (SWIM) that are consistent with ERAM architecture.

Releases 1-3 were programmed to be complete in FY 2011. During operational testing, some necessary corrective actions were identified delaying the implementation of ERAM through FY 2013 and requiring additional funding in FY 2012 – FY 2013. As many of the required fixes were already developed in Release 2, the program has stepped up to use Release 2 for the waterfall deployment of ERAM. The Salt Lake City (ZLC) key site has been successfully operating on ERAM Release 2 in a continuous Operational Suitability Demonstration (OSD) phase since October 19, 2010. Independent Operational Assessment has been conducted at both the ZLC and Seattle (ZSE) key sites with an In Service Decision expected by March 2011. FY 2012 funding will complete software updates required for deployment to 6 sites with additional funding required to complete the waterfall deployment to the remaining 7 sites in FY 2013.

The current schedule calls for deployment to 7 sites in FY 2011, 6 sites in FY 2012 and 7 sites in FY 2013.

The ERAM D-Position Upgrade and System Enhancements effort will increase efficiency and add capacity benefits over those established by the baseline ERAM program. It will also build the foundation for incorporating NextGen technologies that mature during the ERAM D-Position Upgrade and System Enhancements timeframe.

The ERAM D-Position Upgrade and System Enhancements activities will begin in FY 2011 with the following overall multi-year objective for the priority enhancement: Hardware replacement and associated software to increase display size and increase processing capacity of the controller Data-Position. This performance enhancement is necessary because the hardware will reach utilization thresholds due to the cumulative effects of adding ERAM System Enhancements, DataComm, ADS-B requirements as well as other NextGen capabilities.

Other programs will fund ERAM capabilities for implementation during the ERAM D-Position Upgrade and System Enhancements development timeline. Costs for those efforts are not included in this program, although the planning for each of the ERAM D-Position Upgrade and System Enhancements software releases allows for software development allocation to accommodate externally funded requirements. This program does not duplicate any efforts budgeted and documented in other programs' CIPs.

The ERAM D-Position Upgrade and System Enhancements effort will begin in 2011 with the drafting of investment analysis activities and documentation along with initial contract development and negotiations with the prime contractor. Prime contractor system engineering, software development, and implementation activity begins in 2012 and completes in 2017. Hardware upgrades start in 2014 with deployment to En Route labs.

The benefits of the ERAM D-Position Upgrade and System Enhancements effort will be justified via a business case analysis. This activity is expected to be complete by second quarter, 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

The ERAM effort will enable NextGen capabilities to be implemented allowing the increased efficiency and capacity benefits projected for this system enhancement.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- None.

Mandatory
- Begin software system engineering and design for the ERAM AIX operating system technical refresh.
- Begin software system engineering and design and development for ERAM Release 5, which covers the initial D-Position enhancements.
- Start the hardware engineering for D-Position display and processor and R-Position processor upgrades.

Program Plans FY 2013 – Performance Output Goals
- Continue software design and start software development for the D-Position Upgrade and integration of externally funded capabilities.
- Continue hardware engineering for the D-Position display and processor and R-Position processor upgrades.

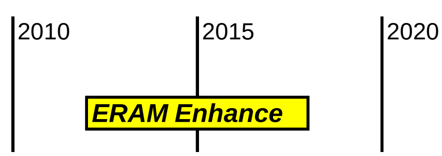
Program Plans FY 2014 – Performance Output Goals
- Continue the D-Position Software development.
- Test and Implementation of ERAM Technical Refresh Operating System Upgrades.
- Procure and install hardware for the D-Position display and processor and R-Position processor upgrades in En Route labs.

Program Plans FY 2015 – Performance Output Goals
- Complete integration and test of the ERAM D-Position Upgrades.
- Procure and start deployment of D-Position and R-Position hardware upgrades.
- Start software development of ERAM Release 6 System Enhancements.

Program Plans FY 2016 – Performance Output Goals
- Continue Deployment of the D-Position and R-Position hardware upgrades.
- Continue with Software Development of ERAM Release 6.

System Implementation Schedule

ERAM D-Position Upgrade and System Enhancements
Start Activities 2012 -- Complete Activities 2017



2A03, EN ROUTE COMMUNICATIONS GATEWAY (ECG)

FY 2012 Discretionary $2.0M
FY 2012 Mandatory $4.0M
FY 2012 Total 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) Systems 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 Wide Area Multilateration (WAM). ECG introduces new interface standards and data formats which are required for compatibility with International Civil Aviation Organization (ICAO) standards. ECG also increases capacity to process data to accommodate inputs 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) details the strategy that is used 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.

The following components will be evaluated for technical refresh as they will have reached EOL and EOS status; Modem Splitter Cards, 500W Low Power Distribution Unit (PDU), 500W regular PDU, Operational Router, Operational Local Area Network (LAN) Switch and the ECG/ERAM Router Firewall (RFW).

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 – 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 this system 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 2012 – Performance Output Goals

- Complete engineering analysis for the 500W Power Distribution Units (PDU) and Modem Splitter Cards.
- Complete procurement for the Interface Processor, Magma Chassis, Work Stations, Monitors, and Digital Versatile Disk (DVD-Read/Write (RW)).
- Start deployment of the Operational Local Area Network (LAN) Switch (OLS).
- Deploy software changes in support of ERAM and other emerging programs at all ARTCC's.

Program Plans FY 2013 – Performance Output Goals

- Complete engineering analysis for the ECG/ERAM Router Firewall.
- Complete procurement for the 500W PDUs and Modem Splitter Cards.
- Start the deployment for the Interface Processor, Magma Chassis, Printer, Work Station, Monitor, and DVD-R/W to the ARTCC's.
- Complete the deployment of the OLS at all ARTCC's.
- Deploy software changes in support of ERAM and other emerging programs at all ARTCC's.

Program Plans FY 2014 – Performance Output Goals

- Complete engineering analysis for the ECG Random Access Planned Position Indicator (RAPPI).
- Start procurement for the ECG RFW.
- Complete the deployment of the Interface Processor, Magma Chassis, Printer, Work Station, Monitor, and DVD-RW at all ARTCC's.
- Deploy software changes in support of ERAM and other emerging programs at all ARTCC's.

Program Plans FY 2015 – Performance Output Goals

- Complete procurement for the ECG RFW and ECG RAPPI.
- Complete deployment for the ECG RFW and ECG RAPPI at all ARTCC's.
- Deploy software changes in support of ERAM and other emerging programs at all ARTCC's.
- Identify opportunities for purposeful evolution.

Program Plans FY 2016 – Performance Output Goals

- Identify opportunities for purposeful evolution.

2A04, NEXT GENERATION WEATHER RADAR (NEXRAD)

FY 2012 Request $2.8M

- 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 downstream 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. The FAA will continue providing support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). 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 FAA is acquiring dual polarization technology for their NEXRAD platforms, and 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 Technical Refresh Program (CIP Project W02.02-02) has three main purposes:

1. The FAA will continue providing support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). Each year, the FAA is required to pay its pro-rata share of NEXRAD Product Improvement (NPI) Science Evolution costs.
2. Under the terms of the Tri-Agency MOA, the FAA is required to fund its pro rata share for the installation of hardware and software technical refresh updates on the twelve (12) FAA-owned NEXRADs. In particular, the Radar Product Generator (RPG) and Radar Data Acquisition (RDA) computers and peripherals will reach end of life beginning in 2014, and will require a technical refresh.
3. 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 greatest challenge will be to develop one or more operationally suitable displays that may be used by pilots, controllers, Flight Service specialists, and/or dispatchers for use as a decision making tool for avoiding and/or mitigating airborne threats due to the presence of airborne icing and hail.

A large-scale NEXRAD Tech Refresh Program 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 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 3 – 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 2012 – Performance Output Goals
<u>NLIHA Program</u>

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (1 yr).
- Complete refinement of In-flight Icing and Hail Detection algorithms.
- Implement Dual Polarization hardware and software modifications onto 12 FAA NEXRAD Platforms.
- Present NEXRAD Tech Refresh business case to JRC/EC that extends the NEXRAD program through FY2018.

Program Plans FY 2013 – Performance Output Goals
<u>NLIHA Program</u>

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (1 yr).
- Implement FAA-developed Icing and Hail detection algorithms onto all NEXRAD platforms.
- Demonstrate a proof of concept display of icing artifacts that will one day be used by pilots, controllers, Flight Service Specialists and/or ground dispatchers in an operational environment.

Program Plans FY 2014 – Performance Output Goals

- **<u>NEXRAD Technical Refresh Program</u>**
- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (1 yr).
- Support roll-out of operationally suitable in-flight icing dissemination capabilities onto existing FAA display platforms.
- Implement NEXRAD Tech Refresh in accordance with the NEXRAD Radar Operations Center (ROC) 8-Year Mod Plan.
- Support ***development*** of operationally suitable in-flight icing dissemination capabilities onto existing FAA display platforms

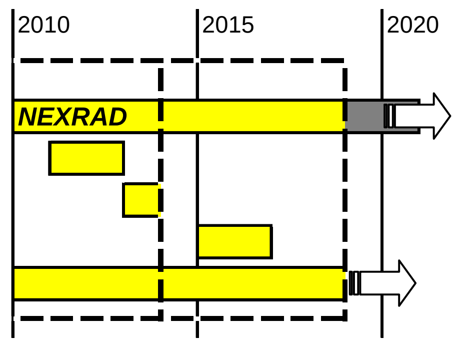
Program Plans FY 2015-2018 – Performance Output Goals
<u>NEXRAD Technical Refresh Program</u>

- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (yearly).
- Implement NEXRAD Tech Refresh in accordance with the NEXRAD Radar Operations Center (ROC) 8-Year Mod Plan.
- Support ***roll-out*** of operationally suitable in-flight icing dissemination capabilities onto existing FAA display platforms.

System implementation schedule

Next Generation Weather Radar (NEXRAD)

Dual Pol Upgrade : 2011--2012
Legacy, Icing & Hail Algorithms (NLIHA) : 2013
In-Flight Icing Dissmination: 2015--2016
Tech Refresh/NPI Science Evolution : 2010--2018



2A05, AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER (ATCSCC) RELOCATION

FY 2012 Request $3.6M

- ATCSCC – Relocation, F28.01-01

Program Description

The Air Traffic Control System Command Center (ATCSCC) Relocation program has built anew facility adjacent to the Potomac TRACON to relocate the Command Center from its present location in Herndon, VA. For the past sixteen years the Command Center has been housed in commercial space with a current lease cost in excess of four million dollars annually. This long-term lease will expire in May 2011. The FAA has established a permanent location for this critical NAS function that will meet and stay ahead of evolving FAA security standards. The new facility will not have the physical constraints in the existing leased ATCSCC facility operations room that inhibit reconfiguration and expansion of new Traffic Flow Management (TFM) equipment deployments. In the existing facility, 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 finished on schedule. The building's infrastructure construction was completed in July 2010. The Partial Building Occupancy Date was met on May 3, 2010. Full Building Occupancy Date was met on July 2, 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

This project collocates the ATCSCC with another FAA facility, offering lower life cycle costs. Collocation will eliminate the need for continuing the current lease, and it eliminates the need for land acquisition, reduces the amount of site preparation, and significantly reduces the need for additional backup power, cable and utility systems. The FAA estimates cost avoidance of $121.3 million for the period, fiscal year 2011 through 2031.

Program Plans FY 2012 – Performance Output Goals

- Complete Moving & Disposal Costs by March 31, 2012.
- Finalize all Misc Service Contracts by Sept 30, 2012.
- Finalize recurring FTI and Admin Circuit costs by Sept 30, 2012.

Program Plans FY 2013-2016 – Performance Output Goals

- None (FY 2012 is the programs last year of funding and milestones).

2A06, ARTCC BUILDING IMPROVEMENTS/PLANT IMPROVEMENTS
FY 2012 Discretionary $46.0M
FY 2012 Mandatory $6.0M
FY 2012 Total Request $52.0M

- 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 by providing life cycle management of the physical plant infrastructure at the 21 ARTCCs and two Center Radar Approach Control (CERAP) facilities. These structures were built in the 1960's and expanded several times since then. There is currently a $90 million backlog of equipment past its lifecycle nationally within these facilities. This backlog increases risks to operations and is a financial liability. (Industry studies have shown that for every $1 in backlog, building owners incur $4 in potential capital liabilities.) This program modernizes and sustains these buildings to meet air traffic service requirements and to reduce the backlog. Each year, several major renovation projects and numerous smaller sustain projects are funded. Through this, operations and capital liability risks are also reduced.

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 – 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 air traffic control equipment are sustained and modernized to meet operational requirements.

Program Plans FY 2012 – Performance Output Goals
Discretionary

- Fund Automation Wing Rehabilitation Build out Phase II project at Albuquerque.
- Fund Control Wing Basement/Major Mechanical at the Memphis, New York and Fort Worth, and Chicago ARTCCs.
- Fund Control Systems project at the Fort Worth, New York, Jacksonville, Miami, and San Juan ARTCCs.
- Provide $500,000 per ARTCC for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

Mandatory

- Fund Mission Critical and Local Sustain projects at all ARTCC's.

Program Plans FY 2013 – Performance Output Goals

- Fund Control Wing Basement/Major Mechanical projects at the Chicago, Houston, Boston, Fort Worth, and Albuquerque ARTCCs.
- Fund Control System projects at the Chicago, Houston, and Albuquerque ARTCCs.
- Provide $500,000 per year per ARTCC for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

Program Plans FY 2014 – Performance Output Goals

- Fund Control Wing Basement/Major Mechanical projects at the Oakland, Boston, and Albuquerque ARTCCs.
- Fund Control System projects at the Chicago, Memphis, and Fort Worth ARTCCs.
- Fund Administration Wing project at Anchorage.
- Fund Auto Wing Rehab Phase II at Albuquerque.
- Provide $500,000 per ARTCC for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

Program Plans FY 2015 – Performance Output Goals

- Fund Control Wing Basement/Major Mechanical projects at the Cleveland, Indianapolis, Washington, and Los Angeles ARTCCs.
- Fund Control System projects at the Cleveland, Indianapolis, Washington, and Los Angeles ARTCCs.
- Provide $500,000 per ARTCC for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

Program Plans FY 2016 – Performance Output Goals

- Fund Control Wing Basement/Major Mechanical projects at the Atlanta, Salt Lake, Seattle, and Washington ARTCCs.
- Fund Control System projects at the Atlanta, Salt Lake, Seattle, and Washington ARTCCs.
- Provide $500,000 per ARTCC for mission critical failure mode mitigation and miscellaneous sustainment needs.
- Conduct facility condition assessments to update the national Facility Condition Assessment database.

2A07, AIR TRAFFIC MANAGEMENT (ATM)
FY 2012 Request $7.5M

- TFM Infrastructure – Tech Refresh, A05.01-12
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1, A05.01-10

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. 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 system compares the projected traffic with the capacity of destination airports to determine if steps need to be taken to manage the flow and prevent delays. 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 benefit all segments of aviation including airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, and partner countries.

The TFM Modernization (TFM-M) project upgrades 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 CATMT work packages are developing more sophisticated software to refine our management of airspace and better collaborate with users.

CATMT work packages 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) 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).

ATM TFM Infrastructure Tech Refresh will:

- Provide a Technology Refresh of the hardware used for the TFM Processing Center (TPC) at the William J. Hughes Technical Center. This hardware provides the central data processing capability for the TFM system.

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 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.

Program Plans FY 2012 – Performance Output Goals
- Continue TFM System Processing Center Technology Refresh.
- Perform close out activities associated with the final deployment of CATMT WP 1 capabilities.

Program Plans FY 2013 – Performance Output Goals
- Continue TFM System Processing Center Technology Refresh.

Program Plans FY 2014 – Performance Output Goals
- Continue TFM System Processing Center Technology Refresh.
- Begin TFM System remote site technology refresh activities.

Program Plans FY 2015 – Performance Output Goals
- Complete TFM System Processing Center Technology Refresh.
- Continue TFM System remote site technology refresh activities.

Program Plans FY 2016 – Performance Output Goals
- Continue TFM System remote site technology refresh activities.

System Implementation Schedule

Traffic Flow Management (TFM) - Infrastructure Modernization (TFM-M)

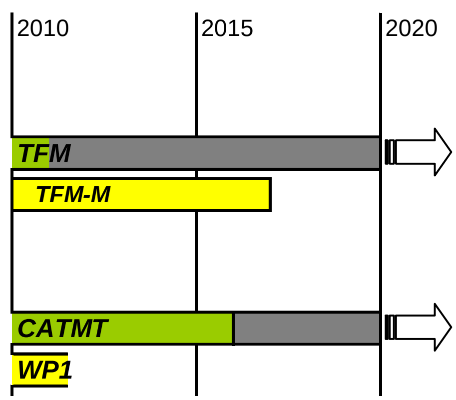
First Operational Capability (OC): 2005 -- Last OC: Sept 2010

First site Deploy: 2006 -- Last site Deploy: 2016

Collaborative Air Traffic Management Technologies (CATMT) – Work Package 1

First OC: June 2008 -- Last OC: WP# 2015

WP1 First Software Enhancement: 2006 -- Last: 2011



2A08, AIR/GROUND COMMUNICATIONS INFRASTRUCTURE
FY 2012 Request $4.8M

- 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 3 – 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, the CFE and RCE projects improve and provide upgrades needed at A/G Communication sites and facilities to sustain reliable operation.

Program Plans FY 2012 – Performance Output Goals

- CFE Enhancements initiated at 3 of 6 locations.
- CFE Enhancements continued at all previously initiated locations.
- Service Available (Establish/Replace/Upgrade) for three (3) CFE sites.
- Develop "Open Standards for Voice over Internet Protocol (VOIP) Test Plan for RCE Test Bed.
- Install RCE units for sustainment as required.

Program Plans FY 2013-2016 – Performance Output Goals

- Service Available (Establish/Replace/Upgrade) for four (4) CFE sites.
- Install RCE units for sustainment as required.

2A09, AIR TRAFFIC CONTROL EN ROUTE RADAR FACILITIES IMPROVEMENTS
FY 2012 Request $5.8M

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

Program Description

The Long Range Radar (LRR) Infrastructure Upgrades/Sustain Program modernizes 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 improvements also support the installation and lifecycle modernization 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 renovation and upgrades. Some En Route secondary radar service outages were due to leaking roofs and antiquated air conditioning systems. These outages will result in airline late arrivals and take off delays which could cost millions of dollars per occurrence.

LRR Infrastructure Upgrades consist of two phases:

Phase I – Upgrades to Facility Infrastructure. Projects include replacement of heating, ventilation, and air-conditioning (HVAC), engine generators, uninterruptible power supply, lightning protection, grounding, bonding, and shielding systems (LPGBS), and structural upgrades to support Air Traffic Control Beacon Interrogator model 6 (ATCBI-6) deployments.

Phase II – Renovation of the Facility Infrastructure. In this phase, critical infrastructure systems for both En Route secondary beacon and primary radar includes:

- Major repair and replacement of access roads, grounds, storm water controls, security lightings and walkways.
- Refurbishment of HVAC, cooling fans, duct works, elevators, wiring and lighting systems.
- Repair or replacement of building and antenna tower roofs, structural components such as foundations, beams, columns, bracings, struts, platforms, walls and concrete slabs.

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 – 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 2012 – Performance Output Goals

- Upgrade LPGBS in accordance with FAA-STD-19E at ten (10) sites.
- Replace/Repair existing HVAC systems at three (3) sites.
- Upgrade existing Uninterruptible Power Sources (UPS) at three (3) sites.
- Prioritize infrastructure sustainment using the LRR project priority system.
- Mitigate assessment deficiencies found at Air Route Surveillance Radar (ARSR) Model 3 and 4 sites.

Program Plans FY 2013 – Performance Output Goals

- Upgrade LPGBS in accordance with FAA-STD-19E at ARSR sites.
- Perform Site Condition Assessments on ARSR 1s and 2s and Fixed Position Surveillance (FPS) sites.
- Replace/Repair existing HVAC systems.
- Upgrade UPSs.
- Prioritize and continue to manage upgrades identified by the condition assessments.

Program Plans FY 2014 – Performance Output Goals

- Upgrade LPGBS in accordance with FAA-STD-19E at ARSR sites.
- Perform Site Condition Assessments on ARSR 1s and 2s and Fixed Position Surveillance (FPS) sites.
- Replace/Repair existing HVAC systems.
- Upgrade UPSs.
- Prioritize and continue to manage upgrades identified by the condition assessments.

Program Plans FY 2015 – Performance Output Goals
- Upgrade LPGBS in accordance with FAA-STD-19E at ARSR sites.
- Perform Site Condition Assessments on ARSR 1s and 2s and Fixed Position Surveillance (FPS) sites.
- Replace/Repair existing HVAC systems.
- Upgrade UPSs.
- Prioritize and continue to manage upgrades identified by the condition assessments.

Program Plans FY 2016 – Performance Output Goals
- Perform Site Condition Assessments on ARSR 1s and 2s and Fixed Position Surveillance (FPS) sites.
- Replace/Repair existing HVAC systems and UPSs.
- Prioritize and continue to manage upgrades identified by the condition assessments.

2A10, VOICE SWITCHING AND CONTROL SYSTEM (VSCS)
FY 2012 Request $1.0M

- Voice Switching and Control System (VSCS) – Tech Refresh – Phase 3, C01.02-04

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 air traffic control centers (ARTCCs). The real time Field Maintenance/Testing System at the FAA William J. Hughes Technical Center (WJHTC) and the Training System at the FAA Academy will also be upgraded to perform the same as an operational site. These upgrades will ensure that the air-to-ground and ground-to-ground communications capabilities are reliable and available for separating aircraft, coordinating flight plans, and transferring information between air traffic control facilities in the en route environment. To date, this program has replaced all VSCS internal control systems. Equipment has been procured to replace the VSCS Traffic Simulation Unit at the FAA WJHTC. This test bed is being used to test the capabilities of the upgraded systems to determine if they meet the formal baseline requirements established for VSCS performance. Additional upgrades will be completed to ensure that the VSCS continues to provide reliable voice communications, which can support future en route operations.

VSCS Tech Refresh Phases 1 and 2 included funding for Work Station Upgrades, VSCS Display Module Replacement (VDMR), VSCS Integrated Test Suite (VITS) Replacement, Maintenance Test Replacements (MTSR-F) as well as some PLM to C++ software code conversion. Tech Refresh Phase 3 will be dependent upon Investment Analysis which will include examining additional PLM to C++ software code conversion efforts.

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 – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2014.*

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 2012 – Performance Output Goals

- Complete Investment Analysis for VSCS Tech Refresh Phase 3.

Program Plans FY 2013-2016 – Performance Output Goals

- To be determined after VSCS Tech Refresh Phase 3 Investment Analysis.

2A11, OCEANIC AUTOMATION SYSTEM

FY 2012 Discretionary $6.0M
FY 2012 Mandatory $2.0M
FY 2012 Total Request $8.0M

- 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 technology refresh for the automation system was completed for all three operational sites and the system installed at the William J, Hughes Technical Center (WJHTC). This technology refresh activity increased system performance, capacity, and usability, and will make improvements to software functionality. The ATOP program will continue to deliver Preplanned Product Improvements (P3I) through FY 2016 for evolutionary improvements to the Ocean21 system. The planned software and hardware modifications will provide system safety and efficiency improvements for the controller workforce, address needed functionality changes to support airspace expansion initiatives, address Agency-required system infrastructure changes (e.g., X.25 to IP interface upgrades), 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 88.0 percent at the 35 OEP airports 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 (RNP-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 2012 – Performance Output Goals

Discretionary

- Provide delivery of Preplanned Product Improvements in operational releases to all three Oceanic sites in December 2011, April 2012, and August 2012.
- Support Deployment of Radar for New York (ZNY) procedural sectors in February 2012.
- Complete Anchorage (ZAN) 60s airspace re-allocation project in August 2012.

Mandatory

- Provide required program and engineering support.

Program Plans FY 2013 – Performance Output Goals

- Complete the ATOP Development and Support procurement in July 2013.
- Transition to ICAO 2012 flight plan processing in November 2012.
- Provide delivery of Preplanned Product Improvements in operational releases to all three Oceanic sites in December 2012, April 2013, and August 2013.
- Provide required program and engineering support.

Program Plans FY 2014 – Performance Output Goals

- Provide delivery of Preplanned Product Improvements in operational releases to all three Oceanic sites in December 2013, April 2014, and August 2014.
- Provide required program and engineering support.

Program Plans FY 2015-2016 – Performance Output Goals

- None.

System Implementation Schedule

Advanced Technologies and Oceanic Procedures (ATOP)

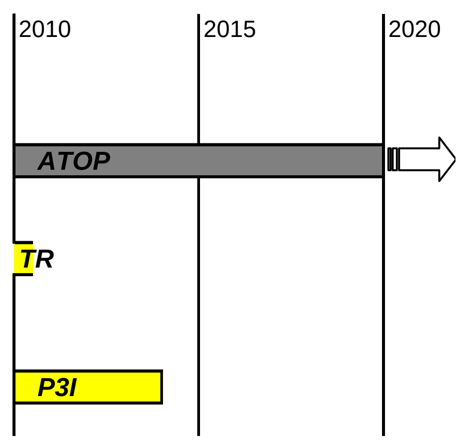
First site IOC: June 2004 -- Last site IOC: March 2006

ATOP Tech Refresh (TR)

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

ATOP P3I

First Release: February 2006
Last Release: 2014



2A12 Next Generation VHF Air-to-Ground Communications System (NEXCOM)
FY 2012 Request $45.2M

- 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
- Communications Facilities Enhancement – Ultra High Frequency Radio Replacement, C06.04-00

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 increasing the number of available frequencies that are needed to ensure that the air traffic system's capability grows 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 now has the Authorization to Proceed as of December's JRC meeting. Air To Ground Communications will be preparing for an August 2011 Final investment decision.

Segment 1a will replace all en route radios with Multimode Digital Radios (MDRs) by the end of FY 2013. The first installation was in 2003. 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 2024. The NEXCOM procurement for Segment 2 will have a combined contract to deliver Very High Frequency (VHF) radios for civil aviation and Ultra high 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 8.33 kHz voice-only mode divides the current bandwidth for one channel into three channels and this increase in the number of channels 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 3 – 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 2012 – Performance Output Goals
- Segment 1a: Deploy 1900 new En Route Air Traffic Control Radios.
- Segment 2: Deploy 540 new Terminal Air Traffic Control Radios.

Program Plans FY 2013 – Performance Output Goals
- Segment 1a: Deploy 850 new En Route Air Traffic Control Radios.
- Segment 2: Deploy 1080 new Terminal Air Traffic Control Radios.

Program Plans FY 2014 – Performance Output Goals

- Segment 2: Deploy 2000 new Terminal Air Traffic Control Radios.

Program Plans FY 2015 – Performance Output Goals

- Segment 2: Deploy 2133 new Terminal Air Traffic Control Radios.

Program Plans FY 2016 – Performance Output Goals

- Segment 2: Deploy 2077 new Terminal Air Traffic Control Radios.

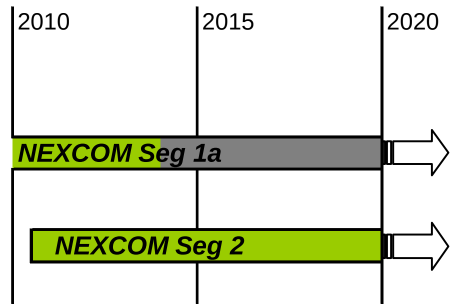
System Implementation Schedule

Next-Generation VHF A/G Communications System (NEXCOM) – Segment 1a & 2

First site IOC: July 2003 -- Last site IOC: September 2013

First Site Decom: July 2023 -- Last Site Decom: September 2033

First site IOC: September 2010 -- Last site IOC: August 2023



2A13, SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM)

FY 2012 Request $66.4M

- System Wide Information Management (SWIM) – Segment 1, G05C.01-01
- System Wide Information Management (SWIM) – Segment 2, G05C.01-04

Program Description

The System Wide Information Management (SWIM) Program is an information management and data sharing system for NextGen. SWIM will provide standards/guidance to publish data, retrieve it, secure its integrity, and control its access and use to NAS programs that provide 9the capabilities of SWIM 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. Activities for FY 2012 include completing the Pilot Report (PIREP) Data Publication capability, continuing development for the Terminal Data Distribution capability and for the Traffic Flow Management Flow Information Publication capability in release 7 of TFMS.

SWIM is being developed incrementally. Future segments will include additional capabilities that move the FAA toward the data sharing required for NextGen.

SWIM has adopted a two-phase JRC approach for Segment 2. In November 2010, the JRC approved a Segment 2 Authorization to Proceed which resulted in:

- Approval of FY 2011-2012 planning funds; holding acquisition funds for FY 2012-2013,
- Approval of NAS and enterprise Service Oriented Architecture (SOA) governance roles and responsibilities, and
- Approval for SWIM to provide enterprise SOA infrastructure so programs do not need to replicate or procure individually.

Given the Segment 2 budgets in FY 2013 & 2014, the SWIM program is redirecting its efforts. The primary focus is to ensure availability of the first 2 critical capabilities required to meet SWIM Implementing programs' (SIPs) schedules. The effort to acquire a Segment 2 integration contractor is on hold. SWIM Segment 2 will focus on two capabilities: enterprise messaging services and interface management. SWIM plans to leverage the existing ATC Communications FTI contract or other commercially available products to provide the Segment 2 enterprise messaging service in order to meet critical NextGen Network Enabled Weather (NNEW) and Aeronautical Information Management (AIM) modernization requirements.

Activities will include further requirements and architecture analyses, and prototyping critical/near-term capabilities. Specific activities are to:

- Assist in creation of the NAS Enterprise Architecture roadmap for 2012;
- Define the strategy to address synchronization issues with regard to SWIM SOA implementation and other programs' timing of core services implementation;
- Develop risk management for implementation of NAS SOA services;
- Provide periodic updates on system engineering and governance deliverables; and
- Analyze additional capabilities available under the FTI contract including Domain Name Service (DNS) and Network Time Protocol (NTP).

SWIM will return to the JRC in FY 2012 with the details of the program redirection and cost estimates based on the new Segment 2 approach. In Segment 2, SOA Core Services will be developed, deployed and maintained by SWIM with assets under the control of the SWIM Program. These SOA Core Services will be limited in FY 2013 & 2014.

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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

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.

Program Plans FY 2012 – Performance Output Goals

- Pilot Report (PIREP) Data Publication Operational (Weather Message Switching Center Replacement (WMSCR)).
- AIM, CIWS and ITWS data publication operational.
- ERAM release 3 data publication operational.
- TFM release 5 data publication operational.

Program Plans FY 2013 – Performance Output Goals

- Terminal Data Distribution Operational.
- Flow Information Publication Operational.

Program Plans FY 2014 – Performance Output Goals

- Flight Data Publication – Host ATM Data Distribution System/ Flight Data Input / Output (HADDS/FDIO) Operational (ERAM).
- Runway Visual Range (RVR) Publication Service Operational (TFM).

Program Plans FY 2015 – Performance Output Goals
- Flight Data Publication – Enterprise Services Operational (ERAM).

Program Plans FY 2016 – Performance Output Goals
- Complete SWIM Segment 1 development.
- Begin planning for tech refresh - Tech refresh implementation will be handled by individual programs.

2A14, AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) – NATIONAL AIRSPACE SYSTEM (NAS) WIDE IMPLEMENTATION

FY 2012 Request $285.1M

- Automatic Dependent Surveillance Broadcast (ADS-B) NAS-Wide Implementation – Segments 1 and 2, G02S.01-01
- X, Automatic Dependent Surveillance Broadcast (ADS-B) – Future Segment, G02S.01-02

Program Description

The Surveillance and Broadcast Services (SBS) program office is implementing Automated Dependant Surveillance – Broadcast (ADS-B), Automated Dependant Surveillance – Rebroadcast (ADS-R), 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, using information 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 to allow controllers and pilots to locate and identify them when they are on runways or taxiways.

Below are additional services provided as part of the ADS-B system implementation:
ADS-R: Two communication link protocols have been approved for ADS-B use; Universal Access Transceiver (UAT), used mostly by general aviation aircraft, and 1090 extended squitter (ES), which broadcasts but does not receive signals, normally used in commercial transport aircraft. The ADS-R service provides a rebroadcast of the ADS-B received information in the other frequency band. This ensures that any particular ADS-B broadcast is available on both the UAT and ES protocols for aviation use.

TIS-B: Traffic Information Services provide ADS-B equipped aircraft with a more complete “picture” including aircraft which are not equipped with ADS-B. TIS-B comprises surveillance information provided by one or more surveillance sources, such as secondary or primary surveillance radar. The surveillance information is processed and converted for use by ADS-B equipped 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, completed on November 25, 2008, provided the authority to proceed with NAS-Wide deployment of Essential Services TIS-B/FIS-B. The second, on September 26, 2010, provided 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. FY 2012 will continue NAS-Wide deployment of ADS-B with subscription services operational for surveillance and air traffic services at ERAM, CARTS, STARS & ASDE-X. Additionally further development of ATC Spacing Services i.e.; Ground Based Interval Management-Spacing (GIM-S) (En Route only) and future applications i.e.; Flight Deck Based Mgmt-Spacing (FIM-S), In-Trail Procedure (ITP), and Traffic Situational Awareness with Alerts (TSAA) is planned.

The ADS-B NAS-Wide Implementation: Future Segment covers performance based 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 88.0 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 based on more accurate aircraft position information that will allow better use of existing airspace. This should result in an increase in capacity and will result in fewer delays and more optimal routing for aircraft.

Program Plans FY 2012 – Performance Output Goals

- Complete In-Trail Procedures (ITP) Operational Evaluation.
  - This application provides operational benefits in non-surveillance airspace by enabling "in-trail" climbs/descents at reduced separation distances.
- Implementation of 93 Service Volumes out of 306 (77 completed between 2008 and 2011).

Program Plans FY 2013 – Performance Output Goals

- Implementation of 136Remaining Service Volumes out of 306 completing NAS-Wide Implementation.
- FIM-S/DS Minimum Operational Performance Specifications (MOPS) Development
  - This application creates an operational environment that maximizes airspace throughput while enabling aircraft to minimize fuel burn and environmental impacts.
- Traffic Situation Awareness with Alerts (TSSA) MOPS Approval.
  - This application provides operational benefits in increased safety by providing alert information to pilots for conflicting traffic.

Program Plans FY 2014 – Performance Output Goals

- Ground-Based Interval Management Initial Operating Capability – September 2014.
  - This application provides operational benefits through precise management of intervals between aircraft arrival trajectories, resulting in fuel savings and efficiency.

Program Plans FY 2015 – Performance Output Goals

- Although this segment has not yet been baselined it is anticipated that in addition to performance based subscription charges the program's funding will be used for future application development and surveillance expansion. ATC separation/advisory services & Pilot advisory services Initial Operating Capabilities (IOC)s are planned. GIM-S and FIM-S would be NAS enabled.

Program Plans FY 2016 – Performance Output Goals

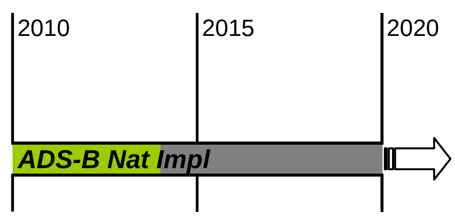
- Although this segment has not yet been baselined it is anticipated that in addition to performance based subscription charges the program's funding will be used for future application development and surveillance expansion.

System Implementation Schedule

Automatic Dependent Surveillance-Broadcast (ADS-B) National Airspace System (NAS) Wide Implementation

First site IOC: August 28, 2008 -- Last site IOC: 2013

Expected operational life: 21 years



2A15, Windshear Detection Services

FY 2012 Request $1.0M

- Windshear Detection Services, W05.03-01

Program Description

Wind Shear Detection Services (WSDS) program uses a portfolio approach. WSDS includes a family of wind shear technologies currently present within the NAS; 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 the WSDS program is to maintain and improve existing windshear detection performance levels by modernizing, rightsizing and incorporating net-centric technology in existing systems.

WSDS contains two Work Packages (WPs). WP1 will examine the feasibility of several Technology Refresh (Tech Refresh), and Service Life Extension Programs (SLEP) approaches to address existing LLWAS, TDWR and WSP supportability and obsolescence issues,. WP2 will analyze other technologies such as LIDAR, to determine if they can replace or supplement existing systems in detecting wind shear. WP2 will also examine whether nearby airports that don't have these systems could benefit from wind shear technology offered by WSP, TDWR, and NEXRAD. It will address the numbers and types of systems needed to serve new runways that qualify for windshear detection service; determine NextGen wind shear detection requirements, to support Trajectory Based Operations and other solution sets.

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. WP1 will allow for the continuation of wind shear alerts and warnings currently generated by LLWAS, TDWR, and WSP increasing controller, and Pilot awareness. New Technology such as LIDAR, and modified NEXRAD contained within WP2, will enhance this awareness, and optimize, and modernize wind shear detection service across the entire NAS. WP1 and WP2 initiatives contribute to the goal of increasing safety by reducing the number of aircraft accidents and fatalities caused by wind shear.

Program Plans FY 2012 – Performance Output Goals

- Continue development of the WSDS business case through Final Investment Decision (FID) scheduled for the 2Q of CY 2014.

Program Plans FY 2013-2016 – Performance Output Goals

- TBD – Pending JRC approval.

2A16, WEATHER AND RADAR PROCESSOR (WARP)

FY 2012 Request $2.5M

- 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 with or without onboard radar avoid accidents in convective weather;

- Decreased need for deviations from planned flight paths because more precise information about severe weather is available; 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. A WARP Maintenance and Sustainment Services (WMSS) Contract was awarded in April 2005 and a subsequent WMSS Contract was awarded in June 2010. 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 by the NextGen Weather Processor (NWP). 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 transitioning from the National Airspace Data Interchange Network (NADIN) 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 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 3 – 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 2012 – Performance Output Goals

- Complete removal of Commercial Weather Service, replaced by government sources--FAA and NWS.
- Conduct Site Acceptance Test (SAT) of the WARP "Sustain Configuration" -- Segment 1.
- Complete the development of the selectable layer for improved stratification of weather information activities.
- Complete the development of the data format adaptation activities.
- Complete NADIN II interface(s) transition from NADIN II to FTI.

Program Plans FY 2013-2015 – Performance Output Goals

- Continue sustainment of WARP.

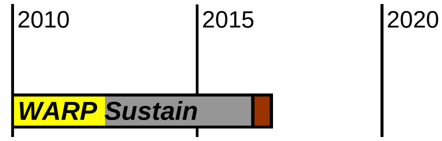
Program Plans FY 2016 – Performance Output Goals

- WARP subsystems not subsumed by the NextGen Weather Processor will begin decommissioning.

System Implementation Schedule

WARP Sustain

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



2A17, COLLABORATIVE AIR TRAFFIC MANAGEMENT TECHNOLOGIES (CATMT)

FY 2012 Request $41.5M

- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G05A.05-01
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G05A.05-02

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.

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 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 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. NextGen CATMT will add 6 new capabilities to the TFMS. These 6 are Weather Integration (Wx Int), Arrival Uncertainty Management (AUM), Collaborative Airspace Constraint Resolution (CACR), Airborne ReRoute (ABRR), Collaborative Information Exchange (CIX), and TFM Remote Site - ReEngineeting (TRS-R).

Program Plans FY 2012 – Performance Output Goals

- Deploy initial Route Availability Planning Tool (RAPT) on the TFM System (The RAPT tool helps to identify possible routes for departure during periods of severe weather), part of the weather integration.
- Deploy CIWS Weather on the Future Traffic Display (TFD) (Weather Integration).
- Deploy TRS-R Phase 1 (TFM Remote Site – ReEngineeting) which will reduce the current 3 software code baselines to a single code baseline at the remote sites.
- Deploy Initial CIX capability.
- Deploy initial Segments of CACR into TFMS.

Program Plans FY 2013 – Performance Output Goals

- Complete CACR deployment.
- Initiate TRS-R Phase 2 use the Release 3 hubsite software architecture to rewrite the FAA remote sites.
- Continue CIX phased deployment.
- Deploy RAPT to New York.

Program Plans FY 2014 – Performance Output Goals

- Deploy ABRR.
- Complete CIX deployment.

Program Plans FY 2015 – Performance Output Goals

- Complete TRS-R – complete the updates/enhancements of the remote site operating software.

Program Plans FY 2016 – Performance Output Goals

- None planned as of 8/30/2010, CATMT WP 4 not yet defined.

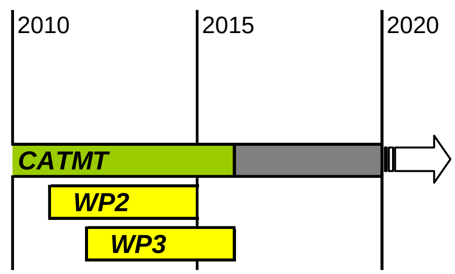
System Implementation Schedule

Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2 and 3

First Operational Capability (OC): June 2008 -- Last OC: 2015

WP2 First Software Enhancement: 2011 -- Last: 2014

WP3 First Sofware Enhancement: 2012 -- Last: 2015



2A18, COLORADO ADS-B WAM COST SHARE
FY 2012 Discretionary $3.8M
FY 2012 Mandatory $2.0M
FY 2012 Total Request $5.8M

- Colorado Wide Area Multilateration (WAM), G08M.03-01
- X, Colorado WAM - MLAT Services, G08M.03-02

Program Description

The increase in air traffic volume for the ski country of Colorado has resulted in increased numbers of delays and denied service at mountain airports, especially during bad weather. The FAA has established a reservation system known as the Special Traffic Management Program (STMP) during the peak travel months in an effort to regulate and systematically meter the traffic to the airports. This solution keeps the traffic volume manageable for the Denver Air Route Traffic Control Center (ARTCC), but produces extended delays and, in some cases, diversions or denial of Air Traffic Control (ATC) services.

The Colorado Division of Aeronautics has determined that a lack of surveillance is one of the main reasons behind reduced capacity during Instrument Meteorological Conditions (IMC). The problem is compounded by mountainous terrain, single instrument runway airport configurations and limited ramp space. The base of existing radar coverage is most often at or above 9,000 feet. The lack of more comprehensive surveillance forces controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. This is a safe means of providing the service, but it is not efficient enough to provide for Colorado’s air traffic services needs. Normally, many arrivals into Colorado Mountain airports are conducted under Visual Flight Rules (VFR). IMC which reduces acceptance rates for mountain airports from 12-17 flights per hour to 4 per hour. From November to April, when the STMP is in effect, the Colorado DOT estimates 75 aircraft per airport, per day are delayed or diverted, creating daily revenue loss for the state. The ADS-B/Multilateration system will enhance public safety, increase capacity of the FAA NAS system, and provide increased services and economic benefit to the identified four Colorado Mountain Communities.

The project will develop an ADS-B/Multilateration surveillance system constituting Phase II of the Colorado Surveillance implementation plan. The system will be an ADS-B 1090 Extended Squittter (ES) and Universal Access Transceiver (UAT) surveillance system with integrated multilateration. The multilateration component will provide beacon only surveillance in the near term until the transition to ADS-B is complete. During the aircraft equipage period to ADS-B compliant avionics (DO-260B), the system will provide surveillance of traditional ATCRBS and Mode S equipped aircraft through Multilateration. For those aircraft that are equipped, ADS-B surveillance will be provided. In addition, the system will provide information over the UAT link supporting Flight Information Services-Broadcast (FIS-B) and Traffic Information Services-Broadcast (TIS-B) services using this technology. The surveillance data will be provided to the automation system at Denver ARTCC from a service provider under contract to the FAA. The baseline surveillance performance of the system will be equal to that of the existing Air Traffic Control Beacon Interrogator – Model 6 (ATCBI-6) currently employed by the FAA in providing En Route Air Traffic separation.

The Service Provider Selected Alternative transfers development, deployment, operation, maintenance, and ownership of the surveillance system from the FAA to a private non-federal contractor. The service provider will integrate ADS-B and multilateration under governmental oversight (FAA and the State of Colorado). After the system is certified by the FAA and is operational, the service provider will charge the FAA an annual service fee to provide the surveillance data.

ADS-B is an advanced surveillance technology that provides highly accurate and comprehensive surveillance information via a broadcast communication link. ADS-B is a surveillance technique in which aircraft provide, via a data link, flight data derived from on-board position-fixing and navigational systems. Aircraft determine their position (longitude, latitude, altitude, and time) using GPS, internal navigational reference system, or otherwise. The aircraft’s ADS-B equipment function processes this position information, along with other aircraft-derived flight parameters, into a periodic broadcast transmission, typically once a second. Any airborne or ground-based

ADS-B capable receiver, within range of broadcast, may receive and process the surveillance information for a variety of functions or uses.

The increased positional accuracy and ability to provide additional aircraft-derived flight information (flight objects or flight data message elements), defines ADS-B as “enhanced surveillance.” The additional flight information, such as identification, directional vector, velocity, next waypoint, and other data are limited only by the equipment’s capability, the communication link capacity, and the receiving system’s capability. Additionally, ADS-B equipment may be placed on ground vehicles or obstacles to allow locating and identifying these items. The FAA’s ADS-B system is based primarily on providing four fundamental broadcast services to support the ADS-B enabled applications:

ADS-B: This critical service provides highly accurate, aircraft-derived, ADS-B reports that contain identification, state vector, and status/intent information about the aircraft. The information will be used for surveillance applications. ADS-B information is broadcast by the ADS-B equipped aircraft, received and processed by air traffic automation systems, the ADS-B on-board avionics, and subsequently displayed on the aircraft’s multi-function display.

ADS-R: Two communication link protocols have been approved for ADS-B use; Universal Access Transceiver (UAT), used mostly by general aviation aircraft, and 1090 extended squitter (ES0, which broadcasts but does not receive signals, normally used in commercial transport aircraft. The Automatic Dependent Surveillance – ReBroadcast (ADS-R) service provides a rebroadcast of the ADS-B received information in the alternate link protocol. This ensures that any particular ADS-B broadcast is available on both the UAT and ES protocols for aviation use.

TIS-B: Traffic Information Services provide ADS-B equipped aircraft with a more complete “picture” including aircraft which are not equipped with ADS-B. TIS-B comprises surveillance information provided by one or more surveillance sources, such as secondary or primary surveillance radar. The surveillance information is processed and converted for use by ADS-B equipped aircraft.

FIS-B: Flight Information Services provide ground-to-air broadcast of non-control, advisory information which provides users valuable, near real-time information to operate safety and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

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

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

Relationship to Performance Target

ADS-B and WAM are technologies 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 2012 – Performance Output Goals
Discretionary

- Complete Automation Operational Test – January 2012.
- Multilateration Services Site Acceptance Test - February 2012.
- Integration complete – May 2012.
- OT&E (CD2) complete – May 2012.
- Key Site Installation Complete June 2012.
- Initial Operating Capability June 2012.
- In-Service Decision September 2012.

<u>Mandatory</u>

- Support all necessary activities to achieve IOC and ORD of the Durango and Telluride Service Volume.

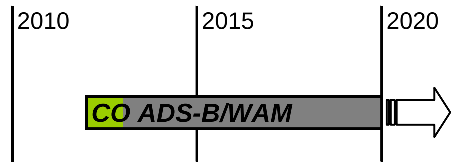
Program Plans FY 2013-2016 – Performance Output Goals

- Steady State. The funding required for years 2013-2035 (remaining lifecycle) will cover subscription fees, based upon performance, for the service provider.

System Implementation Schedule

Colorado ADS-B/WAM Cost Share

First site ORD: June 2012 -- Last site ORD: September 2012
Expected operational life: 23 years



2A19, AUTOMATED TERMINAL INFORMATION SERVICES (ATIS)

FY 2012 Request $1.0M

- Automated Terminal Information Services (ATIS), C28.01-01

Program Description

ATIS is a highly robust recording device designed to operate continuously with very high reliability and maintainability. ATIS provides current, routine, non-control information to arriving and departing aircraft by means of continuous radio broadcasts. As airport conditions change, controllers update ATIS messages on the recording equipment with new information. Examples of this information include weather conditions, runway conditions, and approach or departure information. ATIS equipment is installed in Air Traffic Control Towers (ATCTs).

This is a “technology refresh” program. While new ATIS equipment will have state-of-the-art components, ATIS functionality and capabilities will remain virtually unchanged. One exception will be a new text-to-voice capability that will reduce controller workload and reduce occurrences of inaccurate or unintelligible ATIS messages. The ATIS program will replace the 442 aging and obsolete recorders with new equipment. This program improves standardization and configuration control and adds an interface unit for automated weather observation to support future expansion and modernization of the NAS.

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

- *FAA Strategic Goal 2 – Greater Capacity.*
- *FAA Objective 1 – Increase capacity to meet projected demand and reduce congestion.*
- *FAA Performance Target 3 – 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 new ATIS equipment 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 this ATIS equipment.

Program Plans FY 2012 – Performance Output Goals

- Contract award: June 30, 2012.
- Complete design reviews: September 30, 2012.
- Complete two equipment deliverables: One for key site; one for testing.

Program Plans FY 2013-2016 – Performance Output Goals

- None – Pending JRC approval.

2A20, Tactical Flow Time Based Flow Management (TBFM)
FY 2012 Request $38.7M

- HD Trajectory Mgmt – Time Based Flow Management (TBFM), G02A.01-03
- X, HD Trajectory Mgmt – TBFM – Tech Refresh, G02A.01-07

Program Description

Trajectory Management – Time Based Flow Management (TBFM) will modernize and enhance the current Traffic Management Advisor (TMA) System. TMA is an automation system currently available at all twenty Air Route Traffic Control Centers that enables the use of time-based metering to optimize the flow of aircraft as they approach congested airspace and airports. TBFM will replace obsolescent TMA hardware and support NextGen capabilities. It improves the management of traffic flow by using point-in-space metering or extended metering, and it increases airspace capacity utilization through flexible scheduling. TBFM shares metering data with other tools/stakeholders, and enables use of Area Navigation/Required Navigation Performance (RNAV/RNP) routes. It enables more efficient departure operations with the integrated departure and arrival concept and it increases an FAA traffic manager's awareness of severe weather within their area of responsibility.

The TBFM Program is divided into three (3) segments:

Segment I modernized TMA with agreed upon near-term enhancements and deployments. This segment was completed in April 2009. The program Final Investment Decision has been completed and the next phase of TMA and the transition to implementation of TBFM has been initiated.

Segment II is the TBFM Program. This is an upgrade of TMA that will fulfill operational user needs and NextGen goals. The TBFM program will incorporate NextGen concepts such as RNP/RNAV route selections, weather integration, and accelerated arrivals/flexible schedule. A Final Investment Decision for this segment was achieved in April 2010.

Segment III (Work Package 3, G02A.01-06) will prepare for the follow-on phase, 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.

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 – Time Based Flow Management will provide complete time based metering solutions across all flight phases. 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 Plans FY 2012 – Performance Output Goals
- Design, develop and test new systems that replace current (end of life) hardware and reduce the logistical footprint at the facilities.
- Design, develop, test and deploy flexible scheduling functionality so scheduling techniques within the TBFM system can be used to create a more optimal schedule and to assign achievable Estimated Time of Arrivals (ETAs) and Scheduled Time of Arrivals (STAs) by reducing partial slots.
- Design, develop, test and deploy improved wind data functionality to improve trajectory calculations (ETAs).
- Design and develop systems to enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes.

Program Plans FY 2013 – Performance Output Goals
- Complete the test and deployment of systems to enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes.
- Design, develop, test and deploy information sharing functionality that will leverage the System Wide Information Management (SWIM) Service Oriented Architecture (SOA) infrastructure and standards to distribute TBFM information (i.e. aircraft arrival and departure STAs) to NAS systems and users while also receiving flight data via this service.
- Complete the implementation waterfall as well as deploy TBFM system functionalities to additional facilities.
- Design and develop the ability to display convective weather.

Program Plans FY 2014 – Performance Output Goals
- Complete the test and deployment of the ability to display convective weather.
- Continue development, test and deployment of Integrated Departure and Arrival Capability (IDAC).

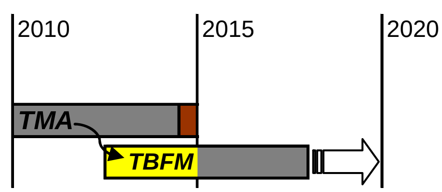
Program Plans FY 2015 – Performance Output Goals
- None.

Program Plans FY 2016 – Performance Output Goals
- Prepare for and begin tech refresh activities.

System Implementation Schedule

Time Based Flow Management (TBFM)

First Operational Implementation: Dec 2012 -- Last OI: Sept 2014



B. TERMINAL PROGRAMS

2B01, AIRPORT SURFACE DETECTION EQUIPMENT – MODEL X (ASDE-X)
FY 2012 Request $2.2M

- Airport Surface Detection Equipment – Model X (ASDE-X) – Tech Refresh & Disposition, S09.01-01

Program Description

ASDE-X is a surface surveillance system that provides air traffic controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors. It improves the controller's ability to maintain awareness of the operational environment and to anticipate contingencies. ASDE-X Safety Logic (AXSL) uses surveillance information from ASDE-X to determine if the current and projected positions and movement characteristics of tracked aircraft and vehicles present a potential collision situation. Visual and audible alerts are provided to air traffic controllers when safety logic predicts a collision.

Deployment of the 35 planned ASDE-X systems will be completed in FY 2011. The first ASDE-X system was delivered in 2002. Some of the equipment has reached the end of its life and is no longer supportable. The ASDE-X Tech Refresh program provides for the replacement and upgrade of hardware to ensure the continued operation of the surface surveillance system through its designated lifecycle. The ASDE-X program baseline included costs for the periodic replacement of Commercial Off-The-Shelf (COTS) system components; e.g., processors, displays, computer operating systems and Commercially Available Software (CAS).

Funding for ASDE-X Tech Refresh begins in FY 2012. A study will be completed to determine the equipment/software that will be included in the ASDE-X Tech Refresh effort. Results of the study will determine the ASDE-X Tech Refresh course of action and schedule.

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 when safety logic predicts a collision.

The ASDE-X Tech Refresh Program will ensure the continued operation of ASDE-X systems through its designated lifecycle. Completing the technical refresh effort will keep the number of Category A&B runway incursions at the reduced levels attained during ASDE-X system deployment.

Program Plans FY 2012 – Performance Output Goals

- Complete tech refresh analysis and study.

Program Plans FY 2013 – Performance Output Goals

- Begin tech refresh effort with the initiation of procurement activities.

Program Plans FY 2014 – Performance Output Goals

- Continue tech refresh effort.

Program Plans FY 2015 – Performance Output Goals

- Continue tech refresh effort.

Program Plans FY 2016 – Performance Output Goals

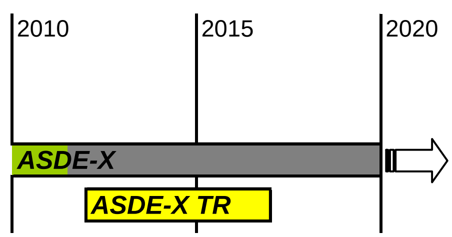
- Complete tech refresh effort.

System Implementation Schedule

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

First ORD October 2003 -- Last ORD: May 2011

First site Delivery: 2013 -- Last site Delivery: 2016



2B02, TERMINAL DOPPLER WEATHER RADAR (TDWR) – PROVIDE
FY 2012 Request $7.7M

- 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 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 2018. 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 FY 2012 – Performance Output Goals
- Modify eight sites with Radar Data Acquisition (RDA) modification kits.
- Award a contract for the production Transmitter Sustainment mod kits.
- Conduct the field reliability evaluation of the production Antenna Drive Motor systems.
- Acquire and install 10 new radomes.
- Complete the software revision needed for the production Radar Product Generator (RPG) Tech Refresh computers.
- Install the RPG uninterruptible power system (UPS) at 15 more sites.
- Conduct first article testing of the production Radio-Frequency Filter Amplifier (RFFA) assemblies.
- Install new air conditioner systems at 12 more sites.

Program Plans FY 2013 – Performance Output Goals

- Complete the field reliability test and acquisition of the production Antenna Drive Motor systems.
- Install 13 more radomes.
- Issue the Transmitter Sustainment modification to the field.
- Install RDA mod kits at eight more sites and release upgraded RDA software.
- Complete the development testing and procure the production RPG Tech Refresh computers.
- Acquire the last of the RFFA assemblies and issue the modification.
- Installation the RPG UPS units at 15 more sites.
- Acquire the production RFFA assemblies and install them at 10 sites.
- Install new air conditioner systems at 12 more sites.
- Begin installing battery monitors in the facility UPS units.

Program Plans FY 2014 – Performance Output Goals

- Install the Antenna Drive Motor systems at seven more sites.
- Install the RDA modification at eight more sites.
- Install the RPG Tech Refresh computers at eight sites.
- Complete the Transmitter Sustainment modification installations.
- Complete the RPG UPS installations.
- Install the RFFA modification at 25 more sites.
- Complete the air conditioner installations.
- Install new radomes at 13 more sites.
- Complete installation of battery monitors in the facility UPS units.
- Begin replacement of Surge Protection Devices (SPD) at TDWR facilities.

Program Plans FY 2015 – Performance Output Goals

- Install the RDA modification at eight more sites.
- Install the RPG Tech Refresh computers at 12 more sites.
- Install the Antenna Drive Motor systems at eight more sites.
- Complete installation of the RFFA modification.
- Complete the installation of the new radomes.
- Complete installation of the replacement SPD units.

Program Plans FY 2016 – Performance Output Goals

- Install the RDA modification at eight more sites.
- Install the RPG Tech Refresh computers at 12 sites.
- Install the Antenna Drive Motor systems at eight more sites.

System Implementation Schedule

- RDA Retrofit: Complete last modification in FY 2017.
- RPG Computer Tech Refresh: Complete last installation in FY 2018.
- Antenna Drive Motors: Complete last installation in FY 2019.

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

FY 2012 Request $25.0M

- 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 aircraft (both military and civilian) within the nation's airspace. At the end of FY 2009, 46 of the 47 baselined STARS sites were operational within the NAS. The final site was completed in June 2010 with the installation of STARS equipment at the newly-construction Dayton Tower facility. STARS baseline deployments are complete, and STARS is in the Hardware Technology Refreshment and Software Enhancement phase of its life cycle.

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. TAMR Phase I addresses technology, mobility, and security gaps with the existing systems. As in any Commercial Off-The-Shelf (COTS) based system, an aggressive hardware Tech Refresh 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 3 – 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 2009, STARS had an overall system availability (software/hardware) of 99.99998% 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. This program will modernize the STARS equipment to sustain this high level of availability.

Program Plans FY 2012-2014 – Performance Output Goals

- Continue procurement installation of system Technical Refreshment of end -of-life COTS hardware, e.g., cathode ray tube main display monitor (MDM), Sun Ultra 5 processors, system data recording hardware, etc.

Program Plans FY 2015-2016 – Performance Output Goals

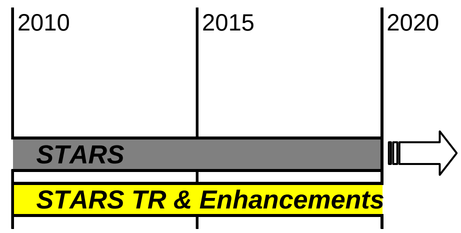
- Continue procurement installation of system Technical Refreshment of end -of-life COTS hardware, e.g., Sun Ultra 5 processors, etc.
- Identification, qualification, procurement and installation of emergent end -of-life COTS hardware.

System Implementation Schedule

Standard Terminal Automation Replacement System (STARS)

First site IOC: October 2002 -- Last site IOC: September 2007

STARS Tech Refresh & Terminal Enhancements - 2006 -- +2024



2B04, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 3)

FY 2012 Request $98.8M

- Terminal Automation Modernization – Replacement (TAMR) – Phase 3 – Segment 1, A04.07-01
- X, Terminal Automation Modernization – Replacement (TAMR) – Phase 3 – Segment 2, A04.07-02

Program Description

The first phase of the TAMR program, TAMR Phase 1, replaced the automated radar processing and display systems at 47 Terminal Radar Approach Control (TRACONs) and their associated Air Traffic Control Towers (ATCTs) with Standard Terminal Automation Replacement System (STARS). The STARS automation system is a fully digital system capable of tracking all aircraft within the defined terminal airspace using available FAA and U.S. Department of Defense (DoD) surveillance systems.

The second phase of the TAMR program, TAMR Phase 2, involved the replacement of automation systems at five (5) additional TRACONs with STARS and the modernization of aging air traffic controller displays and system processors at four (4) large TRACONs, including Denver and Chicago.

A third phase of the TAMR program was originally planned to modernize or replace the automation systems at 106 additional air traffic control facilities. These sites presently operate with the Common Automated Radar Terminal System (CARTS) platform, and many are nearing the end of their intended service lives. On April 21, 2010 the JRC decided to segment the TAMR Phase 3 program into two (2) segments to better address short-term versus long-term planning objectives. The JRC directed TAMR Phase 3 Segment 1 to address the near-term requirements including an alignment to NextGen initiatives such as ADS-B. TAMR Phase 3 Segment 2 will meet mid-term NextGen requirements and potential convergence of automation systems into a standard configuration.

Based upon the JRC Authorization Decision dated September 15, 2010, TAMR Phase 3 Segment 1 will replace eleven (11) existing CARTS IIIE facilities with STARS hardware and software components. *(NOTE: The TAMR Phase 1 program is currently qualifying the new hardware baseline that will sustain TAMR Phase 1 (the existing 52 STARS facilities) and support this TAMR Phase 3 Segment 1 ARTS IIIE to STARS modernization and replacement initiative.)* In particular, TAMR Phase 3 Segment 1 will:

- Provide ADS-B capability at eleven (11) IIIE facilities by 2013 and enable convergence to a single Terminal Automation hardware and software platform, STARS, by 2015:

- Replace five (5) IIIE facilities with STARS and support ADS-B at these facilities by 2013 (Dallas (D10), Northern California TRACON (NCT), Atlanta (A80), Southern California TRACON (SCT) and Potomac TRACON (PCT)).
- Continue New York TRACON (N90) backroom upgrade to support ADS-B by 2011 (CARTS).
- Support ADS-B software deployment at five (5) additional CARTS IIIE facilities (Louisville (SDF), Denver (D01), Minneapolis (M98), St Louis (T75) and Chicago (C90)) by 2013.
- Replace remaining six (6) IIIE facilities with STARS by 2015 to enable convergence to a single Terminal Automation hardware and software baseline (SDF, D01, M98, T75, C90 and N90).

This approach for TAMR Phase 3 Segment 1, in tandem with continuing limited CARTS software development activities through 2013, provides the FAA with a strategy expected to support ADS-B requirements and continue with the FAA's original plan for Terminal convergence to one automation platform originally established under the Standard Terminal Automation Replacement System (STARS) contract. Once executed, Terminal convergence will eliminate a redundant need to sustain both STARS and CARTS and eliminate the need to continue with redundant software development activities.

While TAMR Phase 3 Segment 1 addresses the modernization of the eleven (11) IIIE facilities TAMR Phase 3 Segment 2 will modernize terminal automation systems across the IIE facilities with common display and processing hardware platforms, unified software, and modern digital interfaces.

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

Improvements to the NAS can mitigate the anticipated increase in flight delays and any resulting decrease in economic productivity. The TAMR Phase 3 Segment 1 Program provides a platform to modernize the eleven (11) IIIE facilities in alignment with the original Mission Needs Statement and in alignment with near-term NextGen requirements such as support for ADS-B.

Program Plans FY 2012 – Performance Output Goals

- Continue development and implementation of JRC preferred solution for TAMR Phase 3 Segment 1:
  - Achieve First site delivery.
  - Complete upgrade of New York TRACON (N90).
  - Complete Operational Test and Evaluation (OT&E) Build 1.

Program Plans FY 2013 – Performance Output Goals

- Continue implementation of JRC preferred solution for TAMR Phase 3 Segment 1:
  - Complete IOC at 4 sites.
  - Complete OT&E for Build 2.
  - ADS-B available at all 11 ARTS IIIE sites.
- Finalize investment analysis for TAMR Phase 3 Segment 2 for Final Investment Decision (FID) from the JRC.

Program Plans FY 2014 – Performance Output Goals

- Continue implementation of JRC preferred solution for TAMR Phase 3 Segment 1:
  - Complete IOC at 3 sites.
- Develop and implement JRC preferred solution for TAMR Phase 3 Segment 2.

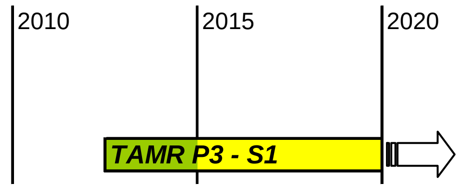
Program Plans FY 2015 – Performance Output Goals
- Complete implementation of JRC preferred solution for TAMR Phase 3 Segment 1:
  - Complete OT&E for Build 3.
  - Complete IOC for 4 sites (All 11 will be complete).
- Continue implementation of JRC preferred solution for TAMR Phase 3 Segment 2.

Program Plans FY 2016 – Performance Output Goals
- Continue development and implementation of JRC preferred solution for TAMR Phase 3 Segment 2.

System Implementation Schedule

Terminal Automation Modernization/Replacement (TAMR) Phase 3 - Segment 1

First site IOC: October 2012 -- Last site IOC: February 2015



- Contract Award – December 2010.
- JRC Decision – Authorization to Proceed – December 2010
- Final Investment Decision for Segment 1 – FY 2011.
- ADS-B available at all 11 sites – CY 2013.

2B05, TERMINAL AUTOMATION PROGRAM
FY 2012 Request $2.5M

- 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 Terminal NAS facilities. The FDIO system interfaces to the Host Computer System (HOST) and provides flight data information to NAS Terminal facilities.. The FDIO system retrieves the flight data from the HOST and prints this information on paper strips for 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 and modified COTS equipment. The FDIO system is mainly comprised of computers, servers, monitors, keyboards, printers, and circuit cards that are commercially available.

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 – 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

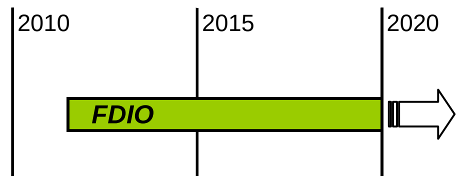
The FDIO program replaces end-of–life, obsolete FDIO equipment with modern COTS and modified COTS equipment, thereby reducing potential outages and delays.

Program Plans FY 2012 – Performance Output Goals
- Procure replacement hardware and update software necessary to replace/modernize end of life/obsolete 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 2013-2016 – Performance Output Goals
- Continue procurement of replacement equipment necessary to replace/ modernize end of life/obsolete equipment in the field for continued FDIO operation.
- Install replacement hardware and update software to replace/modernize end of-life/obsolete components for continued FDIO operation.

System Implementation Schedule

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



2B06, Terminal Air Traffic Control Facilities – Replace
FY 2012 Request $51.6M

- ATCT/TRACON Replacement, F01.02-00

Program Description
The FAA provides air traffic control services from more than 500 Air 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 approximately 30 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.

The ATO has an established process for selecting the towers and TRACONs to be replaced. It includes an economic analysis and operational considerations to ensure that the facilities we propose replacing each year are the higher priority locations.

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 – 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. 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 2012 – Performance Output Goals

- Design starts at three sites (Phase I/II).
- Start construction at two sites (Phase III).
- Equipment installation at three sites and planned commissioning at two sites (Phase IV/V).

Program Plans FY 2013-2016 – 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 2012 Discretionary $56.9M
FY 2012 Mandatory $5.0M
FY 2012 Total Request $61.9M

- ATCT/TRACON Modernization, F01.01-00

Program Description

The FAA must continually upgrade and improve terminal facilities and equipment to provide an acceptable level of service and to meet current and future operational requirements. Improvements include replacing facility components that are deteriorating such as: roofs, air conditioners, tower cab consoles, undersized generators and environmental equipment. In addition to the renovation projects, modernization includes facility upgrades such as adding operating positions for controllers and training space, rehabilitating administrative and equipment space to accommodate facility expansion, and expanding base-buildings to support current and future demand.

ATCT/TRACON facilities have also had to be modernized to address operational and safety issues, including upgrading visibility of the entire airport surface, improving accessibility, removing hazardous materials, upgrading structures 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 the Interagency Committee on Seismic Safety in Construction 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 3 – 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 2012 – Performance Output Goals
Discretionary
- Conduct 18 planning activities (e.g., Life Cycle Assessments, Conditions Assessments, etc.) to determine requirements.
- Initiate an average of 32 new projects to improve, repair, and sustain infrastructure at ATCT/TRACON facilities.
- Conduct analysis on the longer-term plans for facilities.

Mandatory
- Initiate an average of 10 new projects to improve, repair, and sustain infrastructure at ATCT/TRACON facilities.

Program Plans FY 2013-2016 – 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 2012 Request $10.0M

- 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 (CCS) being installed at the new Air Traffic Control System Command Center (ATCSCC) location in Warrenton, VA. The program also provides 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 3 – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2014.*

Relationship to Performance Target

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

Program Plans FY 2012 – Performance Output Goals

- Deliver 10 terminal voice switches to various FAA facilities.
- Provide voice switches as required to meet ATO-T new tower requirements / relocation efforts.
- Replace end of lifecycle and non supportable voice switches to facilities identified by ATO-T as requiring a replacement switch.

Program Plans FY 2013 – Performance Output Goals

- Award contract to continue replacement effort.
- Deliver 8 terminal voice switches to various FAA facilities.
- Provide voice switches as required to meet ATO-T new tower requirements / relocation efforts.
- Replace end of lifecycle and non supportable voice switches to facilities identified by ATO-T as requiring a replacement switch.

Program Plans FY 2014 – Performance Output Goals

- Deliver 5 terminal voice switches to various FAA facilities.
- Provide voice switches as required to meet ATO-T new tower requirements / relocation efforts.
- Replace end of lifecycle and non supportable voice switches to facilities identified by ATO-T as requiring a replacement switch.

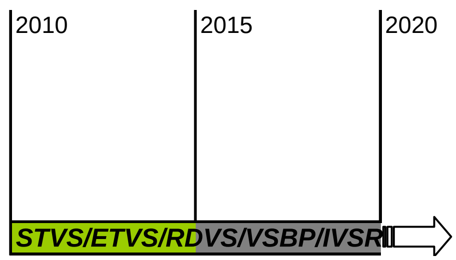
Program Plans FY 2015-2016 – Performance Output Goals

- None – Pending JRC approval.

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: 2014



2B09, NAS Facilities OSHA and Environmental Standards Compliance

FY 2012 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 compliance programs provide comprehensive ATO-wide environmental, occupational safety and health management initiatives to meet Occupational Safety and Health Administration (OSHA) & Federal Environmental Standards, 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, to decommissioning.

The Fire Life Safety program manages the implementation of projects to upgrade Air 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 250 of the approximately 386 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 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 target: Ensure 100% of all staffed and at least 95% of all unstaffed ATO workplaces listed in the Workplace Inspection Tool and as required by FAA policy and Federal Regulation are inspected by September 30, 2012.

Program Plans FY 2012-2016 – Performance Output Goals

- Upgrade 100 fall protection systems on self supporting Air Traffic Control Towers (ATCTs) in the ATO Service Areas to comply with OSHA regulations.
- Conduct 9 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Continue fire life safety upgrades to 20 ATCTs initiated in previous year.
- Initiate fire life safety upgrades for 20 additional ATCTs.
- Complete the FAA acceptance process for 100% of mold remediation projects identified through the Agency identification process and planned for FY 2012.
- Conduct job hazard analyses on additional NAS equipment through the Job Hazard Program.
- Develop and deploy lockout/tagout for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.

2B10, AIRPORT SURVEILLANCE RADAR (ASR-9) SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2012 Discretionary $6.0M
FY 2012 Mandatory $2.0M
FY 2012 Total Request $8.0M

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

Program Description

The Airport Surveillance Radar Model 9 (ASR-9) provides aircraft target and weather information to air traffic controllers, which is essential to separating aircraft and helps reduce delays and improve safety at high activity airports. The ASR-9 surveillance system was designed and fielded in the 80's/90's and has 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. The modification will facilitate the implementation of 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 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 sites (Phase 2). Phase 1 was completed in 2010.

Phase 2, currently in investment analysis, will implement modifications to the ASR-9 radar system to sustain primary surveillance capability in terminal airspace through 2025. During this phase, obsolescence and supportability issues will be addressed with regard to the Surveillance Communication Interface Processor (SCIP), Data Communication Equipment (DCE), Transmitter Backplane, Receiver Protector, Maintenance Display Unit and other components. The sustainment of the ASR-9 aligns with the National Airspace System Enterprise Architecture, 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 3 – 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 program contributes 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 serves airports with high activity levels and these radars are projected to remain in service until at least 2023. The SLEP Phase 2 project being performed will address the most critical performance issues in order to improve system reliability and supportability and thereby reduce unscheduled outages.

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Continue the design and development of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR).
- Initial production units of transmitter backplane and cable sets will also be procured.
- The program will continue test and evaluation and procure initial production units of the receiver protector replacement unit.

<u>Mandatory</u>

- Finalize the design and development of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR) and procure test units.
- The program will finalize test and evaluation and procure initial production units of the receiver protector replacement unit.

Program Plans FY 2013 – Performance Output Goals

- Continue testing and implementation of ATO-EC preferred solution pending approval.
- Start production phase pending ATO-EC approval pending approval.

Program Plans FY 2014 – Performance Output Goals

- Continue production and implementation of ATO–EC preferred solution pending approval.

Program Plans FY 2015 – Performance Output Goals

- Continue production and implementation of ATO–EC preferred solution pending approval.

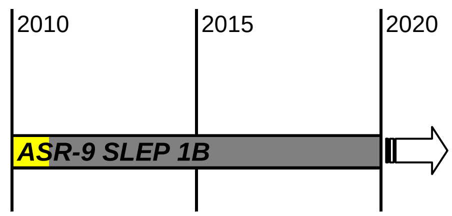
Program Plans FY 2016 – Performance Output Goals

- Continue implementation of ATO–EC preferred solution pending approval.

System Implementation Schedule

Airport Surveillance Radar-Model 9 (ASR-9) Service Life Extension Program (SLEP) Phase 1B and 2

Phase 1B: First ORD: March 2008 -- Last ORD: October 2010
Phase 2: EC FID planned for June 2012



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

FY 2012 Request $3.9M

- A, ASR-11 – Tech Refresh – Segment 1, S03.02-04
- X, ASR-11 – Tech Refresh – Segment 2, S03.02-05
- B, Mobile Airport Surveillance Radar (MASR), S03.02-06

A AND X, ASR TECH REFRESH, SEGMENT 1, S03.02-04 AND 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 and cost effective operation of the radar system through its designated lifecycle. The ASR-11 Technology Refresh Program is an ongoing program to address obsolescence and maintenance issues and will be managed through 5-year segments.

The ASR-11 Tech Refresh Segment 1 is well defined and provides increased functionality by replacing existing Signal Data Processors (SDP's) with an Advanced Signal Data Processor (ASDP). The existing SDPs are 1980's technology, and are no longer in production. They have no spare processor or memory capacity with no possibility for expanding their capacity. By coupling the ASDP modification with software improvements, four ASR-11 program In-Service Decision (ISD) open action items are resolved.

The major objectives of the ASR-11 Tech Refresh Segment 1 are:

1) Install production ready, form-fit function replacement kits for the SDP and eliminate 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.

The ASR-11 Tech Refresh Segment 1 (S03.02-04) was approved in October 2008 and an In-Service Decision was made in January 2010. The funding will support the continued installation of these upgrades through FY 2014; and this activity will retrofit 68 systems in the FAA inventory with the ASDP modification kits.

The Tech Refresh Segment 2 (S03.02-05) is not fully defined yet and we are working on a business case analysis to identify parts obsolescence, operational performance deficiencies, or other areas requiring technology refresh to ensure continued reliable and cost effective operation of the radar system through its designated lifecycle. The Segment 2 Investment Analysis Readiness Decision (IARD) is planned for September 2012 and the Final Investment Decision (FID) is planned for September 2013.

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 – 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) costs 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 2012 – Performance Output Goals

- Deliver 18 out of 68 ASDPs.
- Install 12 out of 68 ASDPs.

Program Plans FY 2013 – Performance Output Goals

- Install 11 out of 68 ASDPs.
- Implement Segment 2 Tech Refresh.

Program Plans FY 2014 – Performance Output Goals

- Install 12 out of 68 ASDPs.
- Implement Segment 2 Tech Refresh.

Program Plans FY 2015 – Performance Output Goals

- Install 7 out of 68 (100%) ASDPs.
- Implement Segment 2 Tech Refresh.

Program Plans FY 2016 – Performance Output Goals

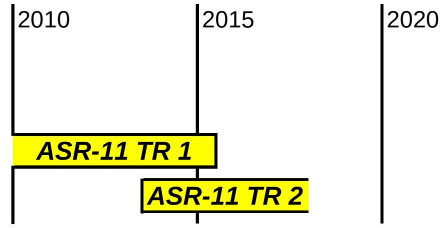
- Implement Segment 2 Tech Refresh.

System Implementation Schedule

Airport Surveillance Radar - Model 11 (ASR-11) Tech Refresh - Segment 1 and 2

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

First site Delivery: 2013 -- Last site Delivery: 2017



B, Mobile Airport Surveillance Radar (MASR), S03.02-06

Program Description

The Mobile Airport Surveillance Radar (MASR) is a terminal surveillance radar that can be moved from site to site to support radar relocations, temporary planned outages of an existing radar for installation of upgrades and emergency operations when existing systems are damaged. This system will have the performance capabilities of existing systems.

The MASR will be deployed quickly within known, short-duration timeframes and be compatible with all air traffic control towers (ATCT), Terminal Radar Approach Controls (TRACON), Air Route Traffic Control Centers (ARTCC), and their associated automation systems.

The MASR system architecture will support a reusable, service-oriented capability with an emphasis on providing the terminal surveillance service efficiently and quickly. The system will have interfaces for power, mechanical, data, and remote monitoring and control. It will be designed to be interoperable with all currently deployed ASR-8, ASR-9 and ASR-11 terminal radars and their associated automation interfaces.

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 – 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 MASR investment will provide a capability that will maintain operational availability at the goal levels during periods of planned or unplanned outages of terminal surveillance radars.

Program Plans FY 2012 – Performance Output Goals
- Complete Business Case Development.

Program Plans FY 2013 – Performance Output Goals
- Award Contract and begin System Development.

Program Plans FY 2014 – Performance Output Goals
- Complete System Development and conduct operational testing.
- Procure and manufacture first system.

Program Plans FY 2015 – Performance Output Goals
- Procure and manufacture second system.
- Conduct operational testing.
- Operationally deploy first system and place into service.

Program Plans FY 2016 – Performance Output Goals
- Operationally deploy second system and place into service.

2B12, RUNWAY STATUS LIGHTS (RWSL)
FY 2012 Request $29.8M

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

Program Description

The RWSL system integrates airport lighting equipment with approach and surface surveillance systems to provide a visual signal to pilots and vehicle operators indicating that it is unsafe to enter/cross or begin takeoff on the runway. The system is fully automated based on inputs from surface and terminal surveillance systems. Airport surveillance sensor inputs are processed through light control logic that commands in-pavement lights to illuminate red when there is traffic on or approaching the runway. Runway Entrance Lights (REL) provide signal to aircraft crossing entering runway from intersecting taxiway. Takeoff Hold Lights (THL) provide signal to aircraft in position for takeoff. 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 installations of RWSL will contribute toward reducing the rate of runway incursions by indicating to pilots and vehicle operators the existence or forecast of a conflict if it crosses the hold line or begins its takeoff.

Program Plans FY 2012 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Complete installation at 4 of 23 operational sites.
- Achieve IOC at 9 of 23 (43%) operational sites.

Program Plans FY 2013 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Achieve IOC at 2 of 23 (52%) operational sites.

Program Plans FY 2014 – Performance Output Goals
- Start construction at 6 of 23 operational sites.
- Complete installation at 4 of 23 operational sites.
- Achieve IOC at 2 of 23 (61%) operational sites.

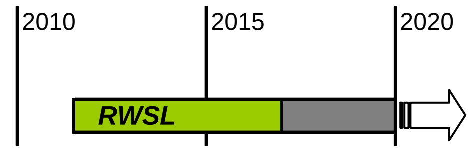
Program Plans FY 2015 – Performance Output Goals
- Start construction at 1 of 23 operational sites.
- Complete installation at 6 of 23 operational sites.
- Achieve IOC at 6 of 23 (87%) operational sites.

Program Plans FY 2016 – Performance Output Goals
- Complete installation at 1 of 23 operational sites.
- Achieve IOC at 3 of 23 (96%) operational sites.

System Implementation Schedule

Runway Status Lights (RWSL)

First site IOC: May 2011 -- Last site IOC: September 2017



2B13, NATIONAL AIRSPACE SYSTEM VOICE SYSTEM (NVS)

FY 2012 Request $19.8M

- Networked Facilities – NAS Voice System, G03C.01-01

Program Description

The NAS Voice System (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 using 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 system with standardized components that will reduce maintenance and parts inventory costs.

The current voice system 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 3 – 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 2012 – Performance Output Goals
- Release Screening Information Request (SIR).

Program Plans FY 2013 – Performance Output Goals
- Achieve Final Investment Decision from Joint Resources Council (JRC).
- Award NVS Contract.

Program Plans FY 2014 – Performance Output Goals
- Achieve NVS System Requirements Review (SRR).

Program Plans FY 2015 – Performance Output Goals
- Achieve NVS Preliminary Design Review (PDR).

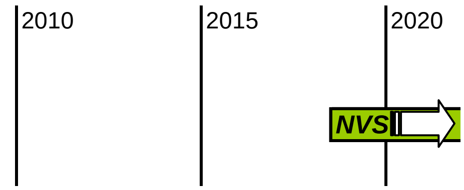
Program Plans FY 2016 – Performance Output Goals

- Achieve NVS Critical Design Review (CDR).

System Implementation Schedule

NAS Voice System (NVS)

First site IOC: September 2018 -- Last site IOC: September 2024



2B14, INTEGRATED DISPLAY SYSTEM (IDS)

FY 2012 Request $8.8M

- Integrated Display System (IDS) – Replacement, A03.05-01
- X, Integrated Display System (IDS) – Replacement – Tech Refresh, A03.05-02

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 IDS4 is interfaced to a variety of operational NAS weather sensors for collection and display of meteorological conditions in textual and graphic forms such as windshear, cloud height, wind speed, abnormal weather conditions, and runway visual range conditions. The system also provides static information such as policy/procedure checklists for handling emergencies, position relief, or runway changes; emergency contact numbers for the assigned airspace or airports; flow restrictions; airways and sectional charts; and, preferred routes to assist with directing aircraft on arrival/departure.

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.

The FAA will replace the IDS4 systems with a state-of-the-art system comprised mainly of Commercial-Off-The-Shelf (COTS) components. As in any COTS based system, a technical refresh of components is absolutely essential to sustain system services. Therefore, the FAA plans to perform a system analysis in FY 2015 (approximately 5 years after original COTS system components are acquired) to identify affected components before they become inoperable due to obsolescence. Based on the system analysis, replacement components will then be acquired to replace obsolete components.

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 – 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 2012 – Performance Output Goals

- Continue production and system installation at 52 operational facilities.

Program Plans FY 2013 – Performance Output Goals

- Continue production and system installation at 64 operational facilities.

Program Plans FY 2014 – Performance Output Goals

- Continue production and system installation at 29 operational facilities.

Program Plans FY 2015 – Performance Output Goals

- Continue production and system installation at 1 operational facility.
- Complete system analysis and begin technical refresh of hardware to replace obsolete components.

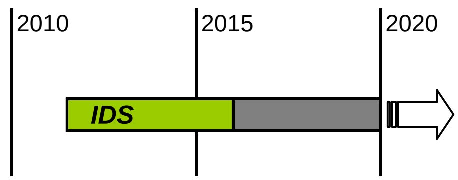
Program Plans FY 2016 – Performance Output Goals

- Continue technical refresh of hardware to replace obsolete components.

System Implementation Schedule

Integrated Display System (IDS)

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



2B15, REMOTE MAINTENANCE AND LOGGING SYSTEM (RMLS)

FY 2012 Request $4.2M

- Remote Monitoring and Logging System (RMLS) – National RMM Network, M07.04-01
- X, Remote Monitoring and Logging System (RMLS) – Technology Refreshment, M07.04-02

Program Description

Remote Maintenance Monitoring System (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 hardware for RMLS NRN was installed at Alaska Center (ZAN) in early CY 2010, Key site testing and remaining sites implementation, scheduled to begin in FY 2011.

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 3 – 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 FY 2012 – Performance Output Goals

- RMLS NRN installed at Jacksonville Center (ZJX), Memphis Center (ZME), Miami Center (ZMA), New York Center (ZNY), Boston Center (ZBW), Atlanta Center (ZTL), Washington Center (ZDC), Albuquerque Center (ZAB), Indianapolis Center (ZID), Chicago Center (ZAU), Ft. Worth Center (ZFW) and Houston Center (ZHU).
- RMLS NRN operational at Honolulu Center (ZHN), Southern California TRACON (SCT), Seattle Center (ZSE), Salt Lake Center (ZLC), Oakland Center (ZOA), Denver Center (ZDV) and Los Angles Center (ZLA).
- Tech Refresh RMLS NLN hardware at National Operations Control Center (NOCC), Pacific Operations Control Center (POCC), and Tech Center Operational Testing (OT) System.
- RMLS NRN Western Service Area Operational May 2012.

Program Plans FY 2013 – Performance Output Goals

- RMLS NRN installed at Minneapolis Center (ZMP), Cleveland Center (ZOB) and Kansas City Center (ZKC).
- RMLS NRN operational at Jacksonville Center (ZJX), Memphis Center (ZME), Miami Center (ZMA), New York Center (ZNY), Boston Center (ZBW), Atlanta Center (ZTL), Washington Center (ZDC), Albuquerque Center (ZAB), Indianapolis Center (ZID), Chicago Center (ZAU), Ft. Worth Center (ZFW), Houston Center (ZHU), Minneapolis Center (ZMP), Cleveland Center (ZOB)and Kansas City Center (ZKC).
- Tech Refresh RMLS NLN hardware at Atlantic Operations Control Center (AOCC) and Midstates Operations Control Center (MOCC), and Tech Center IT System.
- RMLS NRN Eastern Service Area Operational January 2013.
- RMLS NRN Central Service Area Operational (FOC) March 2013.

Program Plans FY 2014 – Performance Output Goals

- No activities.

Program Plans FY 2015 – Performance Output Goals

- Tech Refresh RMLS NLN hardware at NOCC, POCC, and Tech Center OT System.
- Tech Refresh RMLS NRN hardware at POCC and AOCC.

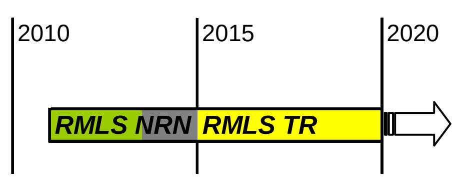
Program Plans FY 2016 – Performance Output Goals

- Tech Refresh RMLS NLN Hardware at MOCC, AOCC and Tech Center IT System.
- Tech Refresh RMLS NRN Hardware at MOCC and Tech Center IT System.

System Implementation Schedule

Remote Monitoring Logging System (RMLS)

RMLS NRN Key Site Operational (IOC): April 2011
RMLS NRN Final Operational Capability: March 2013
RMLS Tech Refresh: FY15 and beyond



2B16, MODE SELECT – SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2012 Discretionary $4.0M
FY 2012 Mandatory $4.0M
FY 2012 Total Request $8.0M

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

Program Description

The Mode Select (Mode S) secondary radar system provides aircraft target information to air traffic controllers, which help reduce delays and improve safety at high activity airports. The Mode S surveillance system was designed and fielded in the 80's/90's and has 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. This modification will facilitate the implementation of 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 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 Mode-S sites (Phase 2). Phase 1 was completed in 2010. A Supportability Study conducted in November 2009 assessed the health of the Mode S System and identified areas of concern. Phase 2 will address many of these areas of concern.

Phase 2, currently in investment analysis, will implement modifications to the Mode S system to sustain secondary surveillance in terminal airspace through 2025. The components that process radar data, the antenna, and the beacon video reconstitutor will be replaced with more modern components to address obsolescence issues. The sustainment of the Mode S system aligns with the National Airspace System Enterprise Architecture, 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 3 – 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 Mode S SLEP program contributes 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 Mode S system serves airports with high activity levels and these radars are projected to remain in service until at least 2023. The SLEP Phase 2 project being performed will address the most critical performance issues in order to improve system reliability and supportability and thereby reduce unscheduled outages.

Program Plans FY 2012 – Performance Output Goals
Discretionary
- Award contract for Beacon Video Reconstitutor (BVR) Replacement test units.

Mandatory
- Award contract for antenna array test units.
- Award contract for receiver processor and interrogator replacement prototype units.

Program Plans FY 2013 – Performance Output Goals
- Continue testing and implementation of ATO-EC preferred solution pending approval.
- Start production phase pending ATO-EC approval pending approval.

Program Plans FY 2014 – Performance Output Goals
- Continue production and implementation of ATO–EC preferred solution pending approval.

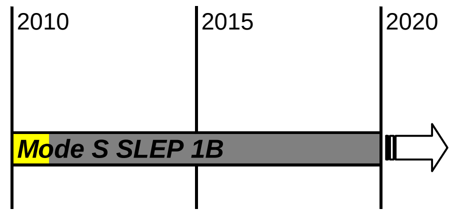
Program Plans FY 2015 – Performance Output Goals
- Continue production and implementation of ATO–EC preferred solution pending approval.

Program Plans FY 2016 – Performance Output Goals
- Continue implementation of ATO–EC preferred solution pending approval.

System Implementation Schedule

Mode Select (Mode S) Service Life Extension Program (SLEP) Phase 1B and 2

Phase 1B: First ORD: March 2008 -- Last ORD: October 2010
Phase 2: EC FID planned for June 2012



2B17, AIRPORT SURVEILLANCE RADAR (ASR-8) RELOCATION

FY 2012 Request $2.7M

- ASR-8 Relocation Bismarck, ND, ear mark S03.05-02

Program Description

The Bismarck, ND Airport Authority had scheduled redevelopment on the existing ASR-8/Mode-S property. The redevelopment plan was based on the FAA's original plan to install a new ASR-11 radar system at a new site on airport property. However, the FAA cancelled the ASR-11 installation effort, and the existing ASR-8/Mode-S remains in service, preventing the redevelopment work desired by the Airport Authority. In FY 2008, Congress directed the FAA to relocate the existing ASR-8/Mode-S radar to a new site on airport property to allow the redevelopment to proceed and appropriated funding for the effort. This project includes the construction of a supporting facility and tower and installation of the radar system. The program office is requesting additional funds to complete the project, because the original appropriation was insufficient to complete the relocation.

To accomplish the ASR-8/Mode-S relocation, the FAA will construct a building and tower at the new Bismarck, ND site, refurbish and install a decommissioned system to establish airport surveillance service at this location, and afterwards remove the existing radar system. This approach will minimize loss of Air Traffic services during the relocation.

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 – 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 relocation will maintain Air Traffic services and sustain operational availability provided by the Bismarck radar.

Program Plans FY 2012 – Performance Output Goals
- Initiate the bidding process for construction on the new site.
- Award construction contract.
- Initiate the planning activities on installing the refurbished ASR-8/Mode S equipment.

Program Plans FY 2013 – Performance Output Goals
- Complete construction of the new facility.
- Complete installation of the refurbished ASR-8/Mode S equipment.
- Commission the new site.
- Dismantle and dispose of the old ASR-8/Mode S equipment.

Program Plans FY 2014 – 2016 – Performance Output Goals
- None

System Implementation Schedule
- New site ORD August 2013.

2B18X, Integrated Terminal Weather System (ITWS)
FY 2012 Request $0.0M

- 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 Content Measurement), 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; transition of NEXRAD interfaces from 'point-to-point' X.25 protocol to TCP/IP, and development of a version of ITWS that does not require input from a Terminal Doppler Weather Radar (TDWR) - the so called "mini-ITWS" in the P3I documentation,. P3I items which are planned for development and deployment in the near term future include: 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 the integration of ITWS functionality into the NextGen Weather Processor (NWP) and NextGen Network Enabled Weather (NNEW) environments.

In FY 2010, ITWS achieved the commissioning of the 34th, (and final) site approved by the FAA Joint Resources Council (JRC). These 34 ITWS sites provide weather product information to a total of 75 airports, of which 30 are designated as OEP airports.

Technology Refreshment of ITWS will include the systematic 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, the FAA will be unable to sustain the generation of ITWS Weather Products that are vital to the needs of the ATC user community. In addition, the FAA will not be able to provide satisfactory maintainability and supportability of current ITWS sites, and it will not be able to interconnect ITWS with NWP and NNEW systems and those of other NAS ‘internal’ and ‘external’ users (e.g., airport authorities, airlines, etc) to permit seamless interoperability and common situational awareness.

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 – 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 ITWS Requirements Specification (FAA-E-2900F) states: "The ITWS shall have an inherent availability of at least .999815" (i.e., 99.98% availability). ITWS has maintained this level of operational availability at all commissioned sites, including the 30 OEP airports where ITWS is currently installed.

Program Plans FY 2012 – Performance Output Goals
- Achieve IARD approval for Technical Refreshment at all commissioned ITWS sites.
- Develop plan for one-year extension to the current ITWS Life-cycle.
- Plan for development of ITWS Engineering Study for Technical Refresh.
- Continue studies, concept definition demonstrations, and acquisition preparations for potential ITWS integration into NextGen weather system architecture.

Program Plans FY 2013 – Performance Output Goals
- Continue planning for the development of the ITWS Technical Refresh Engineering Study.
- Evaluate potential ITWS integration into NWP and NNEW.

Program Plans FY 2014 – Performance Output Goals
- Conduct and complete ITWS Tech Refresh Engineering Study.
- Develop ITWS Technical Refresh Hardware and Software prototype(s).
- Generate ITWS Tech Refresh NAS Change Proposal (NCP).
- Establish NextGen Weather user requirements for ITWS functionality within the NWP and NNEW environments.

Program Plans FY 2015 – Performance Output Goals
- Complete testing of ITWS Tech Refresh prototype(s).
- Acquire ITWS Tech Refresh hardware.
- Generate ITWS Tech Refresh national NCP.
- Update ITWS baseline documentation per Tech Refresh.
- Generate ITWS Tech Refresh SSM.
- Perform ITWS Tech Refresh Keysite testing.
- Commence ITWS Tech Refresh deployment.
- Establish ITWS interface to NWP/NNEW environment.

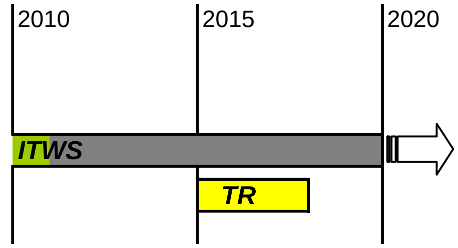
Program Plans FY 2016 – Performance Output Goals
- Continue ITWS Tech Refresh deployment and associated activities.

System Implementation Schedule

Integrated Terminal Weather System (ITWS) - Tech Refresh

First ORD: April 2003 -- Last ORD: August 2010 (34th Unit)

Tech Refresh: First site Deployment: 2015 -- Last site: 2017



2B19X, Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)

FY 2012 Request $0.0M

- X, 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 2009, the FAA replaced the Automated Radar Terminal System (ARTS) IIE systems with STARS at 4 sites - Anchorage, AK; Corpus Christi, TX; Pensacola. FL: 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 3 – 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 five (5) medium to small and four (4) major airports supported by this investment.

Program Plans FY 2012-2013 – Performance Output Goals

- Complete contractual activities to design/develop solutions for accomplishing a technology refreshment of the terminal system hardware and software.

Program Plans FY 2014-2016 – Performance Output Goals

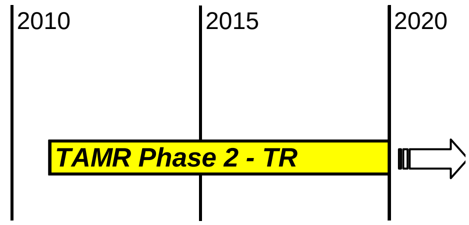
- Technology refreshment will be accomplished in several five (5) year cycles as components reach the end of their useful life or become unavailable.

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



C. FLIGHT SERVICE PROGRAMS

2C01, AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)

FY 2012 Request $2.5M

- Automated Surface Weather Observation Network (ASWON) – ASOS – Pre-Planned Product Improvements (P3I), W01.02-02

Program Description

Automated Surface Weather Observation Network (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, except the ADAS, 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 ADAS, located in FAA En Route centers, accepts weather data from ASOS, AWSS, and AWOS and retransmits the data to weather processor systems like Integrated Terminal Weather System (ITWS) and Weather and Radar Processor (WARP). 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 3 – 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 2012 – Performance Output Goals

- Complete deployment of ceilometer (deploy last 278 sensors).
- Complete EPI sensor procurement (procure last 221 EPI sensors).
- Continue EPI sensor deployment (deploy 300 of remaining 551 EPI sensors).

Program Plans FY 2013 – Performance Output Goals

- Complete deployment of EPI sensor (deploy last 251 sensors).

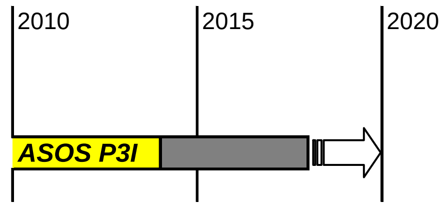
Program Plans FY 2014 – Performance Output Goals

- All program activity completed.

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 2012 Request $4.5M

- A, Alaska FSS Modernization, F05.04-01 and Flight Service Automation Modernization, F05.05-01
- B, Alaska Flight Service Facility Modernization (AFSFM), F05.04-02

A, FLIGHT SERVICES FACILITIES – ALASKA FSS MODERNIZATION, F05.04-01 AND FLIGHT SERVICE AUTOMATION MODERNIZATION, F05.05-01

Program Description

Flight Service Automation Modernization (FSAM) program is developing alternatives for the automation platform for all FAA facilities. Options including integrating graphical and text-based weather products and other aeronautical information for use in pilot briefings; integrating aeronautical data updates with NOTAM and flight plan data into FSAM; and the development of a web portal that will provide both FAA users and aviation community users with access to the same data, improving access to consistent and accurate flight service information. In addition there will be consideration of an automatic capability to provide pilots with critical updates that occur after having received preflight briefings, and to monitor VFR aircraft in order to be more proactive in search and rescue efforts.

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

A. FSAM will provide better awareness for pilots by automatically providing critical updates on changing weather conditions, allowing pilots to make decisions sooner to avoid hazardous weather.

B. Expedited Search and Rescue (ESAR) will take a proactive approach to rapidly finding VFR aircraft that prematurely stop on their route of flight. Pilots that crash are often alive, but do not survive because it takes so long to find them. One reason is that the FAA doesn't start looking for the aircraft until 30 minutes after the pilot's Estimated Time of Arrival. ESAR will trigger alerts as soon as the pilot stops prematurely.

Program Plans FY 2012 – Performance Output Goals
- Achieve Initial Investment Decision (IID) for FSAM.

Program Plans FY 2013 – Performance Output Goals
- Achieve FSAM Final Investment Decision (FID).

Program Plans FY 2014-2016 – Performance Output Goals
- TBD – Pending approval.

B, FLIGHT SERVICES FACILITIES – ALASKA FLIGHT SERVICE FACILITY MODERNIZATION (AFSFM), F05.04-02

Program Description

The Alaska Flight Service Modernization (AFSM) program modernizes or replaces the Flight Service facilities in Alaska to ensure the security and sustainment of Flight Services, and develop the infrastructure for continuity of operations. Over 1/3 of the Alaska Flight Service facilities were constructed in the 1970's and require extensive renovations to meet current building codes, fire life safety, Architectural Barriers Act Accessibility Standard (ABAAS) and electrical standards. Specifically, 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. A Flight Services Delivery Study will be conducted to analyze facility locations, areas of service demand, conditions of existing facilities and quality of life issues, and identify cost effective and efficient means of delivering flight services in Alaska.

The Alaska Flight Services Modernization program will conduct an analysis of Alaskan Flight Services facilities to identify and prioritize actions required to maintain and sustain each facility. In coordination with Technical Operations and Western Service Center, develop a plan to maintain and sustain Alaskan Flight Services facilities.

In FY 2012 the Alaska Flight Service Facility Modernization funds will be used for Dillingham FSS construction completion as well as Ketchikan FSS roof replacement and siding replacement/repair.

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 – 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 AFSM program will directly contribute to the FAA's Greater Capacity safety goal by increasing operational availability and capabilities by providing facilities upgrades and addressing quality of life issues in existing Alaska Flight Services Facilities.

Program Plans FY 2012 – Performance Output Goals
- Continue sustainment of Alaska Flight Services Facilities.

Program Plans FY 2013-2016 – Performance Output Goals
- Continue sustainment of Alaska Flight Services Facilities.

2C03, WEATHER CAMERA PROGRAM
FY 2012 Request $4.8M

- 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, 520, which is 35% of those accidents, occurred in Alaska.

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 – By the end of FY 2019 reduce the Rate of Fatal and Serious Injury Accidents by 10% in 10 Years.*

Relationship to Performance Target

One of the Strategic 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 2012 – Performance Output Goals
- Install and make operational an additional 24 camera sites for a total of 190 sites by September 30, 2012.

Program Plans FY 2013 – Performance Output Goals
- Install and make operational an additional 25 camera sites for a total of 215 sites by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals
- Install and make operational an additional 6 camera sites for a total of 221 sites by September 30, 2014.

Program Plans FY 2015-2016 – Performance Output Goals
- None.

D. Landing and Navigational Aids Programs

2D01, VHF Omnidirectional Range (VOR) With Distance Measuring Equipment (DME)

FY 2012 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. VORs 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 modernized.

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 3 – 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 2012 – Performance Output Goals

- Procure five Very High Frequency Omnidirectional Range (VOR) collocated with Distance Measuring Equipment Electronics Kits.
- Procure five Very High Frequency Omnidirectional Range Doppler Antenna Kits.
- Replace the Runway End Identifier Lights at 20 locations.
- Attain service availability for one (Dopplerize) Very High Frequency Omnidirectional Range at one location.

Program Plans FY 2013-2016 – Performance Output Goals

- Attain service availability for one (Dopplerize) Very High Frequency Omnidirectional Range at one location.

2D02, INSTRUMENT LANDING SYSTEMS (ILS) – ESTABLISH
FY 2012 Request $5.0M

- 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 2012 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.
- Install MALSR systems at two locations.

Program Plans FY 2013-2016 – Performance Output Goals
- Procure eight Instrument Landing Systems.
- Install Instrument Landing Systems at eight locations.

2D03, WIDE AREA AUGMENTATION SYSTEM (WAAS) FOR GPS

FY 2012 Request $125.5M

- 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, over the entire National Air Space. WAAS also overcomes the limitations of 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 involves development, modernization, technology refresh and enhancement of WAAS.

WAAS has two remaining segments:
1. Phase III – Full LPV-200 Performance 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: Trajectory Based Operations, High Density Airports, and Flexible Terminal and Airports.

The program funds the following efforts:
1. Satellite leases for GEO #3, GEO #4, Gap Filler GEO, as well as the development of the 5th GEO payload;
2. Development efforts in the transition to a second civil frequency (L5), completion of GIII receiver development, and communication upgrades;
3. Survey Development;
4. Development of 500 approach procedures (FAA Strategic Plan Initiative), additional survey costs due to modifications in survey development criteria, as well as associated flight inspections. Additionally, this would include data collection by operators, benefits analysis, and development of WAAS-specific procedures within the NAS;
5. Threat model assessments, conduct ionospheric analysis, safety analysis, and support GNSS evolutionary architecture studies in cooperation with DOD GPS Modernization efforts; and
6. Technical assistance contracts to support program management, planning, software and hardware development, software and safety assurance, finance, system performance assessment, logistics, training, test and evaluation, reliability-maintainability-availability (RMA) analysis, quality assurance (QA), human factors (HF), earned-value management (EVM), security, safety engineering, and specialty engineering.

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. The WAAS Phase IV effort, Dual Frequency Operations, will begin development in FY 2014 and extend through 2028. The Department of Defense notified the GPS user community through a Federal Register Notice (Vol. 73, NO. 96, May 16, 2008) that the L2 P signal will end in December 2020. The FAA intends to replace the use of L2 P by WAAS with the second civil frequency (L5). As a civilian signal, L5 can also be used by civilian receivers and provides improved accuracy for civil users of GPS. Aircraft receivers that can process inputs from both frequencies can internally calculate a correction for errors in the GPS position information caused by ionospheric refraction. An upgraded WAAS will then provide a more robust LPV-200 signal for dual frequency users. The expectation is that users will equip with dual frequency (L1/L5) avionics when the upgraded system is operational. For those users who do not upgrade avionics, WAAS will continue to support single frequency users during and after Phase IV, upgrade implementation. There will be a continuing need to acquire replacement GEOs throughout the WAAS lifecycle to ensure the current and future WAAS signal in space remains available.

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 nation's 19,000 runway ends.

Program Plans FY 2012 – Performance Output Goals

- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends to increase safety and capacity of airspace.
- Complete Ionosphere Robustness Upgrade and hardware and software upgrades #3.

Program Plans FY 2013 – Performance Output Goals
- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends to increase safety and capacity of airspace.
- Complete continuity and availability upgrades including hardware and software upgrades #4.
- Complete G-III Reference receiver development.

Program Plans FY 2014 – Performance Output Goals
- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends to increase safety and capacity of airspace.
- Initiate design and prototype of L1/L5 architecture and hardware and software upgrades #5.
- Complete 5th Geo Milestone 1 – GEO integration and testing.

Program Plans FY 2015 – Performance Output Goals
- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends to increase safety and capacity of airspace.
- Complete L1/L5 Architecture design, testing, software and hardware upgrades #6.
- Complete 5th GEO Integration into WAAS.
- G-III Fielding – Operational System/ Cutover into WAAS.

Program Plans FY 2016 – Performance Output Goals
- Continue to develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends to increase safety and capacity of airspace.
- Complete L1/L5 Architecture definitization and initiate L1/L5 architecture development.
- Complete Safety Computer Upgrade.
- Upgrade #7 for WAAS hardware and software to implement dual frequency operations.

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
- FY15 Hardware Upgrade #6 – G-III Implementation
- FY16 Hardware Upgrade #7 – Dual Frequency I

- FY12 Software Upgrade #3 – Obsolescence Upgrade I
- FY13 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
- FY16 Software Upgrade #7 – Dual Frequency/Algorithm II

Implementation schedule for new GEO:
- Install Ground Uplink Station for 5th GEO (FY13)
- Develop 5th GEO Satellite Payload (FY12-13)
- 5th GEO System Integration & Test (FY13-14)
- 5th 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 Strategic Plan initiative calls for development of 500 new procedures in FY 2011, and that initiative will 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 two years prior. Hence, surveys contracted in FY 2011 will be delivered in 2012 and used to support procedure development in FY 2013.

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 2012-2016 – Performance Output Goals

- Complete a sufficient quantity of Surveys to ensure the ability to develop 500 WAAS procedures per year.

2D04, RUNWAY VISUAL RANGE (RVR)

FY 2012 Request $5.0M

- Runway Visual Range (RVR) – Replacement/Establishment – N08.02-00

Program Description

The Runway Visual Range (RVR) system provides pilots and air traffic controllers with a measured value for the 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 safer than the older systems 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, 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 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 3 – 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 measurements 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. This negatively affects airport capacity and reduces adjusted operational availability. The replacement or upgraded equipment requires less maintenance and repair time, which reduces system downtime, consequently improving traffic flow capacity, and adjusted operational availability.

Program Plans FY 2012 – Performance Output Goals
- Procure ten RVR systems.
- Begin the installation of RVR systems at eight locations.

Program Plans FY 2013 – Performance Output Goals
- Install RVR systems at five locations.

Program Plans FY 2014-2016 – Performance Output Goals
- Procure four RVR systems.
- Install RVR systems at four locations.

2D05, APPROACH LIGHTING SYSTEM IMPROVEMENT PROGRAM (ALSIP)
FY 2012 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 (ALSF-2) provides visual information on whether the pilot is aligned with the runway centerline, the aircraft's height above the runway plane, 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 fly below the minimum recommended altitudes and risk striking these structures during departure or landing. It also directly affects the goal of reducing aircraft fatal accidents.

Program Plans FY 2012 – Performance Output Goals
- Procure 10 Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights systems.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at four locations.
- Replace the High Intensity Approach Lighting System with Sequenced Flashing Lights at one location.

Program Plans FY 2013 – Performance Output Goals
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at one location.
- Replace the High Intensity Approach Lighting System with Sequenced Flashing Lights at one location.

Program Plans FY 2014 – Performance Output Goals
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at one location.
- Replace the High Intensity Approach Lighting System with Sequenced Flashing Lights at one location.

Program Plans FY 2015 – Performance Output Goals
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at one location.
- Replace the High Intensity Approach Lighting System with Sequenced Flashing Lights at one location.

Program Plans FY 2016 – Performance Output Goals
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.

2D06, DISTANCE MEASURING EQUIPMENT (DME)
FY 2012 Request $5.0M

- Sustain Distance Measuring Equipment (DME), N09.00-00

Program Description

DMEs are radionavigation aids that are used by pilots to determine the aircraft's distance from the DME 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 90 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 because the continuous ranging information from a LPDME allows procedure designers more flexibility in terms of where step down fixes are placed and how many are needed, leading to better specification/control over the vertical descent profile thus reducing CFIT risks.

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 2012 – Performance Output Goals
- Procure four Distance Measuring Equipment systems.
- Begin the installation of LPDME at 34 locations.

Program Plans FY 2013 – Performance Output Goals
- Procure 25 Distance Measuring Equipment systems.
- Install Distance Measuring Equipment systems at 25 locations.

Program Plans FY 2014-2016 – Performance Output Goals
- None

2D07, VISUAL NAVAIDS – ESTABLISH/EXPAND
FY 2012 Request $3.4M

- 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 lamp housing assemblies arranged perpendicular to the edge of the runway. The PAPI projects a pattern of red and white lights along the desired glide slope so a pilot can tell whether they are on the glide slope and how to correct their glide slope if they above or below it. A REIL is a 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) recommendations 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 when runways are 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 enhances system safety by reducing the probability of a Controlled Flight into Terrain accident during approach and landing. Installing the REIL system reduces accidents because the system clearly identifies the approach end of a runway to the pilot.

Program Plans FY 2012 – Performance Output Goals

- Procure 45 Precision Approach Path Indicator systems.
- Install Precision Approach Path Indicator systems at five locations.

Program Plans FY 2013 – Performance Output Goals

- Install Precision Approach Path Indicator systems at 13 locations.

Program Plans FY 2014-2016 – Performance Output Goals

- None

2D08, INSTRUMENT FLIGHT PROCEDURES AUTOMATION (IFPA)

FY 2012 Request $2.2M

- Instrument Flight Procedures Automation (IFPA) – Tech Refresh, A14.02-02

Program Description

FAA's Aeronautical Products (AJV-3) directorate maintains more than 20,000 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 approaches 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, does not meet all of today's functional or integration requirements. The current IAPA system is barely able to support the existing inventory of 20,000 instrument flight procedures. A modern integrated system is being installed to accommodate the expected growth of the NAS. Aeronautical Products is replacing IAPA to increase functional capabilities, and increase 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 in supporting instrument flight procedures development. It will include functionality for developing approaches, missed approaches, circling, 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 of systems will be accomplished between the Aeronautical Products organization and the Flight Inspections Operations Office of the Aviation System Standards organization, eliminating manual effort and duplication of data.

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 the Automated Process Tracking System (APTS). IFP and APTS deployments have been ongoing since FY 2007, and efficiency benefits documented in the IFPA OMB300 have been achieved. 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 began in early FY 2010 and will continue through FY 2012, with IAPA replacement scheduled for late 2012.

Beginning in FY 2012, Aeronautical Products must replace legacy workflow infrastructure software with the FAA's newly procured enterprise-wide Business Process Management (BPM) Commercial-Off-The-Shelf (COTS) software as part of the Tech Refresh project. The current vendor, Oracle Corporation, no longer supports the legacy workflow software. In addition, beginning in FY 2013 the Tech Refresh project will allow upgrade of the IPDS software tool for COTS architecture changes, including conversion for the upcoming Windows-7 operating system. Computer servers used to execute the IFPA tool suite will be due for Tech Refresh in FY 2013.

In November 2010, the IFPA Tech Refresh cost and schedule baseline was approved by the Joint Resources Council (JRC).

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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 2012 – Performance Output Goals
- Complete COTS BPM Workflow Software Replacement Configuration.

Program Plans FY 2013 – Performance Output Goals
- Complete IPDS Phase 1 COTS Technology Refresh.

Program Plans FY 2014 – Performance Output Goals
- Complete COTS BPM Workflow Software Replacement Phase 1.
- Complete Windows-7 upgrade to IPDS.

Program Plans FY 2015 – Performance Output Goals
- Complete COTS BPM Workflow Software Replacement Phase 2.

Program Plans FY 2016 – Performance Output Goals
- Complete COTS BPM Workflow Software Replacement Phase 3.
- Complete IPDS Phase 2 COTS Technology Refresh.

System Implementation Schedule

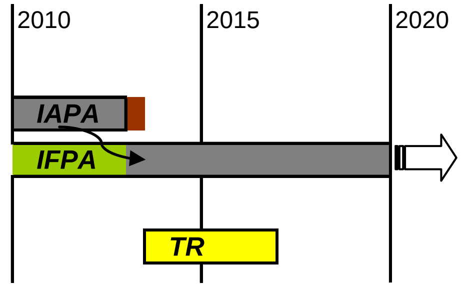
Instrument Flight Procedures Automation (IFPA)

Last site Decom: January 2013

First site IOC: June 2007 -- Last site IOC: September 2012

Instrument Flight Procedures Automation (IFPA) - Tech Refresh

First site: September 2013 -- Last site: September 2016



2D09, NAVIGATION AND LANDING AIDS – SERVICE LIFE EXTENSION PROGRAM (SLEP)

FY 2012 Request $6.0M

- Navaids – Sustain, Replace, Relocate, N04.04-00

Program Description

This program renovates or replaces airport approach lighting systems at sites where there is a high risk for failure of these systems and where failure would result in denying use of the primary precision approach. 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 also 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, and 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 ILS.

This program also supports various other efforts that are related to the replacement of navigation equipment, such as: replace guide wires that support a 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, 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 regulators, installing an improved monitoring system and replacing electrical cables at some locations.

This program supports product improvements, modifications, and technological upgrades to visual lighting system 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 3 – 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 lighting systems are maintenance intensive, resulting in excessive downtime, which negatively impacts airport 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 2012 – Performance Output Goals

- Begin the replacement of various systems at 36 locations

Program Plans FY 2013 – Performance Output Goals

- Procure eight ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 30 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at eight locations.

Program Plans FY 2014-2016 – Performance Output Goals

- Procure three ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 10 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at three locations.

2D10, VASI Replacement – Replace with Precision Approach Path Indicator

FY 2012 Request $7.0M

- 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 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 systems 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 2012 – Performance Output Goals

- Procure 45 Precision Approach Path Indicator systems.
- Begin the replacement of VASI systems with PAPI systems at 20 locations.

Program Plans FY 2013-2016 – Performance Output Goals

- Procure 12 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 12 locations.

2D11, GLOBAL POSITIONING SYSTEM (GPS) CIVIL REQUIREMENTS

FY 2012 Request $50.3M

- 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) per a 2008 DoD/DOT Memorandum of Agreement on Civil Use of GPS 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 2012-2013 – Performance Output Goals

- Provide funding to the Air Force GPS Wing is to implement 1) Civil Signal Monitoring, 2) L1C signal and 3) program oversight and technical support.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

2D12, RUNWAY SAFETY AREAS – NAVIGATION MITIGATION

FY 2012 Request $25.0M

- 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 RSA must be free of all objects that are 3 inches above grade and are not frangible. The relocation or removal of existing rigid objects will decrease the potential for damage to aircraft and minimize injuries or fatalities to aircraft passengers and crew members if an aircraft has to use the RSA.

The 2006 DOT Appropriations (PL-109-115) required Part 139 certificated airports to comply with the current RSA airport design standards prior to December 31, 2015. In accordance with PL-109-115, the FAA must report on the agency's progress toward RSA improvements.

The FAA has identified 1,266 RSA projects of varying size and complexity that need to be addressed at various airport locations. These projects would replace non-compliant navaids in the RSAs. The projected funding levels will require a phased approached to continue the implementation of RSA projects. Initial funding will be provided each fiscal year, while completion funding will typically be provided the following fiscal year. However, the projected funding levels will create a significant backlog of requirements for the RSA program.

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

RSA compliance provides a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs. This initiative will address FAA-owned NavAids that do not conform to the current RSA standards and modify them to ensure their compliance with Part 139 in Title 14 of the US CFR.

Large NavAids that are not moved or made frangible can pose a considerable safety risk to aircraft and passengers when struck during an overrun. For example, in June 1975 a Boeing 727 crashed into several non-frangible approach lighting systems (ALS) towers while attempting to land at John F. Kennedy Airport in New York. Of the 124 persons aboard, 113 died of injuries received in the crash.

Program Plans FY 2012 – Performance Output Goals

- Procure approximately 26 navaids.
- Provide completion funding for approximately 254 RSA projects.
- Provide initial funding for approximately 370 RSA projects.

Program Plans FY 2013 – Performance Output Goals

- Procure approximately 23 navaids.
- Provide completion funding for approximately 370 RSA projects.
- Provide initial funding for approximately 289 RSA projects.

Program Plans FY 2014 – Performance Output Goals

- Procure approximately 27 navaids
- Provide completion funding for approximately 289 RSA projects.
- Provide initial funding for approximately 248 RSA projects.

Program Plans FY 2015 – Performance Output Goals

- Provide completion funding for approximately 248 RSA projects.

Program Plans FY 2016 – Performance Output Goals

- Provide funding to complete remaining RSA projects.

2D13, NAVAID CONTROL, INTERLOCK, AND MONITORING EQUIPMENT (NCIME)

FY 2012 Discretionary $0.0M
FY 2012 Mandatory $1.0M
FY 2012 Total Request $1.0M

- Navaid Control, Interlock, and Monitoring Equipment (NCIME), N18.01-01

Program Description

Because individual display and control devices have been installed in towers for the multiple navigation facilities supporting the airport, an important objective is to design and install a consolidated display and integrated control panel for the controllers. The NCIME program will modernize and consolidate the existing displays and controls. This modernization will include safety features such as an interlock to prevent simultaneous operation of ILSs at opposite ends of the same runway. NCIME will indicate to the air traffic controllers the status of the navigational aids and standardize the equipment used to control, monitor and interlock NAVAIDS equipment. It will expedite runway configuration changes and mitigate safety hazards inherent in the existing Integrated Control and Management System (ICMS).

The following quantities/locations are identified as candidate airports for a NCIME system:

Location	NCIME Quantity
OEP Airports	35
Non-OEP airports which are on the list of the top-50 busiest	5
FAA airports on neither list, but have 5 or more ILSs	7
Additional FAA Airports	168
Mike Monroney Aeronautical Center (MMAC)	3
William J Hughes Technical Center	1
TOTAL	**219**

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

- *FAA Strategic Goal 1 – Increased Safety.*
- *FAA Objective 2 – Reduce general aviation potential hazards.*
- *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 NCIME will mitigate potential safety hazards that have been identified with the current system called Integrated Control and Management System (ICMS™). The new system will provide the following capabilities:

1. If the NCIME system fails, it will not affect the operation of the facilities that were operational.
2. Aircraft flying on final approach will still be provided approach guidance avoiding any potential accident.
3. Due to standardization of the displays, runway reconfiguration selection risk is greatly reduced.

Program Plans FY 2012 – Performance Output Goal
Discretionary

- None.

Mandatory

- Support Final Investment Decision, Solicitation, and SIR activities to prepare for contract award and competitive bid.

Program Plans FY 2013-2016 – Performance Output Goals

- None – Pending approval.

E. OTHER ATC FACILITIES PROGRAMS

2E01, FUEL STORAGE TANK REPLACEMENT AND MONITORING
FY 2012 Request $6.4M

- Fuel Storage Tanks, F13.01 00

Program Description

The FAA Fuel Storage Tank (FST) program designs, fields, and sustains bulk liquid and pressure vessel storage systems that support FAA operations across the NAS. The FST systems are classified under Facility Equipment and Systems Profile designation TANK, and 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 (fuel monitoring systems); and electronic/electrical system operation devices (control boards, technician operations stations, switched relays, etc.). The FST Program active inventory includes over 3,000 TANK systems and historical data is retained on over 1,500 previously closed/removed systems.

The majority of FAA storage tanks support electrical generator operations. Standby generators (SX) provide NAS facilities with an alternative power supply during periods of commercial power company outages. Prime generators (PX) provide the sole source for operations electrical power. A loss of integrity on any FST component will affect the operation of the generator systems and may ultimately result in a total facility failure.

Storage tanks have historically contained materials that, if accidentally released, could cause an adverse environmental impact or result in personal injury. In response to the risk of accidental release, the federal government, the various legislatures, county governments and city jurisdictions have passed statutes specifying the minimum requirements for the construction, installation, removal, and operations of storage tank systems. Additional regulations have been established under the jurisdiction of state, local and international building codes, fire protection codes, airport operating authority requirements, and Occupational Safety and Health Administration (OSHA) mandates. Failure to comply with all elements of these regulatory requirements exposes FAA to the risk of fines and other penalties including loss of the right to use or refill the systems.

Implementation is amortized against a 20 year system service lifecycle. An average of 150 FST system replacements is required annually to sustain NAS operational integrity. TANK system components have differing lifecycles so component sustainment requirements continue to accrue within full system replacement lifecycles.

Additionally, changes in the regulatory environment require immediate response to assure fielded units meet current standards.

Current major initiatives for the FST Program include TANK system upgrades at the Air Route Traffic Control Centers (ARTCC) and PX facilities. These TANK systems have been redesigned to provide enhanced technician control, increase redundant capacity and comply with current regulations.

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 – 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 prioritized based on a successful ranking 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 2012 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Ft. Worth Center (ZFW)/ Kansas City Center (ZKC).
- Implement Prime Power fuel system upgrade at 2 sites, Middleton Island, AK (MDO)/ Cape Yakataga, AK (CYT).
- System replacements under lifecycle management – Various.
- Emergency response to integrity or regulatory requirements – Various.

Program Plans FY 2013 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Chicago Center (ZAU)/ Minneapolis Center (ZMP).
- Implement Prime Power fuel system upgrade at 2 sites, Coghlan Island, AK (CGL)/Fire Island, AK (QAI).
- System replacements under lifecycle management – Various.
- Emergency response to integrity or regulatory requirements – Various.

Program Plans FY 2014 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Seattle Center (ZSE)/ Oakland Center (ZOA).
- Implement Prime Power fuel system upgrade at 2 sites, Chandalar, AK (CQR)/Lynn's Inters Glacier, AK (JDL).
- System replacements under lifecycle management – Various.
- Emergency response to integrity or regulatory requirements – Various.

Program Plans FY 2015 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Washington Center (ZDV)/ Salt Lake Center (ZLC).
- Implement Prime Power fuel system upgrade at 1 site, Summit, AK (UMM).
- System replacements under lifecycle management – Various.
- Emergency response to integrity or regulatory requirements – Various.

Program Plans FY 2016 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Anchorage Center (ZAN)/ Jacksonville Center (ZJX).
- System replacements under lifecycle management – Various.
- Emergency response to integrity or regulatory requirements – Various.

2E02 Unstaffed Infrastructure Sustainment

FY 2012 Discretionary $18.0M
FY 2012 Mandatory $4.6M
FY 2012 Total Request $22.6M

- FAA Buildings and Equipment Sustain Support – Unstaffed Infrastructure Sustainment, F12.00-00

Program Description

The Unstaffed Infrastructure Sustainment (UIS) Program supports NAS structures and equipment to ensure reliable delivery of Air Traffic Control services and capabilities. Efforts include major replacement and/or upgrading of real property and structures which are normally not staffed. Projects to renovate unstaffed infrastructure include:

- Major upgrade and/or replacement of FAA property including: access roads, grounds, security 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, and lighting. NAS communication, surveillance, navigation and weather services equipment is currently housed in approximately 36,000 unstaffed facilities around the country. The anticipated service life for most of this infrastructure is 25 years, and according to the Facility Service and Equipment Profile (FSEP) database, over 50 percent (50%) of the FAA's current unstaffed infrastructure will exceed its service life within the next five (5) years. In addition, the FAA infrastructure portfolio is complex with several facilities located at remote site, which require unique logistical solutions
- Replacement or renovation of NAS towers that are the supporting structures for antennas and other communications, surveillance, navigation and weather equipment.
- Seismic: The FAA is required by Public Law (42 USC 7701), Executive Order (12699 and 12941) and DOT Policy (SS-98-01) to fund and execute a cost effective, long term earthquake risk mitigation program. The Seismic Safety Risk Mitigation program is the FAA's effort to comply with these mandates, protect the safety of FAA employees, protect the buildings and equipment in earthquake prone regions, control the cost of mitigation and reduce the cost of avoidable repairs following an earthquake.
- Life Safety: Significant and unacceptable life safety risks have been identified at over 50 FAA facilities. These risks place the safety of FAA employees and the flying public in jeopardy. The potential for injury, loss of life, loss of buildings and equipment, and the cost of NAS disruptions are entirely avoidable.

Initial portfolio analysis has revealed that many unstaffed facilities:

- Are not compliant with applicable regulations and standards.
- Cannot protect vital air traffic control systems or equipment against premature failure due to environmental impacts (e.g., temperature, excessive corrosion, other).
- While operable, have a fair to poor overall facility condition index (FCI) *(Good Condition is 1.0 – 0.95, Fair Condition is 0.95 – 0.90, Poor Condition is below 0.90).*
- Have impaired or poor facility accessibility.
- Have structures supporting air-ground communications and navigation and landing aids that have been weakened due to environmental factors (e.g., broadcast towers).

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

- *FAA Strategic Goal 2 – Greater Capacity.*
- *FAA Objective 1 – Increase capacity to meet projected demand and reduce congestion.*
- *FAA Performance Target 3 – 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 2012 – Performance Output Goals

Discretionary

- Reduce the number of NAS outages and repair facilities in poor condition and perform structural safety investigations of FAA owned buildings in seismic hazard areas, provide technical training for FAA engineers involved in building and maintaining facilities, and provide personal safety guidance training for all occupants of FAA buildings.
- Initiate 250 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 206 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Accomplish/conduct (3) Seismic Safety Risk Mitigation awareness training classes for Tech Ops personnel by September 30, 2012.

Mandatory

- Upgrade unstaffed infrastructure (buildings, shelters, HVAC, broadcast towers and security) at the top 100 Airports to support Next Generation Communications (NEXCOM) systems being deployed. The NEXCOM Program is currently upgrading communications system at 100 Remote Transmitter Receivers (RTR) and Remote Communications Air Ground (RCAG) facilities per year.
- Complete and brief JRC Investment Analysis Readiness Decision package by February, 2012.
- Initiate 75 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 60 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.

Program Plans FY 2013 – Performance Output Goals

- Complete and brief JRC Initial Investment Decision package by February, 2013.
- Initiate approximately 150-200 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Develop comprehensive inventory of unstaffed and staffed facilities within the FAA and increased accuracy of the overall the FAA's inventory of unstaffed infrastructure and estimate of deferred maintenance.
- By 9/30/2013, Establish FY 2014 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service (AJW-23) to ensure compliance requirements are addressed.
- Accomplish/conduct (3) Seismic Safety Risk Mitigation awareness training classes for Air Traffic Organization personnel by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals

- Complete and brief JRC Final Investment Decision package by February, 2014.
- Initiate 200 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2014, Establish FY 2015 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service (AJW-23) to ensure compliance requirements are addressed.
- Accomplish/conduct (3) Seismic Safety Risk Mitigation awareness training classes for Air Traffic Organization personnel by September 30, 2014.

Program Plans FY 2015 – Performance Output Goals

- Initiate 200 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2015, Establish FY 2016 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service (AJW-23) to ensure compliance requirements are addressed.
- Accomplish/conduct (3) Seismic Safety Risk Mitigation awareness training classes for Air Traffic Organization personnel by September 30, 2015.

Program Plans FY 2016 – Performance Output Goals

- Initiate 200 projects in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Execute 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2016, Establish FY 2017 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service (AJW-23) to ensure compliance requirements are addressed.
- Accomplish/conduct (3) Seismic Safety Risk Mitigation awareness training classes for Air Traffic Organization personnel by September 30, 2016.

2E03, AIRCRAFT RELATED EQUIPMENT PROGRAM

FY 2012 Request $11.7M

- A, Aircraft Related Equipment Program, M12.00-00
- B, 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 FY 2012 – Performance Output Goals
- Begin installation of NAFIS Phase I in the Challenger 601 and 605 aircraft.
- Continue NAFIS Phase I installation in the Beech 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 Flight Inspection Airborne Processor Application (FIAPA) Block 1 development.
- Continue integration of NextGen ADS-B system requirements and FI aircraft equipment installations with ongoing ARE projects and production schedules.

Program Plans FY 2013 – Performance Output Goals
- Continue NAFIS Phase I installation in the Beech fleet.
- Complete installation of NAFIS Phase I in the Challenger 601 and 605 aircraft.
- 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.
- Start flight deck navigation updates for the Challenger 601 fleet.
- Sustain AFIS to comply with NextGen NAS requirements.
- Continue integration of NextGen ADS-B system requirements and FI aircraft equipment installations with ongoing ARE projects and production schedules.

Program Plans FY 2014 – Performance Output Goals
- 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 integration of NextGen ADS-B system requirements and FI aircraft equipment installations with ongoing ARE projects and production schedules.
- Begin installation of NAFIS Phase I on the Learjet fleet.

Program Plans FY 2015 – Performance Output Goals
- Continue NAFIS Phase II installation in the FI fleet.
- Sustain NAFIS to comply with NextGen NAS requirements.
- Continue flight deck navigation updates for Learjet fleet.

Program Plans FY 2016 – Performance Output Goals
- Begin Flight Deck navigation updates to the Challenger 601 fleet.
- Complete Flight Deck updates to the Learjet fleet.
- Continue NAFIS Phase II installation on the FI fleet.

B, AIRBUS SIMULATOR PURCHASE – ADVANCED FLY-BY-WIRE SIMULATOR – TECHNICAL REFRESH, M12.01-03

Program Description

The FAA is responsible for the development, analysis and introduction into the NAS of new concepts and technologies for aircraft navigation and instrument flight operations. The FAA Flight Technologies and Procedures Division (AFS-400) establishes and governs policies, criteria and standards by which terminal and en route flight procedures are established and maintained. AFS-400 is also responsible for approving special instrument approach procedures and requests for waivers of standards.

The FAA acquired an Airbus 330/340 (A330/340) convertible 6-axis full flight aircraft simulator that replicated 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 electronic Fly-By-Wire (FBW) flight control technologies. 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. These initiatives include Automatic Dependent Surveillance-Broadcast (ADS-B) Forward Field Of View, ADS-B Autopilot Upgrade, and Advanced Technology Head-Up–Display (HUD) with Enhanced and Synthetic Flight Vision Technology. This simulator supports NAS NextGen modernization and development initiatives such 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 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 (installation of upgrades developed by the manufacturer) levels. In addition, A350 and A380 simulator Aerodynamic Performance Models will be installed to further explore operational impacts on the NAS from these aircraft types.

Final investment decision for the Airbus simulator Technical Refresh program was approved in September 2010. Technical Refresh funding for this simulator is being requested in FY 2012, FY 2013 and FY 2014.

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 analysis data to ensure safe implementation of new technologies while increasing capacity within the NAS. Improve safety by assisting accident investigators and other inspectors and analysts with replication of mishap incident and trend data that may provide input into procedure and/or equipment modifications. The simulator's high fidelity capability and operational realism along with the ability to quickly modify operational procedures for evaluation will provide enhanced aircraft performance and HITL data for safety analyses across all flight segments.

Program Plans FY 2012 – Performance Output Goals
- Contract Award, Synthetic Vision May 17, 2012.
- Contract Award, Advanced Technology HUD September 19, 2012.
- Contract Award, ADS-B Forward Field of View Upgrade September 14, 2012.
- Contract Award, ADS-B Autopilot Upgrade, September 28, 2012.

Program Plans FY 2013 – Performance Output Goals
- In Service, Synthetic Vision November 15, 2012.
- Contract Award, A380 Aerodynamic Performance Model May 3, 2013.

Program Plans FY 2014 – Performance Output Goals
- In Service, Advanced Technology HUD October 31, 2013
- Contract Award, A350 Aerodynamic Performance Model, September 29, 2014.
- In Service, ADS-B Forward Field of View Upgrade February 28, 2014.
- In Service, ADS-B Autopilot March 14, 2014.

Program Plans FY 2015 – Performance Output Goals
- In Service, A380 Aerodynamic Performance Model December 18, 2014.

Program Plans FY 2016 – Performance Output Goals
- In Service, A350 Aerodynamic Performance Model May 13, 2016.

2E04, AIRPORT CABLE LOOP SYSTEMS – SUSTAINED SUPPORT
FY 2012 Request $5.0M

- Airport Cable Loop Systems – Sustained Support, F10.00-00

Program Description

This program replaces 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 3 – Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 OEP airports through FY 2013.*

Relationship to Performance Target

The Airport Cable Loop Systems will reduce the number of unplanned outages due to degrading copper cables by replacing existing unsupportable communications equipment, and deteriorated underground cable. The program improves signaling and communications which allows for greater capacity and increased operational availability of infrastructure systems.

Program Plans FY 2012 – Performance Output Goals

- Complete fiber installation at Ronald Reagan Washington National Airport (DCA).
- Complete fiber installation at Boston-Logan Airport.

Program Plans FY 2013 – Performance Output Goals

- Complete Add Drop Multiplexer (ADM) installation at Ronald Regan Washington National Airport (DCA).
- Complete ADM installation at Boston Logan Airport.

Program Plans FY 2014 – Performance Output Goals

- Complete fiber installation at Cleveland, OH Airport (CLE).
- Complete fiber installation at Ontario, CA Airport (ONT).

Program Plans FY 2015 – Performance Output Goals

- Begin preliminary to intermediate construction efforts at three airports. The Program will concentrate on planning for sustainment efforts at OEP (retrofit) and lower level (non-OEP) airports.

Program Plans FY 2016 – Performance Output Goals

- Three additional airports will be started this year. The FY 2014 planning activities will confirm the sites. The Program will concentrate on planning for sustainment efforts at OEP (retrofit) and lower level (non-OEP) airports.

2E05, ALASKAN SATELLITE TELECOMMUNICATIONS INFRASTRUCTURE (ASTI)

FY 2012 Discretionary $16.0M
FY 2012 Mandatory $3.0M
FY 2012 Total Request $19.0M

- Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network – ANICS Modernization – Alaskan Satellite Telecommunication Infrastructure (ASTI), C17.02-01

Program Description

The ANICS project (renamed ASTI) was implemented to achieve more reliable 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 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 for critical air traffic control services has fallen below 0.9999 and continues to decline. Many system components have either reached the end of their useful life or are no longer supportable. Several antennas and their protective covers have been destroyed by high winds, and other antennas are fast eroding due to their coastal location. In recent years, aggressive system technical service efforts have been required to maintain overall system availability and reliability. The communication system has experienced a loss of performance capability, increased maintenance, and higher costs.

The ASTI project will replace and/or upgrade system components to raise system availability to required levels (0.9999), reduce the frequency of system alarms and outages, and reduce the level of FAA maintenance. The ASTI program will replace the following major components:

- Antennas,
- Radomes,
- Satellite modems,
- Multiplexing equipment,
- Radio Frequency equipment, and
- Network Management hardware and software.

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

- *FAA Strategic Goal 1 – Increased Safety.*
- *FAA Objective 2 – Reduce general aviation fatalities.*
- *FAA Performance Target 2 – By the end of FY 2019 reduce the Rate of Fatal and Serious Injury Accidents by 10% in 10 Years.*

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 0.9999, 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 2012 – Performance Output Goals

<u>Discretionary</u>

- Conduct First Article Test.
- Conduct Key Site Test.
- Begin alternate L-Band, modem, Network Management Control System (NMCS)/Multiplexer (MUX) installation at 64 sites (Hub & dual antenna sites). Actual may vary based upon validation and priority for year:
  - Replace/Upgrade 177 Modems Switches and Radio Equipment.
  - Replace/Upgrade 10 Multiplexers and Switches.
  - Install Network Management Hardware and Software and 1multi-component NMCS.

<u>Mandatory</u>

- Replace/Upgrade 34 Modems, Switches and Radio Equipment.
- Replace/Upgrade 2 Multiplexers and Switches.

Program Plans FY 2013 – Performance Output Goals

- Pre-deployment implementation at HUBs.
- Continue installation of alternate L-Band, modem, NMCS/Mux installation at 64 sites (year 2).

Program Plans FY 2014 – Performance Output Goals

- Continue installation of alternate L-Band, modem, NMCS/Mux installation at 64 sites (year 3).

Program Plans FY 2015 – Performance Output Goals

- Continue installation of alternate L-Band, modem, NMCS/Mux installation at 64 sites (year 4).

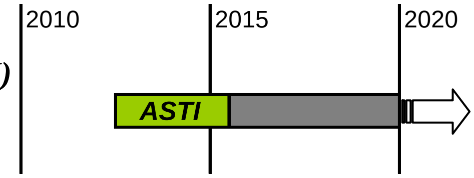
Program Plans FY 2016 – Performance Output Goals

- Complete upgrades and prepare to operational stage.

System Implementation Schedule

- Estimated contract award date is third quarter FY 2011.

Alaskan Satellite Telecommunications Infrastructure (ASTI)
First site ORD: October 2012 -- Last site ORD: June 2016



2E06, FACILITIES DECOMMISSIONING
FY 2012 Request $5.0M

- 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

This project directly supports FAA's Initiative 4 – Improve management of FAA's real property assets by optimizing maintenance costs and disposing of excess assets. Cost avoidance is derived following the disposition of legacy real properties, which are no longer required.

Program Plans FY 2012 – Performance Output Goals

- Complete 60 Real Property Disposal Projects per Service Areas. These projects include, but are not limited to, Visual Aids (Light lanes, lighted devices, etc), Navigational Aids (non-directional beacon (NDB), Direction Finder (DF), ILS, etc), Radio Communications sites including Towers (Remote Communications Outlet (RCO), remote transmitter/receiver (RTR), etc).
- Decommission 5 Obsolete Beacons (3 types; Light Beacon, Radio Ranges and Fan Markers) Nationwide.
- Decommission 6 Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Towers.

Program Plans FY 2013 – Performance Output Goals

- Complete 60 Real Property Disposal Projects per Service Areas. These projects include, but are not limited to, Visual Aids (Light lanes, lighted devices, etc), Navigational Aids (NDB, DF, ILS, etc), Radio Communications sites including Towers (RCO, RTR, etc).
- Decommission 5 Obsolete Beacons (3 types; Light Beacon, Radio Ranges and Fan Markers) Nationwide.
- Decommission 6 Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Towers.

Program Plans FY 2014-2016 – Performance Output Goals

- TBD, No Program Funding Identified.

2E07, ELECTRICAL POWER SYSTEMS – SUSTAIN/SUPPORT

FY 2012 Discretionary $85.6M
FY 2012 Mandatory $10.0M
FY 2012 Total Request $95.6M

- Power Systems Sustained Support, F11.01-01

Program Description

The Electrical Power Systems Sustain Support (PS3) (Power) program funds the initial purchase and installation of components for backup electric power systems and power regulation and protection equipment. Backup electrical power systems are necessary to allow continued operation of air traffic control facilities when there is an interruption in commercial power sources. These disruptions can result in flights that remain grounded, placed in airborne holding patterns, or re-routed to other airports unless reliable backup power systems are installed so air traffic control electronics can maintain required availability and capability. These power systems also protect sensitive electronic equipment from commercial power surges and fluctuations. The Power program replaces, refurbishes and renews components of existing power systems and cable infrastructure when necessary to maintain and improve the overall electrical power quality, reliability, and availability.

The Power program is critical to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS electrical power equipment. The Power program provides the following components and services:

1. NAS Batteries: Batteries serve as a backup power source for key NAS facilities including navigation aids and communications. These batteries provide power for a limited time during major power system disruptions and maintain the function of key systems while the NAS transitions to a safe level of reduced operation. The Power program sustains in excess of 4,000 battery installations with periodic replacement to assure reliability.

2. Uninterruptible Power Supply (UPS): A UPS is a device that conditions commercial power and prevents power disruptions and surges from adversely affecting electronic system performance. A UPS is necessary within an Airport Traffic Control Tower to ensure the continued performance of the facility and eliminate power disruptions to critical infrastructure. The Power program currently sustains 1,783 UPS with an expected service lifecycle of 20 years. A significant portion of the UPS inventory requires replacement due to reliability and supportability issues attributable to age. UPS batteries require refurbishment on a four year cycle.

3. Direct Current (DC) Power Systems: DC power systems are used to provide a low cost, shorter term alternative to an engine generator. Critical safety electronic system availability is increased and commercial power disturbances of up to several hours no longer disrupt air traffic operations. The Power program sustains 541 DC Power systems with a service lifecycle of up to 15 years.

4. En Route Power Systems: The FAA operates 23 En Route Center power systems. Because of the critical role of the En Route Centers in the NAS, 100 percent of their power systems require sustained funding to maintain reliability. The Los Angeles Air Route Traffic Control Center outage highlighted a system flaw or single point of failure that can lead to the loss of all critical and essential power. Each ARTCC requires $8,000,000 to correct this situation. The delivery of this correction will take several years to complete. ARTCC Critical and Essential Power System (ACEPS) has a payback period of less than 6 months.

5. Lightning Protection Grounding, Bonding and Shielding (LPGBS): LPGBS program provide a systematic approach to minimize electrical hazards to personnel, electromagnetic interference, damage to FAA facilities and electronic equipment from lightning, transients, electrostatic discharge (ESD), and power faults. The requirements are considered the minimum necessary to harden sites sufficiently for the FAA missions – to prevent delay or loss of service, to minimize or preclude outages, and to enhance personnel

safety. Further, the requirements for LPGBS have been coordinated with industry standards, and in some cases exceed industry standards where necessary to meet the FAA missions.

6. Power Cable: Of the $4.6 billion NAS power system infrastructure, $2.2 billion represents the power cable at airports essential to the operation of all air traffic. Seventy-five percent of this cable is well beyond the condition and age that commercial power companies would continue to operate. The top 300 airports require 18 million feet of power cable to sustain operations. Replacement of this cable costs $120 per foot and would normally be expected to last 30 years. The FAA aims to extend the life of this cable to 60 years with precise identification of candidate cables for replacement. Even with a 60 year life the annual cost of the cable replacement is estimated to be $35 million. Replacing unreliable terminal power cables has the highest priority in this request.

7. Engine Generators: Engine generators serve as a backup power source for essential NAS electronic systems when commercial power becomes unreliable due to a weather system, natural disaster or other electrical outage beyond FAA control. Without an engine generator, an FAA site may expect 10 or more hours per year of commercial power failure and hence significant NAS disruption. The Power program sustains 3,565 NAS engine generators with a useful service life of 24 years. Maintenance of the aged inventory has increased five fold in six years to avoid a significant reduction in reliability and availability.

8. Critical Power Distribution System (CPDS): CPDS consists of a family of standardized Power System types. The specific standardized CPDS type employed at a NAS ATC facility is optimally matched to the air traffic designated activity level of the NAS facility. The CPDS is designed to meet performance requirements for reliability, availability and maintainability at air traffic level wile optimizing acquisition, and logistic, and training costs.

9. Power System Engineering: Power Systems engineering is an interdisciplinary field of engineering that focuses on how electrical power systems in the NAS should be designed and managed. Systems engineering within the power services group focuses on defining and documenting customer requirements, administering the design phase, system validation, quality control, quality assurance, safety improvement, and system life-cycle.

10. Power Systems Sustained Support: PS3 ensures that electrical power is reliable and that availability meets NAS requirements. PS3 directly impacts all NAS service areas having air traffic control equipment and responsibilities. Back up Power provides an average of 40 hours of uninterrupted operation each year to every system in the NAS. Each system would fail to provide any service for a total of 40 hours per year without access to backup power.

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

Relationship to Performance Target

All NAS facilities are dependant on the availability, reliability, and quality of NAS power. Planned electrical power equipment replacement and improvement activities minimize disruption of air traffic, and maximize availability and reliability of NAS systems. Power systems sustain airport capacity by providing power that reduces the incidence of NAS delays caused by equipment outages that would otherwise have occurred during commercial power disturbances.

Program Plans FY 2012 – Performance Output Goals

Discretionary

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (66 Sets).
  2. Power Conditioning Systems (UPS) (15 Sets).
  3. DC BUS Systems (20 Sets).
  4. ACEPS En Route Critical Power Systems (3 Sets).
  5. Lightning Ground Bonding Protect Systems (4 Sets).
  6. Airport Power Cable Replacements (7 Sets).
  7. Engine Generators Replacement (102 Sets).
  8. Critical Power Distribution Systems (2 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (5 Sets).

Mandatory

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (4 Sets).
  2. Power Conditioning Systems (UPS) (1 Sets).
  3. DC BUS Systems (3 Sets).
  4. ACEPS En Route Critical Power Systems (0.5 Sets).
  5. Lightning Ground Bonding Protect Systems (0.5 Sets).
  6. Airport Power Cable Replacements (1 Sets).
  7. Engine Generators Replacement (8 Sets).
  8. Critical Power Distribution Systems (4 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (5 Sets).

Program Plans FY 2013 – Performance Output Goals

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (70 Sets).
  2. Power Conditioning Systems (UPS) (16 Sets).
  3. DC BUS Systems (23 Sets).
  4. ACEPS En Route Critical Power Systems (4 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (110 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).

Program Plans FY 2014 – Performance Output Goals

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (70 Sets).
  2. Power Conditioning Systems (UPS) (16 Sets).
  3. DC BUS Systems (23 Sets).
  4. ACEPS En Route Critical Power Systems (4 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (110 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).

Program Plans FY 2015 – Performance Output Goals

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (70 Sets).
  2. Power Conditioning Systems (UPS) (16 Sets).
  3. DC BUS Systems (23 Sets).
  4. ACEPS En Route Critical Power Systems (4 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (110 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).

Program Plans FY 2016 – Performance Output Goals

- Sustain existing NAS power systems by completing these projects (Actual may vary based upon validation and priority for year:
  1. NAS Battery set replacement (70 Sets).
  2. Power Conditioning Systems (UPS) (16 Sets).
  3. DC BUS Systems (23 Sets).
  4. ACEPS En Route Critical Power Systems (4 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (110 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).

2E08, AIRCRAFT FLEET MODERNIZATION

FY 2012 Request $9.0M

- 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.

A procurement contract was awarded for four (4) aircraft in FY 2009 using both FY 2008 and FY 2009 funds. Two (2) additional aircraft were purchased in FY 2010 on the same contract as an option. All six (6) aircraft have been delivered and are operational.

This investment will be for three (3) aircraft with a more modern avionics and cockpit configuration than the current fleet of aircraft are using. Two (2) aircraft will be procured in FY 2012 using FY2012 funds and the remaining aircraft will be procured in FY13 using both FY 2012 funds and FY 2013 funds.

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 2012 – Performance Output Goals

- Procure two (2) additional aircraft.

Program Plans FY 2013 – Performance Output Goals

- Procure one (1) additional aircraft.

Program Plans FY 2014-2016 – Performance Output Goals

- None.

2E09, FAA Employee Housing and Life Safety Shelter System Services

FY 2012 Request $2.5M

- FAA Employee Housing and Life Safety Shelter System Services, F20.01-01

Program Description

FAA Employee housing and life safety shelter system sustainment program funds the modernization (replacement/refurbishment) of the housing infrastructure. Government provided housing is necessary where there are no commercially available units available to meet the requirements of the FAA. FAA staff that use this housing include flight service station specialists, field technicians, and airport and aircraft inspectors. The Housing program replaces, refurbishes and renews components of existing housing such as roofing, windows heating and air conditioning systems and electrical wiring.

1. Roofs: The FAA housing was built between the middle 1940s and the 1980s. Roofs, facia, and soffets periodically need to be replaced to ensure the protection of the structure. This housing is located in areas of extreme weather; high winds, heavy rain, hurricanes, and extreme temperature differences. These conditions greatly decrease the life expectancy of the roofing materials.

2. Structural/Siding/Windows/Doors: Siding, windows, and doors need periodic replacement to ensure the protection of the structure. Some of the housing is located in areas with permafrost and/or earthquakes and movement of the soils under the structure can require major repairs to the foundations.

3. Electrical/Plumbing Systems: Electrical and plumbing systems in the housing need to be replaced to ensure the protection of the structure from damage due to failure of these systems.

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

Housing supporting Flight Service Stations is needed where no commercially available units are available. All NAS facilities are dependant on regular and unplanned maintenance and repair. Due to the remoteness of these locations other housing is not commercially available so loss of this housing puts all the local NAS facilities at risk due to the extra time and cost involved in daily travel to and from these sites.

Program Plans FY 2012 – Performance Output Goals

- Sustain existing NAS housing by completing these projects:
  1. Roof replacement (6 Projects).
  1. Structural/Siding/Windows/Doors (6 Projects).
  2. Electrical/Plumbing Systems (3 Projects).
- Complete at least 20% of facility condition assessment surveys* and develop Facility Condition Indexes (FCI) (*using American Society of Home Inspections—ASHI--Standards).
- Stand-up a function to oversee five-year life-cycle management to annually review and report requirements (including possible reductions or transfer of housing). This includes acquisition of a life-cycle management tool. (Function includes contracting capability or contracting liaison).
- Complete 10 major F&E Exterior Protection Projects – Install energy efficient windows, replace roofing, upgrade insulation, improve and refurbish structures to include leveling in shifting geologic conditions (e.g., Kotzebue, Alaska tundra). Install air ventilation systems to mitigate radon, provide drinking water, mitigate asbestos and provide sanitation).

Program Plans FY 2013-2014 – Performance Output Goals

- Sustain existing NAS housing by completing these projects (Actual may vary based upon validation and priority for year:
  1. Roof replacement (4 Projects).
  2. Structural/Siding/Windows/Doors (4 Projects).
  3. Electrical/Plumbing Systems (2 Projects).

Program Plans FY 2015-2016 – Performance Output Goals

- None.

ACTIVITY 3. PROCUREMENT AND MODERNIZATION OF NON-AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. SUPPORT EQUIPMENT

3A01, HAZARDOUS MATERIALS MANAGEMENT
FY 2012 Request $20.0M

- Environmental Cleanup/HAZMAT, F13.02-00

Program Description

The FAA has identified approximately 750 contaminated sites at approximately 150 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 (ESCR) is published. This document contains current and expected future cleanup activities for the 750 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 $542M un-inflated, and with contingency the un-inflated ER Liability is estimated at $700M. We continue to make good progress toward remediating sites, approximately 5% of the existing sites 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. During the period from the publication of the FY 2009 ESCR to the FY 2010 ESCR the total number of identified sites has decreased from approximately 800 to 750.

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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 2012 – Performance Output Goals

- Complete activities at five percent (5%) of the total sites listed in the FY 2011 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.
- Evaluate the FY 2011 project cost estimates produced in the Remedial Action Cost Estimating Requirements tool, and refine their use during the development of the FY 2012 cost estimate.
- Evaluate and implement, as appropriate, expedited remediation methods that would result in reducing the time to closure for select sites and overall project costs.
- Continue to investigate potentially responsible parties who may hold the environmental liability at FAA sites.

Program Plans FY 2013 – Performance Output Goals

- Complete activities at five percent (5%) of the total sites listed in the FY 2012 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.
- Continue to investigate potentially responsible parties who may hold the environmental liability at FAA sites.

Program Plans FY 2014 – Performance Output Goals

- Complete activities at five percent (5%) of the total sites listed in the FY 2013 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.
- Continue to investigate potentially responsible parties who may hold the environmental liability at FAA sites.

Program Plans FY 2015 – Performance Output Goals

- Complete activities at five percent (5%) of the total sites listed in the FY 2014 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.
- Continue to investigate potentially responsible parties who may hold the environmental liability at FAA sites.

Program Plans FY 2016 – Performance Output Goals

- Complete activities at five percent (5%) of the total sites listed in the FY 2015 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.
- Continue to investigate potentially responsible parties who may hold the environmental liability at FAA sites.

3A02, AVIATION SAFETY ANALYSIS SYSTEM (ASAS) – REGULATION AND CERTIFICATION INFRASTRUCTURE FOR SYSTEM SAFETY (RCISS)

FY 2012 Request $30.1M

- Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 2, A17.01-02

Program Description

RCISS segment 2 updates and improves the IT infrastructure that supports the FAA safety workforce. It provides a technology refresh of the hardware and software that allow access to the AVS safety applications and safety related data. This infrastructure enables the ASKME program and it's applications that support new aircraft certification and the SASO program and its applications that collect information on the safety records of aviation operators and aviation maintenance companies. Segment 2 will upgrade and improve the hardware and software that helps safety inspectors integrate information from these databases to improve their oversight of the industry. It will also increase the rate of data transfer from centralized databases to their mobile devices. Improving the rate of data transfer will increase the time available for safety inspections.

The portable devices that inspectors use during field work to maintain connection with the available databases will be updated to keep up with technological change. A side benefit of improving the performance of these devices is the potential to let field personnel work from home offices rather than maintaining centralized office space that is seldom used.

Segment 2 will also upgrade the protection of safety data systems to prevent this important data from being destroyed by natural disaster. It will improve protection of the facility where the data is stored and prevent access to the data by unauthorized users.

Program activities include lifecycle replacement and acquisition of the following IT infrastructure components supporting AVS's 6,000+ Safety Workforce: mobile tablet personnel computers; telecommunications services; application servers and data storage devices (hosting national AVS safety applications); and COTS Software licenses. The program will also procure contractor support services to provide specialized technical expertise in modernizing and maintaining the RCISS enterprise infrastructure.

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 2012 – Performance Output Goals

- Begin the first technology refresh of safety workforce mobile toolkits (includes tablet personnel computer, aircard, flash drive, camera, and accessories) with enhanced telecommunications services and deploy these toolkits to the first 25% of the AVS safety workforce.
- Begin technology refresh of centralized data storage and processing equipment.
- Develop a plan for the physical consolidation of the two existing data centers.
- Begin technology refresh of disaster recovery equipment, co-located within an existing FAA Data Center.
- Establish additional Service Oriented Architecture services to support the SASO and ASKME business application programs.

Program Plans FY 2013 – Performance Output Goals

- Continue the first technology refresh of safety workforce mobile toolkits with enhanced telecommunications services and deploy these toolkits to the second 25% of the AVS safety workforce.
- Continue the ongoing technology refresh of centralized data storage and processing equipment.
- Begin the physical consolidation of the two existing data centers.
- Continue the ongoing technology refresh of disaster recovery equipment.
- Establish additional Service Oriented Architecture services to support the SASO and ASKME business application programs.

Program Plans FY 2014 – Performance Output Goals

- Continue the first technology refresh of safety workforce mobile toolkits with enhanced telecommunications services and deploy these toolkits to the third 25% of the AVS safety workforce.
- Continue the ongoing technology refresh of centralized data storage and processing equipment.
- Complete the physical consolidation of the two existing data centers.
- Continue the ongoing technology refresh of disaster recovery equipment.

Program Plans FY 2015 – Performance Output Goals

- Complete the first technology refresh of safety workforce mobile toolkits with enhanced telecommunications services and deploy these toolkits to the final 25% of the AVS safety workforce.
- Continue the ongoing technology refresh of centralized data storage and processing equipment.
- Continue the ongoing technology refresh of disaster recovery equipment.

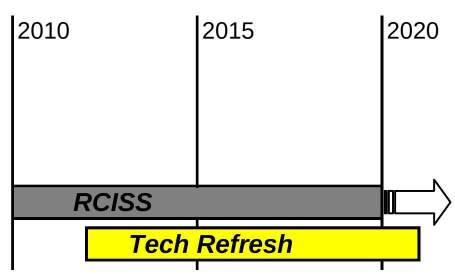
Program Plans FY 2016 – Performance Output Goals

- Begin the second technology refresh of safety workforce mobile toolkits with enhanced telecommunications services and deploy these toolkits to the first 25% of the AVS safety workforce.
- Continue the ongoing technology refresh of centralized data storage and processing equipment.
- Continue the ongoing technology refresh of disaster recovery equipment.

System Implementation Schedule

Aviation Safety Analysis System (ASAS) - Regulation and Certification for Infrastructure System Safety (RCISS)

First site Delivery: 2012 -- Last site Delivery: 2021



3A03, Logistics Support Systems and Facilities (LSSF)
FY 2012 Request $10.0M

- Logistics Center Support System (LCSS), M21.04-01
- X, Logistics Center Support System (LCSS) – Technical Refresh, M21.04-02

Program Description

The FAA's mission is to provide a safe, secure, and efficient NAS, contributing to United States national security and promoting U.S. aerospace safety.

In support of this mission, the FAA Logistics Center (FAALC) manages the central NAS inventory warehouses and distribution facilities for the FAA. It provides routine and emergency logistics products and services to over 8,091 FAA customers at 63,846 facilities as well as, to the Department of Defense (Air Force, Navy, and Army), state agencies, and foreign countries. It provides logistics support for 60,000 parts and services and supplies, tracks, and accounts for Capital and Ops funded parts totaling $750 million. The current system used to support this mission is known as the Logistics and Inventory System (LIS).

LIS is an agency developed legacy mainframe application that lacks the capability and flexibility to accommodate the near term or future long-term supply support needs necessary to maintain the NAS. LIS is built using Natural and COBOL languages and was deployed in 1990. Over the last two decades, over 39,000 changes have been implemented in LIS. Its archaic architecture lacks the scalability to support the increased performance requirements projected by the NAS architecture.

Logistics Center Support System (LCSS) is a non-NAS IT procurement to re-engineer and automate the FAA's logistics management processes. The program aims to modernize the FAA's supply chain and replace the 20-year old Logistics Inventory System (LIS) in support of the Next Generation of air traffic control (NextGen) 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 LCSS program supports the Strategic 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 2012 – Performance Output Goals

- Develop business case (12/01/2011).
- Receive JRC Final Investment Decision – II to proceed with Enterprise Resource Planning (ERP) implementation (12/31/2011).

Program Plans FY 2013 – Performance Output Goals
- Configure ERP, develop interfaces and extensions for implementation (9/30/2013).

Program Plans FY 2014 – Performance Output Goals
- Implement ERP as modernized solution to manage the FAA's supply chain (3/31/2014).

Program Plans FY 2015 – Performance Output Goals
- Maintain COTS ERP solution.

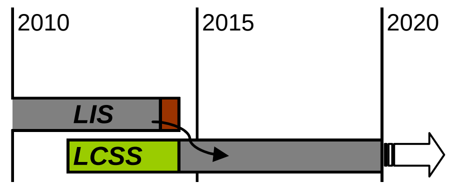
Program Plans FY 2016 – Performance Output Goals
- Maintain COTS ERP solution.

System Implementation Schedule

Logistics Center Support System (LCSS)

Decom: March 2014

System Implementation -- December 2011 to March 2014



3A04, NATIONAL AIRSPACE SYSTEM (NAS) RECOVERY COMMUNICATIONS (RCOM)
FY 2012 Request $12.0M

- 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:

Emergency Response
- Washington Operations Center Complex (WOCC)
- Remote Transmit Receive (RTR) Facility
- Communication Support Team (CST) Vehicle

Emergency Communications
- 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 (ANS)
- Handheld Satellite Phones

Secure Communications
- Satellite Telephone Equipment (STE)
- Secure Conference System (SCS)
- Secure Facsimile (SecFac)
- Secure Cellular Phones
- Defense Messaging System (DMS) SIPRNET
- Secret Internet Protocol Router Network (SIPRNET) Web

- SIPRNET E-Mail
- Automatic Digital Network (AUTODIN)
- OMNI Cryptographic Equipment

Non-Secure Communications

- C3 Lan
- Standard Teleco Phone System
- Automated Message Handling System (AMHS)
- Emergency Operations Network (EON)
- DMS NIPRNET
- Domestic Events Network (DEN)

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 2012 – Performance Output Goals

- Procure and install VHF/FM equipment for Jacksonville (ZJX) District.
- Engineer VHF/FM system requirements for Memphis District (ZME), Cincinnati District (CVG), and Portland District (NCT).
- Technical refresh of video and conference bridge systems.
- Purchase 50 KSV-21 cryptographic cards.

Program Plans FY 2013 – Performance Output Goals

- Procure and install VHF/FM equipment for Memphis District (ZME), Cincinnati District (CVG), and Portland District (NCT).
- Engineer VHF/FM system requirements for Philadelphia District and Pittsburg District.
- Purchase 5 simple key loaders to download keys for cryptographic cards, secure cell phones, and DMS sites.
- Implement Secure Mobile Environment (SME) Portable Electronic Device (PED), proxy server, management server, and Multi-Carrier Entry Point (MCEP).

Program Plans FY 2014 – Performance Output Goals

- Procure and install VHF/FM equipment for Philadelphia District (PHL), Pittsburg District (PIT), and Detroit District (DTW).
- Engineer VHF/FM system requirements for Detroit District and Dallas/Ft Worth District.
- Start transition from STEs to VIPER secure phones.
- SIPRNet and NIPRNet Network Refresh.

Program Plans FY 2015 – Performance Output Goals

- Procure and install VHF/FM equipment for Dallas Fort Worth District (DFW), Salt Lake City District (SLC), and Denver District (DEN).
- Engineer VHF/FM system requirements for Denver District and St Louis District.
- Perform technical refresh on the EON system.
- Upgrade Microsoft Sharepoint software.
- Procure remaining VIPER secure phones.
- Continue SIPRNet and NIPRNet Network Refresh.

Program Plans FY 2016 – Performance Output Goals

- Procure and install VHF/FM equipment for St Louis District (STL) and Minneapolis/St Paul District (MSP).
- Engineer VHF/FM system requirements for Minneapolis/St Paul.
- Desktop virtualization project.

3A05, FACILITY SECURITY RISK MANAGEMENT

FY 2012 Request $18.0M

- Facility Security Risk Management (FSRM), F24.00-00

Program Description

The Facility Security Risk Management (FSRM) Program was established in response to Presidential Decision Directive 63, Critical Infrastructure Protection (later 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, such as centers, towers and terminal radar control facilities (TRACON). 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 3 – 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 2012 – Performance Output Goals

- Provide physical upgrades at 18 facilities as required to meet FAA security requirements for accreditation.

Program Plans FY 2013 – Performance Output Goals

- Provide physical upgrades at 20 facilities plus multiple buildings at Mike Monroney Aeronautical Center (MMAC) as required to meet FAA security requirements for accreditation.

Program Plans FY 2014 – Performance Output Goals

- Provide physical upgrades at 28 facilities as required to meet FAA security requirements for accreditation.

Program Plans FY 2015 – Performance Output Goals

- Provide physical upgrades at 69 facilities as required to meet FAA security requirements for accreditation.

Program Plans FY 2016 – Performance Output Goals

- Provide retrofit fencing at various, previously accredited facilities.

3A06, INFORMATION SECURITY

FY 2012 Discretionary $17.0M
FY 2012 Mandatory $2.0M
FY 2012 Request $19.0M

- A, NAS Information Security – Information Systems Security, M31.00-00
- B, NAS Information Security – NAS Enterprise Information System Security (NEISS), M31.03-01

A, NAS INFORMATION SECURITY – INFORMATION SYSTEMS SECURITY, M31.00-00

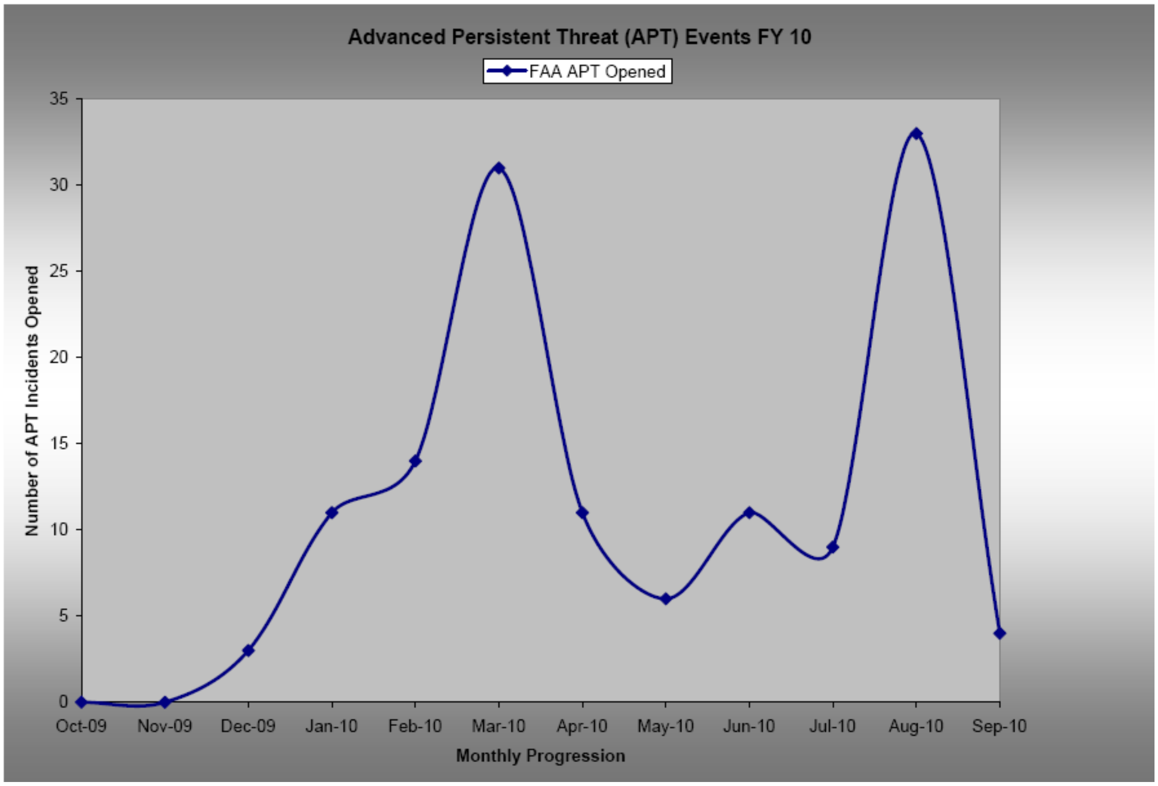
Program Description

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 supports 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. Implementation of a Logical Access and Identity Management solution, the FAA Logical Access and Authorization Control Service (LAACS) is also a part of this program.

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.

Advanced Persistent Threat 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. The development of the term "Advanced Persistent Threat" was initiated as an indirect route to allow the communication of these events and the identification of systems that have been compromised or affected by these sophisticated cyber attacks. The chart below shows the monthly Advanced Persistent Threat event trend for October 2009 thru September 2010.



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 3 – Achieve zero cyber security events that disable or significantly degrade FAA mission critical Line of Business systems.*

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 2012 – Performance Output Goals
Discretionary

- 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.

Mandatory

- Provide software enhancement to the advance threat analysis group to ensure timely notification and tracking of LOB/SO and staff offices incidents involving advance persistent threat.
- Provide enhance system appliances and improve network in support of flexible analysis system. This will provide greater visibility throughout FAA networks to capture full packet data.

Program Plans FY 2013– Performance Output Goals

- Certify and authorize spiral releases of complex systems and newly designed systems.
- 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.
- Monitor and take all actions necessary to ensure that the NAS information technology systems are not interrupted and are available at all times.
- 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.
- Continue LAACS I&I with identified FAA systems and applications and with external FAA customers.

Program Plans FY 2014 – Performance Output Goals

- Certify and authorize spiral releases of complex systems and newly designed systems.
- 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.
- Monitor and take all actions necessary to ensure that the NAS information technology systems are not interrupted and are available at all times.
- Evaluate and acquire enhanced tools used by the CSMC to address complex and rapidly changing cyber threats and vulnerabilities.
- Develop Enterprise Architecture (EA) per annual architectural guidelines including data, information and information security architectures. Develop the EA based upon the Federal Enterprise Architecture Framework (FEAF) utilizing the Federal Segment Architecture Methodology (FSAM) or other OMB approved framework.
- Consolidate Line of Business plans, conduct a quality assessment, and develop the final EA update.

Program Plans FY 2015– Performance Output Goals

- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- 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.
- Enhance enterprise cyber security architecture policies and procedures within the FAA business framework.
- Establish the policy, structure, process, funding mechanisms, and metrics for the “innovation lifecycle”.
- Continue to monitor a wireless intrusion detection system across the FAA enterprise.

Program Plans FY 2016– Performance Output Goals

- Certify and authorize spiral releases of complex systems and newly designed systems.
- 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.

B, NAS INFORMATION SECURITY – NAS ENTERPRISE INFORMATION SYSTEM SECURITY (NEISS), M31.03-01

Program Description

In response to the steady increase of real and perceived threats to the national critical infrastructure, the executive branch of the federal government issued two presidential directives, PDD63 in 1998 and HSPD-7 in 2003, and the legislative branch enacted the Federal Information Security Management Act (FISMA) in 2002. These presidential directives and the FISMA law mandate the adoption of infrastructure security protections. The FISMA law is specific to Information System Security (ISS) and mandates federal agencies to provide cost effective information security protections commensurate with the risk and magnitude of the harm resulting from the unauthorized access, use, disclosure, disruption, modification or destruction of agency information. In addition, FISMA mandates that information security management processes be integrated with the agency strategic and operational planning processes. To comply with the FISMA law, the FAA issued FAA Order 1370.82a, an Information Security Program establishing policy and management responsibilities addressing the FISMA mandates including the integration of the security management planning processes with the Agency strategic planning processes.

The National Airspace System Enterprise Information System Security (NEISS) program was established in recognition of the need to fund the update of legacy systems individual information security solutions to a common NAS enterprise wide solution. This program will ensure that a NAS solution will be consistent with the enterprise level security capabilities identified and agreed upon in the FY 2009 Enterprise Architecture ISS Security Roadmap. The ISS roadmap collected and synthesized ISS safeguard shortfalls pervasive in the NAS which must be provided at the enterprise level to be effective and economical. These identified security shortfalls will be addressed by the five NEISS capabilities:

- External Boundary Protection (EBP) – to prevent malware from entering the NAS,
- Internal Policy Enforcement (IPE) – to contain the spread of malware within the NAS,
- Identity and Key Management (IKM) – to provide identity authentication for all components of the NAS,
- Incident Detection and Response (IDR) – to provide detection, analysis, and response to NAS cyber incidents, and
- Certified Software Management (CSM) – to prevent malware from entering the NAS via the software supply chain.

Other security capabilities, e.g. hardening of user systems, will remain the responsibility of individual NAS programs. However, the investment requirements for the enterprise ISS capabilities will fall under the purview of NEISS program and will allow individual NAS programs to focus on the implementation of their specific non-enterprise level safeguards. The NEISS program will still require input from the program offices.

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 3 – Achieve zero cyber security events that disable or significantly degrade FAA mission critical Line of Business systems.*

Relationship to Performance Target

Each of the NEISS enterprise level Information System Security capabilities will contribute to the FAA Strategic Plan Goal "Achieve zero cyber security events that disable or significantly degrade FAA mission critical Line of Business systems." as follows:

NAS External Boundary Protection (EBP)
Currently NAS programs rely on products that require frequent malware signature updates and are not tailored to NAS enterprise wide operations. The NEISS approach is based on enterprise level boundary protection that recognizes and allows genuine NAS data types and blocks all other traffic. This approach entails fewer updates, because the NAS data types are stable (seldom changes), and effectively blocks all malware.

Internal Policy Enforcement (IPE)
Without IPE, any malware that may enter the NAS via the insider threat or via a breach in the EBP (under extraordinary circumstances) will propagate throughout the highly networked NAS. With IPE, the NAS will be logically partitioned into enclaves exchanging data under a set of internal policy rules designed to contain the spread of malware to only the affected enclave. The containment of the spread of malware within an affected enclave will also reduce the chance of recurrent infections because the number of paths of potential re-infections is smaller than within the whole non-partitioned enterprise.

Incident Detection & Response (IDR)
The current program by program approach to IDR, needlessly and inefficiently replicates investments in equipment and manpower to setup and operate an IDR capability for each program. The NEISS centralized approach results in more effective global view of cyber security incidents, which improves not only detection of malware but also its containment, remediation of impacts and removal. Without the NEISS IDR global approach, malware removal, in a highly networked NAS, would be exceedingly difficult due to cyclical re-infections.

Certified Software Management (CSM)
The NAS is relying increasingly on commercial off the shelf (COTS) software which can introduce malware into the NAS if acquired from a negligent source or updated using code from a fraudulent source. The CSM capability provides software supply chain assurance.

Identity & Key Management (IKM)
The current system by system approach to IKM needlessly and inefficiently replicates investments in equipment and manpower in setting up and operating an IKM capability for each system. The NEISS centralized approach more effectively scales to systems distributed over diverse locations, where a program specific IKM is not interoperable between NAS programs. In addition, IKM is the foundational enabler of the other four capabilities.

Program Plans FY 2012 – Performance Output Goals
- Initiate activities and products in support of Initial Investment Analysis;
    - Update program requirements document,
    - Initial Business case,
    - Initial implementation strategy and planning document, and
    - Plan for final investment analysis.

Program Plans FY 2013-2016 – Performance Output Goals
- TBD.

3A07, System Approach for Safety Oversight (SASO)
FY 2012 Request $23.6M

- 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 SASO Program will align national system safety standards with International Civil Aviation Organization (ICAO) Safety Management System (SMS) components. The SASO Program is divided into three phases. SASO Phase I applied SASO standards to all CFR Part 121 air carriers and demonstrated the benefits of system safety to Flight Standards (AFS) and the aviation community. SASO Phase II extends these standards to CFR Part 135 air taxi and air commuter community, and CFR Part 145 repair station community. SASO Phase II is divided into two segments: Alpha and Beta. Alpha is the first segment and covers the years FY 2010 thru FY 2013. Alpha will develop the AFS Safety Assurance System (SAS), one of four components of the SMS. Beta is the second segment and will cover the years FY 2014 thru FY 2016 during which the remaining three components of the SMS (safety risk management, safety policy, and safety promotion) and the remaining CFR Parts regulated by AFS will be covered.

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 SMS-based 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 contribute to 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.

Program Plans FY 2012 – Performance Output Goals
- SASO Phase II Beta Business Process Reengineering contract awarded.
- SASO Phase II Beta Change Management and Implementation contract awarded.
- SAS Wave III Critical Design Review conducted.
- SAS Wave II software delivered.

Program Plans FY 2013 – Performance Output Goals
- SASO Phase II Beta Software Development Intra-Agency Agreement awarded.
- SAS Wave III software delivered.
- SAS Interim Operating Capability (IOC) commissioned.

Program Plans FY 2014 – Performance Output Goals
- SAS Wave IV Preliminary Design Review conducted.
- Safety Risk Management (SRM) Preliminary Design Review conducted.
- Safety Promotion (SPR) Preliminary Design Review conducted.
- Safety Policy (SPO) Preliminary Design Review conducted.
- SRM, SPR, SPO business processes delivered.

Program Plans FY 2015 – Performance Output Goals
- SAS Wave IV Critical Design Review conducted.
- Safety Risk Management (SRM) Critical Design Review conducted.
- Safety Promotion (SPR) Critical Design Review conducted.
- Safety Policy (SPO) Critical Design Review conducted.
- SRM, SPR, SPO software design documentation delivered.

Program Plans FY 2016 – Performance Output Goals
- SAS Wave IV software delivered.
- Safety Risk Management (SRM) software delivered.
- Safety Promotion (SPR) software delivered.
- Safety Policy (SPO) software delivered.
- SAS, SRM, SPR, and SPO commissioned.

System Implementation Schedule

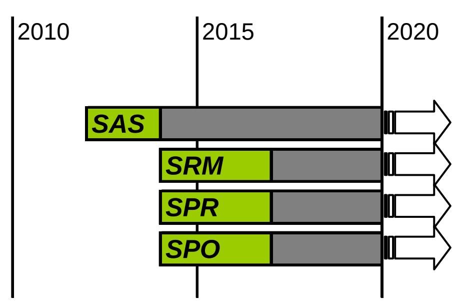
System Approach for Safety Oversight (SASO)

Safety Assurance System (SAS) - FOC 2012-2013

Safety Risk Management (SRM) - IOC 2014

Safety Promotion (SPR) - IOC 2014

Safety Policy (SPO) - IOC 2014



3A08, AVIATION SAFETY KNOWLEDGE MANAGEMENT ENVIRONMENT (ASKME)
FY 2012 Request $17.2M

- 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 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. ASKME will provide a comprehensive automated system and electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/ manufacturing certification, airworthiness certification, designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

Phase 1 IT Application Deliverables Include:

- Electronic File Service (EFS)
- Work Tracking Software – Risk Based Resource Targeting (WTS-RBRT)
- Monitor Safety Related Data (3 related applications)
    - Monitor Safety Analyze Data (MSRD-MSAD)
    - Oversee System Performance – Internal (MSRD-OSPi)
    - Oversee System Performance – External (MSRD-OSPe)
- Designee Supervision / Past Performance (DS/PP)
- Assimilate Lessons Learned (ALL)
- Work Tracking Software – Work Activity Tracking (WTS-WAT)
- Engineering Design Approval (EDA) Begin Design Phase
- Technical Evaluations (DTE/DDS) Begin Design Phase

Phase 2 IT Application Deliverables Include:

- Engineering Design Approval (EDA) Development and Deploy
- Technical Evaluations (DTE/DDS) Development and Deploy
- 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 2012 – Performance Output Goals

- Complete scan historical safety-related documentation for population in the Electronic File Service repository – (Third Year) FY12.
- Complete design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Monitor Safety Related Data-Oversee System Performance – External (MSRD-OSPe) – Starts FY11, Ends FY12.
- Start design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Technical Evaluations (DTE/DDS) – Starts FY12, Ends FY13.
    - Engineering Design and Approval (EDA) – Starts FY12, Ends FY13.

Program Plans FY 2013 – Performance Output Goals

- Finalize documented detailed System Specification Requirements phase (first phase for application development lifecycle) for the following ASKME deliverables:
    - Work Tracking Software-Budget Management (WTS-BMgmt) – FY13.
    - Airworthiness Directives Development (ADD) – FY13.
- Complete design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Technical Evaluations (DTE/DDS) – Starts FY12, Ends FY13.
    - Work Tracking Software-Work Activity Tracking (WTS-WAT) – Starts FY 11, Ends FY13.
    - Engineering Design Approval (EDA) – Starts FY12, Ends FY13.
- Continue design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Work Tracking Software-Budget Management (WTS-BMgmt) – Starts FY13, Ends FY14.
- Start design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Directives Development (ADD) – Starts FY13, Ends FY15.

Program Plans FY 2014 – Performance Output Goals

- Finalize documented detailed System Specification Requirements phase (first phase for application development lifecycle) for the following ASKME deliverables:
    - Airworthiness Certifications (4 related applications) FY14;
        - Standard Airworthiness Certifications (StdAC),
        - Special Airworthiness Certifications (SpclAC),
        - Special Flight Authorizations (SFA),
        - Certification of Imported/Exported Products (CI/EP).

- Complete design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Work Tracking Software-Budget Management (WTS-BMgmt) – Starts FY13, Ends FY14.
- Continue design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Directives Development (ADD) – Starts FY13, Ends FY15.
- Start design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Certifications (4 related applications) – Starts FY14, Ends FY16;
        - Standard Airworthiness Certifications (StdAC),
        - Special Airworthiness Certifications (SpclAC),
        - Special Flight Authorizations (SFA),
        - Certification of Imported/Exported Products (CI/EP).

Program Plans FY 2015 – Performance Output Goals

- Finalize documented detailed System Specification Requirements phase (first phase for application development lifecycle) for the following ASKME deliverables:
    - Compliance and Enforcement Actions (CEA) FY15.
- Complete design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Directives Development (ADD) – Starts FY13, Ends FY15.
- Continue design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Certifications (4 related applications) – FY14, Ends FY16;
        - Standard Airworthiness Certifications (StdAC),
        - Special Airworthiness Certifications (SpclAC),
        - Special Flight Authorizations (SFA),
        - Certification of Imported/Exported Products (CI/EP).
- Start of design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Compliance and Enforcement Actions (CEA) – Starts FY15, Ends FY16.

Program Plans FY 2016 – Performance Output Goals

- Complete design, development, test, and deployment phases (follows System Specification Requirements phase) for the following ASKME deliverables:
    - Airworthiness Certifications (4 related applications) – Starts FY14, Ends FY16;
        - Standard Airworthiness Certifications (StdAC),
        - Special Airworthiness Certifications (SpclAC),
        - Special Flight Authorizations (SFA),
        - Certification of Imported/Exported Products (CI/EP).
    - Compliance and Enforcement Actions (CEA) – Starts FY15, Ends FY16.

3A09, DATA CENTER OPTIMIZATION

FY 2012 Request $1.0M

- Data Center Optimization, F30.01-01

Program Description

The Data Center Consolidation Initiative (DCCI) program is responsible for implementing a corporate-level data center consolidation effort across all lines of business (LOBs) and staff offices (SOs). DCCI objectives are to:

- Ensure all business and mission support applications and servers are hosted within geographically diverse Enterprise Data Centers (EDCs) that have sufficient power and cooling to support service levels and disaster recovery (DR) requirements.
- Reduce the overall data center footprint that the agency is required to maintain while ensuring that IT operations and services are not adversely impacted.
- Shift IT investments to more efficient computing platforms and technologies.

DCCI ensures FAA compliance with:

- Executive Order 13327 "Federal Real Property Asset Management"
- Executive Order 13514 "Federal Leadership in Environmental, Energy, and Economic Performance"
- June 10, 2010 Presidential Memorandum "Disposing of Unneeded Federal Real Estate"

The DCCI program will be procuring

- Virtualization-oriented hardware – servers and storage devices.
- Virtualization software.
- Transition costs to consolidated data center space.
- Data center consolidation support
- Facilities engineering support to:
    - Migrate hardware and applications from existing data center spaces to EDCs or regional data centers.
    - Repurpose other data center space for general-use office space (break down or reconfigure mechanical, electrical, plumbing).
- Upgrades in power, cooling, mechanical, electrical and plumbing for EDCs and regional data centers.

FAA will consolidate data centers and server rooms that support business services and mission support applications. FAA currently maintains 56 such spaces, approximately half of which are located in the Washington, D.C. and surrounding area. The other half are located across the nine FAA regions. Through consolidation FAA will reduce the number of separately maintained data centers and reduce the risk of cyber security events. FAA will achieve 25 percent data center reduction between FY 2012 and FY 2016.

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 3 – Achieve zero cyber security events that disable or significantly degrade FAA mission critical Line of Business systems.*

Relationship to Performance Target

DCCI ensures that all business and mission support applications and servers are hosted within geographically diverse EDCs that have sufficient power and cooling to support service levels and DR requirements. This will increase FAA's overall IT security posture, in support of the Performance Target cited above.

Program Plans FY 2012 – Performance Output Goals

- Obtain IID.
- Obtain FID.

Program Plans FY 2013-2016 – Performance Output Goals

- Future activities will be based on JRC approved program.

3A10, Aerospace Medical Equipment Needs (AMEN)

FY 2012 Request $12.0M

- Aerospace Medical Equipment Needs (AMEN), M53.01-01
- X, Aerospace Medical Equipment Needs (AMEN) – Tech Refresh, M53.01-02

Program Description

The Aerospace Medical Equipment Needs (AMEN) program will replace a portion (121 items) of the Civil Aerospace Medical Institute (CAMI), Aerospace Medical Research Division's (AAM-600) laboratory equipment. Older laboratory equipment lacks the modern capabilities needed for testing and will be replaced with more capable Commercial-Of-The-Shelf (COTS) products over the FY 2012 through FY 2014 period.

CAMI, located at the Federal Aviation Administration (FAA) Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, Oklahoma, is the medical certification, education, research, and occupational medicine wing of the Office of Aerospace Medicine (AAM) under the auspices of the Office of Aviation Safety (AVS). CAMI supports regulation of aviation safety and development of aeromedical safety standards. CAMI's personnel work in sophisticated research laboratories and testing facilities with the need for modern scientific, engineering, and medical systems. The equipment to be procured by the AMEN program supports two critical FAA research areas: Bioaeronautical Sciences and Protection & Survival.

Much of the laboratory equipment used by CAMI's scientists, physicians, and engineers is old and becoming obsolete. This aging equipment places several accreditations at risk, and does not allow the FAA to keep up with science and technology advances currently available in the market. The AMEN technology refresh program is designed to replace 121 equipment items classified into the following categories:

A. 27 Biochemical Sample Analyses Systems e.g., chromatographs, spectrometers, molecular biology instruments, and gene sequencing systems.
B. 24 Biochemical Sample Preparation and Physiological Monitoring Systems e.g., centrifuges, plates, tonometer, oxymeters, extraction tools, balances.
C. 38 Storage, Cleaning, Machining, and Laboratory Safety Systems e.g., refrigerators, freezers, fume hoods, filing cabinets, locker, washer, dryer, drills.
D. 23 Scientific and Engineering Research Systems e.g., High rate material test system, data mining statistical tools, scientific information systems, light system electronic control.
E. 7 Mechanical and Engineering Monitoring Systems e.g., environmental monitoring, anthropometric dummies, calibration systems, transducers.
F. 2 Evacuation and Impact Testing Systems e.g., Impact Sled and Aircraft Cabin Environment Facility (ACEF).

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

More modern equipment will support four human safety research areas: (1) AEROMEDICAL SYSTEMS ANALYSIS: Assessment of very large datasets concerning aircrew, their medical certification, and their involvement in aviation accidents and incidents; (2) ACCIDENT PREVENTION AND INVESTIGATION: Development of procedures to detect aeromedically unsafe conditions and trends. The forensic toxicology laboratory serves as the primary national site for toxicology testing relative to accident investigation fatalities; (3) CRASH SURVIVAL: Assessment of crash environments including head impact, seat deformation, occupant restraint performance, and safety device effectiveness; all key issues in aircraft certification processes and protection of human life; and (4) AVIATION PHYSIOLOGY. Assessment of human performance at altitude, adequacy of protective breathing equipment, aircraft environmental control systems/cabin air quality, and methods of detection/protection from chemical, biological, and radiological threats. This research will lead to a better understanding of disease and environmental stress factors (alcohol, fatigue, hypoxia, g-forces) that concern medical certification decision-making processes, aircrew performance, aeromedical education programs for aviation medical examiners, pilots, and flight attendants; accident investigation practices; certification of aircraft equipment and protective devices; and harmonization of standards.

Program Plans FY 2012 – Performance Output Goals
- Proposals/Quotes completed by 4/1/12 for Deployment in FY12,
- Purchase 47 Items (of type A: 12, B: 4, C: 12, C: 14, D: 3, and E: 2).
- Contract Awards – Purchases by 7/2/12.
- Disposition of Old Equipment before 10/1/12.

Program Plans FY 2013 – Performance Output Goals
- Proposals/Quotes completed by 4/1/13 for Deployment in FY13,
- Purchase 38 Items (of type A: 12, B: 8, C: 9, C: 7, D: 2, and E: 0).
- Contract Awards – Purchases by 7/1/13.
- Disposition of Old Equipment before 10/1/13.
- Deliverables Installation: In Service by 2/3/15 and continuation of this activity for Deployment FY12.

Program Plans FY 2014 – Performance Output Goals
- Proposals/Quotes completed by 4/1/14 for Deployment in FY14,
- Purchase 36 Items (of type A: 3, B: 12, C: 17, C: 2, D: 2, and E: 0).
- Contract Awards – Purchases by 7/1/14.
- Disposition of Old Equipment before 10/1/14.

Program Plans FY 2015 – Performance Output Goals
- Deliverables Installation and testing as necessary.

Program Plans FY 2016 – Performance Output Goals
- Deliverables Installation and testing as necessary.

B. TRAINING, EQUIPMENT AND FACILITIES

3B01, AERONAUTICAL CENTER INFRASTRUCTURE MODERNIZATION
FY 2012 Request $18.0M

- 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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 Plans FY 2012 – Performance Output Goals

- Thomas P. Stafford Building - Replace exterior building panels that are no longer weather tight. Contract award: Jan, 2012. Design review: April – September monthly reviews.
- Systems Training Building renovation construction. Contract award: November, 2011. Design/construction reviews: October – September monthly reviews.
- Demolish obsolete building systems; install new systems: boilers, chillers, air handlers, electrical, plumbing, other building systems, replace temporary buildings, site improvements. Contract award(s): October, 2011 – June, 2012. Design/construction reviews: October – September monthly reviews.
- Phase 1 (of 3) tech refresh of telephone system to new technology. Contract award: May, 2012. Design review: April, 2012.
- Phase 1 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 1, 14, 10, 6, 109, 113, 161, 173, 187, 195 (10 of 61 buildings). Security assessments and upgrades, disaster recovery testing. South campus fiber install for redundancy on network routers. Contract award(s): Jan/May/July, 2012. Design reviews: Oct, 2011 and Jan, 2012.

Program Plans FY 2013 – Performance Output Goals

- Systems Training Building renovation construction. Contract award: Nov, 2013. Design/construction reviews: October – September monthly reviews.
- Demolish obsolete building systems; install new systems: boilers, chillers, air handlers, electrical, plumbing, other building systems, replace temporary buildings, site improvements. Contract award(s): October, 2012 – June, 2013. Design/construction reviews: October – September monthly reviews.
- Phase 2 (of 3) tech refresh of telephone system to move call center services to new technology. Contract award: May, 2013. Design review: April, 2013.
- Phase 2 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 13,15, 9, 189, 190, 191, 192, 193, 226, 230, 232, 256, 257, 264 (24 of 61 buildings). Security assessments, upgrades, disaster recovery testing. East campus fiber for redundancy on network routers. Contract award(s): Jan/May/July, 2013. Design reviews: Oct, 2012 and Jan, 2013.

Program Plans FY 2014 – Performance Output Goals

- Relocate ARSR-1 and ARSR-3 radars to campus radar area. Contract award for design: Nov, 2013. Contract award for construction: August, 2014. Design reviews: October – September monthly reviews.
- Demolish obsolete building systems; install new systems: boilers, chillers, air handlers, electrical, plumbing, other building systems, replace temporary buildings, site improvements. Contract award(s): October, 2013 – June, 2014. Design/construction reviews: October – September monthly reviews.
- Phase 3 (of 3) tech refresh of telephone system to move remaining services off legacy to new technology. Contract award: May, 2014. Design review: April, 2014.
- Phase 3 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 22, 29, 5, 215, 117, 123, 136, 166, 167, 185 (34 of 61 buildings). Security assessments, upgrades, disaster recovery testing. North campus fiber for redundancy on network routers. Contract award(s): Jan/May/July, 2014. Design reviews: Oct, 2013 and Jan, 2014.

Program Plans FY 2015 – Performance Output Goals

- Renovation construction design for FAA program and special purpose buildings 201, 172, and AOS buildings. Contract award for design: Nov, 2014. Contract award for construction: August, 2015. Design reviews: October – September monthly reviews.
- Demolish obsolete building systems; install new systems: boilers, chillers, air handlers, electrical, plumbing, other building systems, replace temporary buildings, site improvements. Contract award(s): October, 2014 – June, 2015. Design/construction reviews: October – September monthly reviews.
- Phase 4 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 24, 23, 4, 25, 199, 204, 208, 209, 211, 214, 218 (45 of 61 buildings). Security assessments, upgrades, disaster recovery testing. West campus fiber for redundancy on network routers. Upgrade MMAC network to support redundancy, reliability, security and availability. Contract award(s): Jan/May/July, 2015. Design reviews: Oct, 2014 and Jan, 2015.

Program Plans FY 2016 – Performance Output Goals

- Demolish obsolete building systems; install new systems: boilers, chillers, air handlers, electrical, plumbing, other building systems, replace temporary buildings, site improvements. Contract award(s): October, 2015 – June, 2016. Design/construction reviews: October – September monthly reviews.
- Phase 5 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 27, 12, 3, 30, 200, 228, 174, 186, 2, 747, 8, 196, 201, 217, 227, 243 (61 of 61 buildings). Tech refresh voice mail. Security assessments, upgrades, disaster recovery testing. Fiber/copper cable for Bldg 214 support to network. Contract award(s): Jan/May/July, 2016. Design reviews: Oct, 2015 and Jan, 2016.

System Implementation Schedule

The following buildings and facilities will be returned to service as phased renovation construction is completed:

- Storm Sewer replacement, Phases 3 and 4, FY 2012.
- Systems Training Building basement returned to service, FY 2013.
- Systems Training building returned to service, FY 2014.

Other implementation:

- Accomplish tech refresh/migration of ‘Call Center’ services to new technology, FY 2013.
- Complete network upgrades of 61 Aeronautical Center buildings, FY 2016.
- Complete fiber/copper upgrade of Aeronautical Center campus, FY 2016.

3B02, Distance Learning

FY 2012 Request $1.5M

- Distance Learning, M10.00-00

Program Description

The Distance Learning program will provide for technology refresh of 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 providing the technology refresh of the CBI 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 technology refresh is accomplished in a phased, multi-year approach. The FY 2012 technology refresh will complete the current refresh cycle (FY 2009 - FY 2012). A new technology refresh cycle will begin in FY 2013 and will run through FY 2016. The program will also provide an update to the latest viewer response system (VRS) technology for the satellite based interactive video teletraining (IVT) system, the FAA Academy'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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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, and 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

Program Plans FY 2012 – Performance Output Goals

- Award contract to One Touch Knowledge Systems for the replacement of the FAA Academy's Aviation Training Network (ATN) Viewer Response System (VRS).
- Upgrade VRS to an IP based solution - to support live synchronous/asynchronous training broadcasts to both a classroom and desktop environment.
- Complete design reviews and equipment testing at the ATN studio.
- After contract award, upgrade the ATN studio and all 137 ATN downlink sites with the One Touch Knowledge System SC-600 Site Controller and associated servers and be operational in six months.
- Award contract to provide for the technology refresh of 350 out of 2275 (100%; phased refresh cycle FY09-FY12 complete) CBI Platforms at ATO Tech Ops (ATO-TO) and Federal Contract Tower (FCT) CBI Learning Centers by 9-2012.
- Provide updates to courseware and application via network and/or DVD's to CBI Platforms by 9-2012.

Program Plans FY 2013 – Performance Output Goals

- Award contract to provide for the technology refresh of 800 out of 2275 (35.1%; begin new refresh cycle FY13-FY16) CBI Platforms at Air Traffic Control Towers (ATCT), FCT, and Flight Standards Districts Office (FSDO) CBI Learning Centers by 9-2013.
- Provide updates to courseware and application via network and/or DVD’s to CBI Platforms by 9-2013.

Program Plans FY 2014 – Performance Output Goals

- Award Contract to provide for the technology refresh of 725 out of 2275 (67%) CBI Platforms at En Route Air Traffic Facilities (ARTCC, TRACONs) and FCT CBI Learning Centers by 9-2014.
- Provide updates to courseware and application via network and/or DVD’s to CBI Platforms by 9-2014.

Program Plans FY 2015 – Performance Output Goals

- Award contract to provide for the technology refresh of 400 out of 2275 (84.6%) CBI Platforms at ATO-TO CBI Learning Centers by 9-30-2015.
- Provide updates to courseware and application via network and/or DVD’s to CBI Platforms by 9-2015.

Program Plans FY 2016 – Performance Output Goals

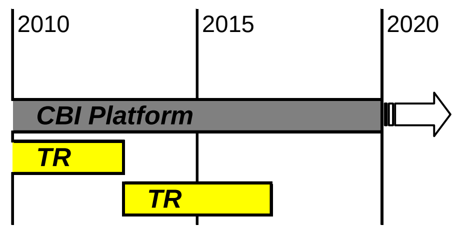
- Award contract to provide for the technology refresh of 350 out of 2275 (100%; end refresh cycle FY13-FY16) CBI Platforms at ATO-TO and FCT learning centers by 9-2016.
- Provide updates to courseware and application via network and/or DVD’s to CBI Platforms by 9-2016.

System Implementation Schedule

Computer-Based Instruction (CBI) Platform

Technology Refresh Phased Implementation: 2009 -- 2012

Technology Refresh Phased Implementation: 2013 -- 2016



ACTIVITY 4. FACILITIES AND EQUIPMENT MISSION SUPPORT

A. SYSTEM SUPPORT AND SUPPORT SERVICES

4A01, SYSTEM ENGINEERING AND DEVELOPMENT SUPPORT
FY 2012 Request $32.9M

- A, Systems Engineering and Development Support – SE2020, M03.03-01
- B, Provide ANF/ATC Support (Quick Response), M08.01-00

A, SYSTEMS ENGINEERING AND DEVELOPMENT SUPPORT – SE2020, M03.03-01

Program Description

The System Engineering 2020 (SE-2020) program manages a portfolio of contracts providing support services for research, analysis, systems engineering and integration for both Next Generation Air Transportation System (NextGen) and non-NextGen initiatives. The portfolio of contracts was awarded in two major categories: Screening Information Request 1 (SIR 1) and Screening Information Request 2 (SIR 2).

SIR 1 supports the full range of NextGen Research & Mission Analysis support services in one or more functional task areas directly related to NextGen and activities necessary to reach the Investment Analysis Readiness Decision (IARD) phase in the Acquisition Management System (AMS) Lifecycle. SIR 1 includes the following service support activities:

- Identify and quantify existing and projected demand for NAS
- Analyze, quantify, revalidate, and document requisite operational improvements
- Develop or test prototypes, provide test equipment, simulate and model software tools
- Plan, design, document, and maintain laboratory facilities
- Analyze policy and organizational issues inherent in NextGen transformation
- Design enterprise architecture roadmaps
- Determine capability gaps and technology opportunities
- Plan for concept and requirement definitions
- Human Factors Research
- Concept of Operations Research
- Human Performance Analysis
- Proof of Concept Research
- Pre-Operational Trials
- Concept Integration
- Rapid Prototyping/Fast-Time Modeling
- Real-Time Simulations
- Real-Time Human-in-the-Loop Simulations
- Full-Scale Demonstrations
- Cognitive Task Analysis Methods
- Cost Benefit Analysis

SIR 2 supports systems engineering activities that occur throughout the AMS Lifecycle for both NextGen and non-NextGen service activities. Note SIR 2 is not intended to perform R&D, post-FID full-scale development, NAS system maintenance, or program management support for program offices responsible for fielding and/or maintaining NAS systems. The majority of SIR 2 activities are expected to occur after the AMS Lifecycle Acquisition Management phase, “Concept and Requirements Definition” (CRD). In addition, SIR 2 supports pre-IARD activities related to the technical refresh of current NAS systems before the “Solution Implementation” phase of the AMS lifecycle. SIR 2 supports the following activities:

- Systems engineering processes

- Preliminary program requirements
- Systems requirements and definition
- Analysis of current designs vs. alternative designs
- Supportability analyses and reliability engineering
- Quality assurance
- Configuration and change control management
- Information security analyses technology support
- System safety engineering and management
- Enterprise Architecture products and amendments
- Awareness of value of emerging technologies
- Planning, design and maintenance of laboratory facilities
- Development and testing of prototypes, software, etc.
- Investment analysis plan requirements
- Business case development
- ATO strategy and planning analysis
- FAA and NextGen performance measurement
- Acquisition baseline management
- Program management and support of FAA program activities
- System and applications training
- Business process re-engineering
- Human Factors Research
- Concept of Operations Research
- Human Performance Analysis
- Proof of Concept Research
- Pre-Operational Trials
- Concept Integration
- Rapid Prototyping/Fast-Time Modeling
- Real-Time Simulations
- Real-Time Human-in-the-Loop Simulations
- Full-Scale Demonstrations
- Cognitive Task Analysis Methods
- Cost Benefit Analysis

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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

The SE2020 program contributes to organizational excellence by providing support for designing and managing NAS modernization and in particular the NexGen activities. 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 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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 2012 Request $41.7M

- 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

In support of the Agency Strategic 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 the cost of all major maintenance and enhancements that would increase the lease costs for existing real estate, and
3. The co-location of sites that currently are leased separately; hence, eliminating duplicate rents, utility costs, and maintenance costs for the excess space.

4A03, LOGISTICS SUPPORT SERVICES (LSS)

FY 2012 Request $11.7M

- 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:*
    - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

Relationship to Performance Target

The LSSC program directly supports the FAA Strategic Plan Goal of Organizational Excellence, Objective 3, Improve financial management while delivering quality customer service. Specifically, the program provides key support functions which enable the FAA to manage real property assets, maintain a clean audit opinion, and plan the execution of critical acquisition activities supporting the NAS. These functions are performed throughout the three Logistics Service Areas, FAA Technical Center, and FAA Aeronautical Center.

Related project management goals include:

1) Complete of 80% percent of the annual real property OMB inventory validation effort.
2) Designate 75% of the disposed real property assets as "retired" within 30 days of the date the disposal forms are received from ATO.
3) Capitalize 85% of all personal and real property capital assets within 65 days of date placed in service.
4) Award at least 90% of all formal contracts (over $100K) in less than 180 calendar days (Office of Acquisition Services (AMQ)) and in less than 120 days (Logistics Service Areas) from the time a purchase request is received from the requiring organization.

4A04, MIKE MONRONEY AERONAUTICAL CENTER LEASES
FY 2012 Request $17.0M

- 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 5,900 employees and contractors, and 1,200 students daily. 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 2012 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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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)).

4A05, TRANSITION ENGINEERING SUPPORT
FY 2012 Request $13.0M

- NAS Implementation Support Contract (NISC), M22.00-00

Program Description

NISC provides technical expertise to assist the agency in deploying, implementing, and integrating many different components and equipment into the NAS within established modernization schedules. Some of the work products that support transition, implementation, and integration activities include: transition plans and timelines, equipment installation schedules, engineering site preparation packages, site implementation plans, analysis of environmental impacts, test procedures, site test monitoring, and corporate work planning.

The NISC contract supports a myriad of FAA priorities. Several examples representative of the breadth of NISC support include:

- Performance-Based Navigation (PBN), comprised of Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications resulting in improved operational access and flexibility which enhance reliability and reduce delays by defining more precise terminal area procedures, as well as reducing emissions and improving fuel consumption.

- NISC supports the Environmental and Occupational Safety and Health (EOSH) compliance program. Engineering and design efforts to ensure meeting EOSH regulatory requirements are conducted on facilities before construction or implementation begins. This process leads to cost avoidance through eliminating rework or retrofit of new facilities and equipment when deployed.

  NISC supports the EOSH efforts to accelerate the schedule for performing environmental due diligence audits for facilities which have been declared excess. By using this approach NISC was able to assist in reducing future FAA lease and operational costs and liability associate with unused facilities being vandalized or used for non conforming purposes.

  NISC resources help implement the FAA's environmental cleanup program throughout the United States, providing cost savings to the FAA through mitigating future environmental liability to the agency. It also supports the FAA's goal of organizational excellence by ensuring the judicious management of natural resources and stewardship of the environment. The program has abated 11,000 hazards (out of 50,000 plus potential hazards identified).

- A Direct entry Digital NOTAM (DDN) System Feasibility study was completed and submitted to the Aeronautical Information Management Group regarding the development and implementation of the DDN system. NISC support is developing a plan that would provide innovative approaches for training, conduct airport surface validation activities and implement an Airport Manager Airport Self Certification process, which would result in cost reductions. The estimated cost reduction has not been completed as the FAA has not identified a time frame for completion of the DDN effort.

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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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.

4A06, TECHNICAL SUPPORT SERVICES CONTRACT (TSSC)

FY 2012 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 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.

FY 2012 is a transition year for TSSC vehicles. The prior contract will end and work will be transitioned to a new competitively awarded contract vehicle. The TSSC Program requires funds to support contract start up activities on the new contract award while sustaining performance and delivery of work on the existing contract vehicle.

The FAA must conduct a full and open competition for the new follow on contract to be awarded. The present contract ends in December, 2011 and the next contract must be in place to accept the transition of project support from the prior contract. The new contract is scheduled to start in the first quarter of FY 2012 while the existing is moving toward its conclusion. Therefore, it will be necessary for the FAA to operate two contracts during FY 2012 including award fee for two contracts, and the cost of contractor management of its employees along with office space, and other contract infrastructure costs on both contracts.

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:*
  - *$20 million in savings for strategic sourcing for selected products and services and a reduction of $30 million in Information Technology operating costs.*

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.

4A07, RESOURCE TRACKING PROGRAM (RTP)
FY 2012 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. This centralized effort puts cost and schedule in one place to show program/project performance.

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.

4A08, CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)
FY 2012 Request $80.8M

- 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. In June 2010 a new FFRDC contract was awarded to MITRE Corporation for program efforts starting in FY 2010 with a base period through FY 2015. The contract includes an option for five years of continuing coverage through FY 2020.

CAASD high quality research, systems engineering, and analytical capabilities help FAA meet the technically complex challenges in the NAS. CAASD provides independent advanced research and development required by the FAA to obtain technical analyses, prototypes and operational concepts needed to fulfill the vision for NAS architecture, FAA's Strategic Plan, and the NextGen Implementation Plan. CAASD provides a level of technical expertise not available within the Federal workforce.

The MITRE/CAASD Product Based Work Plan (PBWP) supports FAA Strategic Plan Goals across the board. The PBWP is developed within the context of the FAA Strategic Plan and the NextGen Implementation Plan, NAS Enterprise Architecture, National Aviation Research Plan (NARP), other agency long-range plans, and the FAA CAASD Long Range Plan (FY 2011-2015). 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.

Benefits of MITRE/CAASD work are detailed in the CAASD Long Range Plan for each program outcome. Individual MITRE/CAASD deliverables provide FAA stakeholders with important data and recommendations that support FAA decision making and contribute to objective accomplishment.

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 88.0 percent at the 35 OEP airports 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 Strategic Plan, and the NextGen Implementation Plan – FAA's plan to NextGen. FAA adoption of the new systems and procedures in the NAS improves on-time performance, increases capacity, and provides a safer and more efficient global air transportation system.

4A09, AERONAUTICAL INFORMATION MANAGEMENT PROGRAM
FY 2012 Discretionary $26.3M
FY 2012 Mandatory $2.6M
FY 2012 Total Request $28.9M

- A, Aeronautical Information Management (AIM) Modernization – Segment 1, A08.03-02
- B, CATM – Flight & State Data Mgmt – AIM Segment 2, G05A.02-05
- C, CATM – Flight & State Data Mgmt – AIM Segment 3, G05A.02-06

A, AERONAUTICAL INFORMATION MANAGEMENT (AIM) MODERNIZATION – SEGMENT 1, A08.03-02

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 first segment of 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. NOTAMs are issued to inform pilots of recent changes such as runway closures and airspace restrictions. The CARF informs pilots about the status of restricted airspace so pilots can plan flights to avoid those restrictions.

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 the first quarter of FY 2012.

Segment 1 Aeronautical Information (AI) products will improve NOTAMs and CARF service to 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 military systems use 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.

Schedule to reach FID:

- Update Life Cycle Cost Estimates data – October 2011;
- Submit updated integrated program schedule and benefits stream – October 2011;
- Resolve Investment Planning and Analysis comments – November 2011; and
- EC and JRC – December 2011.

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 AIM Modernization Segment 1 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.

Program Plans FY 2012 – Performance Output Goals

- Test NOTAMs in Aeronautical Information Exchange Model (AIXM) via SWIM-compliant web services at a minimum of 30 OEP airports.
- Provide Altitude Reservations (ALTRVs) in AIXM via SWIM-compliant web services.
- Award the development contract for AIM Modernization Segment 1.
- Commence Segment 1 solution development, implementation and deployment of completed, tested and operational system modules or subsystems. including the following:
  - Software to store, process and retrieve NOTAM 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.
- Initiate integration with pilot briefing and pre-flight management capabilities.

Program Plans FY 2013 – Performance Output Goals

- Continue Segment 1 solution development, implementation and deployment of completed, tested and operational system modules or subsystems. including 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.
- Continue integration with pilot briefing and pre-flight management capabilities.
- Begin transition to full system operation and sustainment.

Program Plans FY 2014 – Performance Output Goals

- Complete Segment 1 solution development, implementation and deployment of completed, tested and operational system modules or subsystems. including 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 integration with pilot briefing and pre-flight management capabilities.
- Complete transition to full system operation and sustainment; Initial Operating Capability.

Program Plans FY 2015-2016 – Performance Output Goals
- None

B, CATM – Flight & State Data Management – AIM Segment 2, G05A.02-05

Program Description

The AIM Modernization program will provide aviation users with digital aeronautical information that conforms to international standards and supports Next Generation Air Transportation System (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. AIM Modernization improves the delivery of the National Airspace System (NAS) status information.

AIM will implement information systems and services necessary to incorporate standard airport mapping and special activity airspace structure and status data. Consequently this project addresses the capability gap caused by the fact that there is no deployed integrated digital source of aeronautical information, airport and airspace data necessary to achieve shared situational awareness, including its fusion with NOTAM data developed in AIM Modernization Segment 1.

AIM Modernization Segment 2: The second segment develops and implements the following based on Common Structure and Status Data (CSSD) cross domain pre-implementation efforts:
1. Automation to coordinate use of Special Activity Airspace; and
2. Airport mapping and status.

Segment 2 will build on pre-implementation efforts in the NextGen CSSD program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange. Aeronautical Common Services will:
- Improve workflows for Special Activity Airspace (SAA) management with web services using a Service Oriented Architecture (SOA) to allow for communication of SAA relevant information among stakeholders. Digital management of SAAs will also facilitate calculation of metrics, analysis of SAA usage, integration with industrial partners, and scheduling automation.
- Provide a central resource called Airports Geographic Information System (GIS) for critical information about airports including airport mapping and status and a variety of applications for using this data.

Schedule to meet Final Investment Decision (FID):
- Preliminary Investment Analysis – Dec 2010;
- Acquisition Strategy and Stakeholder Management Plan – March 2011;
- Work Breakdown Structure (WBS) and WBS Dictionary – Aug 2011;
- Risk-Adjusted Cost Model – December 2011;
- Business Case Analysis Report (BCAR), Implementation Strategy and Planning Document (ISPD), Final Requirements Document (FRD) – February 2012;
- Release of SIR for software development contract supporting AIM Modernization Segment 2 – February 2012; and
- FID – December 2012.

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

AIM Modernization Segment 2 will target enhancements and new functionality to improve and expand AIM services. The program will improve the accuracy and timeliness of information regarding Special Activity Airspace and Airport 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 2012 – Performance Output Goals
Discretionary
- Complete Investment Analysis Phase (Final Investment Decision scheduled for Q1 FY 2012).
- Perform engineering for SAA Management and Airport Mapping services effort.

Mandatory
- Complete prototype development and demonstrations.

Program Plans FY 2013 – Performance Output Goals
- Develop Aeronautical Information (AI) Data Store Enhancements for special activity airspace management and airport data.
- Produce Aeronautical Information Exchange Model (AIXM) Enhancements for special activity airspace management and airport data.
- Develop Web Services for special activity airspace management and airport data.
- Begin Implementation of special Activity Airspace design capability.

Program Plans FY 2014 – Performance Output Goals
- Begin Implementation of Enterprise-Level Services for Distributing Airport Data Including Airport Airspace Data.
- Develop Performance Metrics for Special Activity Airspace management.
- Develop Business Process/Workflow for special activity airspace management and airport data.

Program Plans FY 2015 – Performance Output Goals
- Perform hardware and software Integration, Assembly, Test, and Checkout.
- Achieve Initial Operational Capability.

Program Plans FY 2016 – Performance Output Goals
- Operate and sustain full system developed under AIM Modernization Segment 2.

C, CATM – FLIGHT & STATE DATA MANAGEMENT – AIM SEGMENT 3, G05A.02-06

Program Description

AIM Modernization Segment 3: The third segment plans, develops and implements the modernization of the static data repository and static data management system, replacing and improving the functionality of NAS Resources (NASR) and employing common adaptation for the NAS Adaptation Services Environment (NASE). This provides a centralized, consistent approach to managing aeronautical information by designing NASR and NASE to be compliant with the NextGen data model (AIXM) and SWIM standards (Web Services). It supports management and full integration of static aeronautical information within the Air Traffic Organization (ATO). Segment 3 involves replacing and improving NASR and NASE – where static aeronautical information and adaptation data are stored now. It is planned to be completed by 2017 to support the static data requirements of Segment 2.

Segment 3 Aeronautical Information (AI) products will improve the provision of static aeronautical information 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.

Accurate and timely aeronautical information 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 static aeronautical information (e.g., aeronautical charts) 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 AIM Modernization Segment 3 program will improve the accuracy and integrity of static aeronautical 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 2012 – Performance Output Goals
Discretionary
- Plan Investment Analysis Phase (for Final Investment Decision).
  - Perform market survey to determine whether viable commercial-off-the-shelf (COTS) solutions or COTS-based solutions requiring minimal development exist.
- Perform initial engineering for NASR and NASE replacement effort, a COTS-based static data management system.
- Develop a concept of operations for NASR and NASE replacement.

Mandatory
- Perform initial work on prototype development and demonstrations.

Program Plans FY 2013 – Performance Output Goals
- Continue Investment Analysis Phase for Final Investment Decision (FID).
- Perform engineering for NASR and NASE replacement effort, including integration of COTS-based static data management system solutions where possible.
- Develop functional requirements for NASR and NASE replacement.
- Perform prototype development and demonstrations.

Program Plans FY 2014 – Performance Output Goals
- Obtain FID.
- Award contract for development of static data management system using COTS-based static data management system solutions where possible.
- Begin to design and develop static data management system using COTS-based static data management system solutions where possible.

Program Plans FY 2015 – Performance Output Goals
- Continue development of static data management system using COTS-based static data management system solutions where possible.

Program Plans FY 2016 – Performance Output Goals

- Complete development and testing of static data management system using COTS-based static data management system solutions where possible..
- Test static data management system using COTS-based static data management system solutions where possible
- Implement COTS-based static data management system; Initial Operating Capability.
- Commence operating and sustaining full system developed under AIM Modernization Segment 3.

4A10, PERMANENT CHANGE OF STATION (PCS) MOVES

FY 2012 Request $2.5M

- Terminal PCS Moves, M51.01-01

Program Description

The Permanent Change of Stations (PCS) supports the Terminal Air Traffic Facilities Program by providing the funding to support terminal projects that have been determined to be candidates for realignment rather than replacement. Whenever construction of a new airport traffic control tower is planned, realignment of the adjacent TRACONs is considered. When TRACONs are realigned, the controllers at those facilities are relocated to the new facility. This project provides funding for the relocation expenses of personnel who will need to move to the new TRACON and qualify for relocation assistance.

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 Permanent Change of Station Moves contributes to the FAA greater capacity goal by supporting the Terminal Air Traffic Control Facilities program. New and replacement facilities support the FAA capacity goal: to provide a system that meets or exceeds air traffic demand. TRACONs that are considered for realignment will require relocation expenses of personnel.

Program Plans FY 2012 – Performance Output Goals

- Develop facility plans for relocation of personnel that supports ATCT/TRACON projects and/or initiatives.

Program Plans FY 2013-2016 – Performance Output Goals

- None.

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix C

Fiscal Years 2012 – 2016

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Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.
	Activity 1: Engineering, Development, Test, and Evaluation	**$137.3**	**$497.9**	**$635.2**	**$474.3**	**$490.4**	**$561.6**	**$688.1**
1A01	Advanced Technology Development and Prototyping (ATDP)*	$1.5	$31.9	$33.4	$26.6	$24.5	$28.0	$26.2
1A02	NAS Improvement of System Support Laboratory	$0.0	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$0.0	$15.0	$15.0	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment*	$4.9	$7.5	$12.4	$5.9	$6.0	$6.1	$6.2
1A05	NextGen Network Enabled Weather (NNEW)	$0.0	$27.4	$27.4	$25.0	$25.0	$10.0	$10.0
1A06	Data Communication in support of Next Generation Air Transportation System (NextGen)*	$7.2	$143.0	$150.2	$113.3	$119.1	$129.8	$104.8
1A07	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development*	$8.1	$16.9	$25.0	$24.6	$24.6	$24.6	$24.6
1A08	Next Generation Air Transportation System (NextGen) - System Development*	$19.0	$90.0	$109.0	$76.5	$76.5	$80.5	$80.5
1A09	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations (TBO)*	$13.7	$9.3	$23.0	$18.0	$18.0	$18.0	$33.0
1A10	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact*	$18.4	$14.6	$33.0	$14.6	$20.0	$20.0	$20.0
1A11	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports*	$13.7	$14.3	$28.0	$11.0	$8.0	$27.4	$42.4
1A12	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)*	$25.0	$28.0	$53.0	$27.5	$31.0	$37.0	$33.0
1A13	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment*	$21.8	$36.3	$58.1	$69.1	$70.5	$67.5	$98.8
1A14	Next Generation Air Transportation System (NextGen) - Safety, Security and Environment*	$3.0	$5.0	$8.0	$0.0	$0.0	$0.0	$0.0
1A15	Next Generation Air Transportation System (NextGen) - System Networked Facilities*	$1.0	$9.0	$10.0	$11.0	$11.0	$11.0	$11.0
1A16	Next Generation Air Transportation System (NextGen) - Future Facilities	$0.0	$19.5	$19.5	$10.0	$20.0	$70.0	$165.9
1A17	Joint Planning and Development Office (JPDO)	$0.0	$3.0	$3.0	$2.0	$2.0	$2.0	$2.0
1A18	Next Generation Air Transportation System (NextGen) - Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0.0	$26.2	$26.2	$26.2	$21.2	$16.7	$16.7
	Activity 2: Air Traffic Control Facilities and Equipment	**$108.1**	**$1,459.9**	**$1,568.0**	**$1,439.7**	**$1,399.8**	**$1,347.4**	**$1,280.6**
	A. En Route Programs	**$78.5**	**$684.6**	**$763.1**	**$641.8**	**$596.1**	**$497.5**	**$483.1**
2A01	En Route Automation Modernization (ERAM)	$0.0	$120.0	$120.0	$90.0	$70.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements*	$64.5	$0.0	$64.5	$57.0	$70.0	$204.0	$165.0
2A03	En Route Communications Gateway (ECG)*	$4.0	$2.0	$6.0	$3.1	$4.9	$4.7	$0.9
2A04	Next Generation Weather Radar (NEXRAD)	$0.0	$2.8	$2.8	$3.3	$1.2	$1.3	$1.2
2A05	Air Traffic Control System Command Center (ATCSCC) - Relocation	$0.0	$3.6	$3.6	$0.0	$0.0	$0.0	$0.0
2A06	ARTCC Building Improvements/Plant Improvements*	$6.0	$46.0	$52.0	$50.9	$52.4	$52.4	$62.4
2A07	Air Traffic Management (ATM)	$0.0	$7.5	$7.5	$23.7	$8.3	$0.9	$1.2
2A08	Air/Ground Communications Infrastructure	$0.0	$4.8	$4.8	$2.6	$2.6	$2.6	$2.6

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(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.
2A09	Air Traffic Control En Route Radar Facilities Improvements	$0.0	$5.8	$5.8	$5.9	$0.0	$0.0	$0.0
2A10	Voice Switching Control System (VSCS)	$0.0	$1.0	$1.0	$15.0	$20.0	$20.0	$15.0
2A11	Oceanic Automation System*	$2.0	$6.0	$8.0	$4.0	$2.8	$0.0	$0.0
2A12	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$0.0	$45.2	$45.2	$33.4	$22.0	$40.0	$40.0
2A13	System-Wide Information Management (SWIM)	$0.0	$66.4	$66.4	$33.0	$28.0	$59.1	$61.7
2A14	Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$0.0	$285.1	$285.1	$270.7	$271.9	$107.3	$112.5
2A15	Windshear Detection Service	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
2A16	Weather and Radar Processor (WARP)	$0.0	$2.5	$2.5	$0.5	$0.7	$0.0	$0.0
2A17	Collaborative Air Traffic Management Technologies (CATMT)	$0.0	$41.5	$41.5	$34.4	$29.3	$3.3	$15.6
2A18	Colorado ADS-B Wide Area Multilateration (WAM) Cost Share*	$2.0	$3.8	$5.8	$1.4	$1.4	$1.4	$1.4
2A19	Automated Terminal Information Services (ATIS)	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
2A20	Tactical Flow Time Based Flow Management (TBFM)	$0.0	$38.7	$38.7	$12.9	$10.5	$0.5	$3.6
	B. Terminal Programs	**$11.0**	**$359.9**	**$370.9**	**$380.9**	**$423.8**	**$469.9**	**$456.5**
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$0.0	$2.2	$2.2	$10.0	$11.1	$13.4	$7.9
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$0.0	$7.7	$7.7	$4.6	$0.5	$0.0	$0.0
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$0.0	$25.0	$25.0	$42.0	$39.5	$54.0	$76.8
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$0.0	$98.8	$98.8	$67.4	$91.9	$141.2	$126.9
2B05	Terminal Automation Program	$0.0	$2.5	$2.5	$2.5	$2.6	$2.6	$2.7
2B06	Terminal Air Traffic Control Facilities - Replace	$0.0	$51.6	$51.6	$100.0	$100.0	$100.0	$115.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve*	$5.0	$56.9	$61.9	$47.7	$52.7	$52.1	$52.1
2B08	Terminal Voice Switch Replacement (TVSR)	$0.0	$10.0	$10.0	$8.0	$5.0	$0.0	$0.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$0.0	$26.0	$26.0	$26.0	$26.0	$26.0	$26.0
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)*	$2.0	$6.0	$8.0	$4.0	$5.0	$5.0	$0.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$0.0	$3.9	$3.9	$8.4	$9.4	$6.3	$4.4
2B12	Runway Status Lights (RWSL)	$0.0	$29.8	$29.8	$36.4	$32.6	$22.7	$0.0
2B13	National Airspace System Voice System (NVS)	$0.0	$19.8	$19.8	$10.0	$30.0	$30.0	$30.0
2B14	Integrated Display System (IDS)	$0.0	$8.8	$8.8	$8.2	$8.2	$2.9	$2.3
2B15	Remote Monitoring and Logging System (RMLS)	$0.0	$4.2	$4.2	$3.7	$0.0	$1.2	$1.1
2B16	Mode S Service Life Extension Program (SLEP)*	$4.0	$4.0	$8.0	$2.0	$5.0	$0.0	$0.0
2B17	ASR-8 Relocation	$0.0	$2.7	$2.7	$0.0	$0.0	$0.0	$0.0
2B18X	Integrated Terminal Weather System (ITWS)**	$0.0	$0.0	$0.0	$0.0	$1.3	$9.7	$5.9
2B19X	Terminal Automation Modernization/ Replacement Program (TAMR Phase 2)**	$0.0	$0.0	$0.0	$0.0	$3.0	$2.7	$5.4
	C. Flight Service Programs	**$0.0**	**$11.8**	**$11.8**	**$14.9**	**$28.2**	**$32.2**	**$37.1**
2C01	Automated Surface Observing System (ASOS)	$0.0	$2.5	$2.5	$0.0	$0.0	$0.0	$0.0
2C02	Flight Service Station (FSS) Modernization	$0.0	$4.5	$4.5	$10.5	$27.0	$32.0	$37.0
2C03	Weather Camera Program	$0.0	$4.8	$4.8	$4.4	$1.2	$0.2	$0.1
	D. Landing and Navigation Aids Programs	**$1.0**	**$244.4**	**$245.4**	**$232.7**	**$179.5**	**$178.3**	**$143.2**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment	$0.0	$5.0	$5.0	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$0.0	$5.0	$5.0	$7.0	$7.0	$7.0	$7.0

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(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.
2D03	Wide Area Augmentation System (WAAS) for GPS	$0.0	$125.5	$125.5	$111.1	$115.5	$121.4	$95.7
2D04	Runway Visual Range (RVR)	$0.0	$5.0	$5.0	$4.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$0.0	$5.0	$5.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$0.0	$5.0	$5.0	$5.0	$0.0	$0.0	$0.0
2D07	Visual Navaids - Establish/Expand	$0.0	$3.4	$3.4	$5.0	$0.0	$0.0	$0.0
2D08	Instrument Flight Procedures Automation (IFPA)	$0.0	$2.2	$2.2	$7.1	$4.5	$2.4	$3.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$0.0	$6.0	$6.0	$8.0	$3.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$0.0	$7.0	$7.0	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$0.0	$50.3	$50.3	$55.0	$0.0	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$0.0	$25.0	$25.0	$20.0	$35.0	$30.0	$20.0
2D13	Navaid Control, Interlock and Monitoring Equipment (NCIME)*	$1.0	$0.0	$1.0	$0.0	$0.0	$0.0	$0.0
	E. Other ATC Facilities Programs	**$17.6**	**$159.2**	**$176.8**	**$169.4**	**$172.2**	**$169.5**	**$160.5**
2E01	Fuel Storage Tank Replacement and Monitoring	$0.0	$6.4	$6.4	$6.6	$6.7	$6.8	$6.8
2E02	Unstaffed Infrastructure Sustainment*	$4.6	$18.0	$22.6	$27.8	$33.1	$33.8	$33.8
2E03	Aircraft Related Equipment Program	$0.0	$11.7	$11.7	$10.1	$10.4	$9.0	$11.4
2E04	Airport Cable Loop Systems - Sustained Support	$0.0	$5.0	$5.0	$5.0	$5.0	$5.0	$5.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)*	$3.0	$16.0	$19.0	$11.8	$11.0	$11.4	$0.0
2E06	Facilities Decommissioning	$0.0	$5.0	$5.0	$5.0	$0.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support*	$10.0	$85.6	$95.6	$95.0	$100.0	$100.0	$100.0
2E08	Aircraft Fleet Modernization	$0.0	$9.0	$9.0	$2.1	$0.0	$0.0	$0.0
2E09	FAA Employee Housing and Life Safety Shelter System Services	$0.0	$2.5	$2.5	$2.5	$2.5	$0.0	$0.0
2E10X	Independent Operational Test/Evaluation**	$0.0	$0.0	$0.0	$3.5	$3.5	$3.5	$3.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$2.0**	**$180.4**	**$182.4**	**$135.1**	**$128.4**	**$96.8**	**$92.9**
	A. Support Equipment	**$2.0**	**$160.9**	**$162.9**	**$123.6**	**$116.6**	**$84.7**	**$80.8**
3A01	Hazardous Materials Management	$0.0	$20.0	$20.0	$20.0	$20.0	$20.0	$20.0
3A02	Aviation Safety Analysis System (ASAS) - Regulation & Certification for Infrastructure System Safety (RCISS)	$0.0	$30.1	$30.1	$15.8	$12.7	$11.9	$20.2
3A03	Logistics Support Systems and Facilities (LSSF)	$0.0	$10.0	$10.0	$10.0	$10.0	$0.2	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$0.0	$12.0	$12.0	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$0.0	$18.0	$18.0	$18.0	$19.4	$12.0	$0.0
3A06	Information Security*	$2.0	$17.0	$19.0	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$0.0	$23.6	$23.6	$26.0	$11.5	$10.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$0.0	$17.2	$17.2	$6.8	$16.0	$6.1	$4.6
3A09	Data Center Optimization	$0.0	$1.0	$1.0	$0.0	$0.0	$0.0	$0.0
3A10	Aerospace Medical Equipment Needs (AMEN)	$0.0	$12.0	$12.0	$3.0	$3.0	$0.0	$2.5
	B. Training, Equipment, and Facilities	**$0.0**	**$19.5**	**$19.5**	**$11.5**	**$11.8**	**$12.1**	**$12.1**
3B01	Aeronautical Center Infrastructure Modernization	$0.0	$18.0	$18.0	$10.5	$10.8	$11.1	$11.1
3B02	Distance Learning	$0.0	$1.5	$1.5	$1.0	$1.0	$1.0	$1.0

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Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2012 Manda-tory	FY 2012 Discre-tionary	FY 2012 Budget Total	FY 2013 Est.	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.
	Activity 4: Facilities and Equipment Mission Support	**$2.6**	**$251.9**	**$254.5**	**$229.9**	**$232.3**	**$253.0**	**$254.8**
4A01	System Engineering and Development Support	$0.0	$32.9	$32.9	$33.5	$34.1	$32.9	$33.3
4A02	Program Support Leases	$0.0	$41.7	$41.7	$40.9	$42.1	$55.2	$56.7
4A03	Logistics Support Services (LSS)	$0.0	$11.7	$11.7	$11.5	$11.5	$11.5	$11.0
4A04	Mike Monroney Aeronautical Center Leases	$0.0	$17.0	$17.0	$17.5	$17.9	$18.4	$18.8
4A05	Transition Engineering Support	$0.0	$13.0	$13.0	$15.0	$15.0	$15.0	$15.0
4A06	Technical Support Services Contract (TSSC)	$0.0	$22.0	$22.0	$25.0	$25.0	$25.0	$25.0
4A07	Resource Tracking Program (RTP)	$0.0	$4.0	$4.0	$4.0	$0.0	$0.0	$0.0
4A08	Center for Advanced Aviation System Development (CAASD)	$0.0	$80.8	$80.8	$70.0	$80.0	$80.0	$80.0
4A09	Aeronautical Information Management Program*	$2.6	$26.3	$28.9	$12.5	$6.7	$15.0	$15.0
4A10	Permanent Change of Station (PCS) Moves	$0.0	$2.5	$2.5	$0.0	$0.0	$0.0	$0.0
	Activity 5: Personnel Compensation, Benefits, and Travel	**$0.0**	**$480.0**	**$480.0**	**$487.1**	**$505.1**	**$514.2**	**$521.7**
5A01	Personnel and Related Expenses	$0.0	$480.0	$480.0	$487.1	$505.1	$514.2	$521.7
	*BLI's that support the mandatory General Fund appropriation request and include a breakout of the funding amount for Mandatory, Discretionary and Total request.							
	** BLI numbers with X represent outyear programs not requested in the FY 2012 President's Budget.							
	Out-year funding amounts are estimates.							
	Total Year Funding	**$250.0**	**$2,870.0**	**$3,120.0**	**$2,766.0**	**$2,756.0**	**$2,773.0**	**$2,838.0**
	Targets	**$250.0**	**$2,870.0**	**$3,120.0**	**$2,766.0**	**$2,756.0**	**$2,773.0**	**$2,838.0**

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix D

Fiscal Years 2012 – 2016

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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

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
Air Traffic Control Beacon Interrogator Replacement (ATCBI-6) ACAT 3	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.
Airport Surface Detection Equipment - Model X (ASDE-X) ACAT 1	Sep-01	Jan-07	$505.2	Sep-05	May-11	$550.1	Sep-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. Current Estimate vs Current Baseline: The estimated 4 month extension to the completion date is due to implementation issues at the last site. Note: By the May-11 current baseline completion date, ASDE-X systems at 34 of 35 sites will have achieved ORD.
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2 ACAT 1	Aug-07	Sep-14	$1,681.5	Aug-07	Sep-14	$1,681.5	Sep-14	$1,712.6	Current Estimate vs Current Baseline: The increase of $31.1M to the current estimate (-1.9% 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, another funding earmark of $9.3M in FY 2008 to accelerate Future Air to Air Applications Development, and an increase of $15M for ADS-B related modifications for Terminal software. Note: The increase to the current estimate is -0.9% when the funding earmarks are excluded.
Collaborative Air Traffic Management Technologies (CATMT) Work Package 2 ACAT 3	Sep-08	Sep-14	$109.5	Sep-08	Sep-14	$109.5	Sep-14	$109.5	

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
En Route Automation Modernization (ERAM) ACAT 1	Jun-03	Dec-10	$2,154.6	Jun-03	Dec-10	$2,154.6	Aug-14	$2,484.6	Current Estimate vs Current Baseline: The completion date for ERAM (ORD defined as site in state of continuous operations with no intent to maintain legacy systems) has slipped to Aug-14 resulting in a -44 month schedule variance (-49%). The budget has increased by $330M, resulting in a -15.3% variance. The program is scheduled to go to the FAA Joint Resources Council in Jun-11 for a Baseline Change Decision for budget and schedule. The budget and schedule variances are associated with the following factors; (1) project plan did not factor in the risks associated with the operational complexity at the selected sites, (2) Insufficient testing environment failed to identify software issues before deployment to key sites (3) Insufficient communication between the Program office and field sites (4) uneven stakeholder engagement during development/deployment.
International Flight Inspection Aircraft (IFIA) ACAT 2	Dec-03	Aug-09	$27.4	Dec-03	Aug-09	$27.4	May-12	$33.7	Current Estimate vs Current Baseline: The completion date for IFIA has slipped to May-12 resulting in a -33 month schedule variance and the budget has increased by $6.3M. These budget and schedule variances are associated with the second and third aircraft and are due to: (1) contract option exercised two years later than planned due to a delay in appropriations; (2) purchase of a different model of the aircraft (costlier with a different configuration) than planned because the original model had been phased out; and (3) much lower trade-in value than was planned for the aircraft being replaced.

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
Logistics Center Support System (LCSS) ACAT 2	Apr-10	Feb-14	$67.4	Apr-10	Feb-14	$67.4	Feb-14	$67.4	
Next Generation Air-to-Ground Communication System (NEXCOM) - Segment 1A ACAT 2	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.
Regulation and Certification Infrastructure for System Safety (RCISS) -Segment 2 ACAT 3	Oct-10	Sep-16	$90.7	Oct-10	Sep-16	$90.7	Sep-16	$90.7	
Runway Status Lights (RWSL) ACAT 1	Jan-10	Oct-15	$327.4	Jan-10	Oct-15	$327.4	Oct-15	$327.4	
System Approach for Safety Oversight (SASO) Phase Iia ACAT 3	Sep-08	Sep-13	$88.0	Sep-08	Sep-13	$88.0	Sep-13	$88.0	
System Wide Information Management (SWIM) Segment 1 ACAT 2	Jul-09	Sep-15	$310.2	Jul-09	Sep-15	$310.2	Sep-15	$310.2	
Tme Based Flow Management (TBFM) ACAT 3	Apr-10	Nov-14	$115.0	Apr-10	Nov-14	$115.0	Nov-14	$115.0	

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
Traffic Flow Management (TFM) - Infrastructure/Collaborative Air Traffic Management Technologies (CATMT) Work Package 1 ACAT 2	Aug-05	Apr-10	$398.1	Aug-05	May-11	$398.1	May-11	$398.1	**Note:** At the Aug-05 Final Investment Decision (FID), the JRC approved the program which consisted of the development and deployment of the modernized TFM system (completion date Apr-10) and the development and deployment of new TFM functionality on the modernized system (completion date May-11). The FY11-15 CIP Appendix D listed an Apr-10 completion date which only encompassed the deployment of the modernized TFM system, the first part of the program. The FY12-16 CIP Appendix D has been revised to a May-11 completion date which encompasses the entire program from the deployment of the modernized TFM system followed by the deployment of the new TFM functionality on the modernized TFM system.
Wide Area Augmentation System (WAAS) ACAT 1	Jan-98	Aug-99	$1,006.6	May-09	Sep-13	$3,008.1	Sep-13	$3,008.1	**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.

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
Airport Surveillance Radar - Model 11 (ASR-11) ACAT 2	Nov-97	Sep-05	$743.3	Sep-05	Sep-09	$696.5	Jun-10	$696.5	The program completed in Jun-10 with the the commissioning of the last 2 systems. The 9 month extension to the completion date in the current baseline was due to an unusually long real estate acquisition at one site and Anomalous Propagation (AP) issues at the other site. The schedule variance versus the original baseline was due to funding reductions which extended the procurement and deployment schedule. The lower budget number versus the original baseline was associated with a reduction of scope.
Integrated Terminal Weather System (ITWS) ACAT 3	Jun-97	Jul-03	$276.1	Nov-07	Jun-10	$282.1	Aug-10	$282.1	The program completed in Aug-10 with the the commissioning of the last system. The 2 month extension to the completion date in the current baseline was due to building infrastructure issues at the last site. The schedule and buget variances versus the original baseline were due to funding reductions and requirements changes to add Terminal Convective Weather Forecasting.
Flight Standards Inspector Aircraft, Replacement Segment 1 ACAT 2	Nov-08	Dec-10	$18.0	Nov-08	Dec-10	$18.0	Dec-10	$18.0	The program completed with all 6 aircraft delivered and fully operational by the Dec-10 completion date.

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix E

Fiscal Years 2012 – 2016

LIST OF ACRONYMS AND ABBREVIATIONS

--Number--	
3D	three dimensional
4D	four dimensional
4D-OTM	four dimensional-oceanic trajectory management
4D Wx SAS	four dimensional weather single authoritative source
--A--	
ABRR	airborne reroute execution
ACEF	aircraft cabin environment facility
ACE-IDS	automated surface observing system controller equipment-information display system
ACEPS	ARTCC critical and essential power systems
ADAM	advanced dynamic airspace management
ADAS	automated weather observation data acquisition system
ADD	airworthiness directives development
ADM	add drop multiplexer
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
ADS-R	automatic dependent surveillance-rebroadcast
AEDT	aviation environmental design tool
AEFS	advanced electronic flight strip
AeroMACS	aeronautical mobile airport communications system
AFIS	automatic flight inspection system
AFN	Air Traffic Service Facilities Notification
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
AGL	above ground level
AI	aeronautical information
AIM	aeronautical information management
AIO	Office of the Chief Information Officer
AIR	FAA Aircraft Certification Service
AirNav	airports and navigations aids
AISM	aeronautical information system modernization
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
AJE	ATO en route and oceanic services
ALL	assimilate lessons learned
ALS	approach lighting system
ALSF-2	approach lighting system with sequenced flashing light model 2
ALSIP	approach lighting system improvement program
ALTRV	altitude reservations
AMASS	airport movement area safety system

AMEN	aerospace medical equipment needs
AMMS	automated maintenance management system
AMOFSG	Aerodrome Meteorology Observation and Forecast Study Group
AMP	airspace management program
AMQ	Office of Acquisition Services
AMRS	aeronautical mobile (R) service
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
AR	authorization required
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-3	airport surface detection equipment – model 3
ASDE-X	airport surface detection equipment – model x
ASDP	advanced signal data processor
ASI	aviation safety inspectors
ASIAS	aviation safety information analysis and sharing
ASKME	aviation system knowledge management environment
ASOS	automated surface observing system
ASR	airport surveillance radar
ASR-7, 8, 9, 11	airport surveillance radar model 7, 8, 9, and 11
ASSC	airport surface surveillance capability
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	air 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
AWSS	automated weather sensor systems
AXSL	ASDE-X safety logic
--B--	
BAC	budget estimates at completion
BCAR	business case analysis report
BEBS	best equipped best served
BLI	budget line item
BPM	business process management
BUEC	back up emergency communication
BW	bandwidth
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
CAI	contractor acceptance inspection
CAMI	civil aerospace medical institute
CARF	central altitude reservation function
CARTS	common-automated radar tracking system
CAS	commercially available software
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
CD 2	common digitizer (converts analog radar data to digital format)
CDA	continuous descent approach
CDM	collaborative decision making
CDP	concept development plan/ climb descent procedures
CDR	critical design review
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
CFR	code of federal regulations
CHI	computer human interface
CI/EP	certification of imported/exported products
CIO	chief information officer
CIP	capital investment plan
CIWS	corridor integrated weather system
CIX	collaborative information exchange
CLEEN	continuous low energy, emissions and noise

CNS	communications, navigation and surveillance
Conops	concept of operations
CONUS	continental United States
COTS	commercial off-the-shelf
CPDLC	controller-pilot data link communications
CPDS	critical power distribution system
CRD	concept and requirements document
CRDR	concept requirements development readiness
CSMC	cyber security management center
CSPO	closely spaced parallel runway operations
CSPR	closely spaced parallel runways
CSSD	common status and structure data
CST	communication support team
CTAS	center TRACON automation system
CTP	collaborative trajectory planning
CTS	coded time source
CWAM	convective weather avoidance model
CWP	corporate work plan
--D--	
DAH	design approval holder
DALR	digital audio legal recorder
DARPA	Defense Advanced Research Projects Agency
DASI	digital altimeter setting indicator
DataComm	data communications
DCCI	data center consolidation initiative
DCE	data communication equipment
DCIS	data communications integrated services
DCL	departure clearance
DCNS	data communication air/ground network service
DCS	data communication system
DDN	direct entry digital NOTAM
DELPHI	DOT accounting system
DF	direction finder
DHS	Department of Homeland Security
DME	distance measuring equipment
DMN	data multiplexing network
DOC	Department of Commerce
DoD	Department of Defense
DOT	Department of Transportation
DOTS+	dynamic ocean tracking system plus
DP	decision point
DR	disaster recovery
D-side	data controller position
DSP	departure spacing program
DS/PP	designee supervision/past performance
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
DVD	digital virtual disc

DVRS	digital voice recorder system
--E--	
EA	enterprise architecture
EBUS	enhanced backup surveillance
EC	executive council
ECG	en route communication gateway
EDA	engineering design approval
EDC	enterprise data centers
EDR	eddy dissipation rate
e-FAROS	enhanced final approach runway occupancy signal
EFS	electronic flight strip
EFS	electronic file service
EFSTS	electronic flight strip transfer system
EFVS	enhanced flight vision systems
EMS	environmental management system
EOL	end of life
EON	emergency operations network
EOS	end of service
EOSH	environmental & occupational safety and health
EPA	Environmental Protection Agency
EPB	external boundary protection
EPI	enhanced precipitation identifiers
ER	environmental remediation
ERAM	en route automation modernization
ERIDS	en route information display system
ERP	enterprise resource planning
ES	extended squitter
ESAR	expedited search and rescue
E-Scan	electronic scan
ESCR	environmental site cleanup report
ESD	electrostatic discharge
ESRL	earth sciences research laboratory
ETA	estimated time of arrival
ETR	emergency transmitter replacement
ETVS	enhanced terminal voice switch
EUROCONTROL	European organization for the safety of air navigation
EVM	earned value management
--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
FCI	facility condition index
FCST	forecast
FCT	federal contract tower

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
FMC	flight management computer
FMS	flight management system
FNS	federal NOTAM system
FOC	final operating capability
FOC	flight operations center
FPS	fixed position surveillance
FRD	final requirements document
FS21	flight service automation system
FSDO	flight standards district office
FSEP	facility service and equipment profile
FSRM	facility security risk management
FSS	flight service station
FST	fuel storage tank
FTI	FAA telecommunications infrastructure
FY	fiscal year
--G--	
GA	general aviation
GAO	Government Accountability Office
GBAS	ground-based augmentation system
GDP	gross domestic product
GEO	geosynchronous communication satellite
GIS	geographic information system
GNSS	global navigation satellite system
GPS	global positioning system
GPS RAIM	global positioning system receiver autonomous integrity monitoring
GRIB	gridded binary (data format)
GSA	General Services Administration
GSD	global sciences division
GUI	graphical user interface
--H--	
HADDS	Host ATM data distribution system
HAZMAT	hazardous materials
HCS	host computer system
HF	high frequency
HF	human factors
HITL	human-in-the-loop
HOST	host computer system
HRJ	hydrotreated renewable jet (fuel)
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
ICMS	integrated control and management system
ICSS	integrated communications switching system
IDAC	integrated departure arrival capability
IDLM	interference detection, location and mitigation
IDR	Incident detection and response
IDRP	integrated departure route planner
IDS	information display system
IDS	integrated display system
IEEE	institute of electrical and electronic engineers
IES	integrated enterprise solution
IFDO	international flight data object
IFP	instrument flight procedures
IFPA	instrument flight procedures automation
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	internal policy enforcement
IRU	inertial reference unit
ISCS	international satellite communication system
ISD	in service decision
ISO	international standards organization
ISPD	implementation strategy and planning document
ISR	in service review
ISS	information systems security
IT	information technology
ITP	in-trail procedures
ITU	International Telecommunication Union
ITWS	integrated terminal weather system
IVSR	interim voice switch replacement
IVT	interactive video teletraining
--J--	
JAWS	Juneau airport wind system
JPALS	joint precision approach and landing system
JPDO	joint planning and development
JRC	joint resources council

--K--	
KV	kilovolt
--L--	
L5	additional frequency for GPS satellites
LAACS	logical access and authorization control service
LAAS	local area augmentation system
LAHSO	land and hold short operations
LAN	local area network
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
LOA	letters of agreement
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
LRIP	limited rate initial production
LRR	long-range radar
LRU	line replaceable units
LSS	logistics support services
LSSF	logistics support system and facilities
--M--	
MALSR	medium-intensity approach light system with runway alignment indicator lights
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
MOCC	midstates operations control center
Mode S	mode select
MOIE	mission oriented investigation and experimentation
MOPS	minimum operational performance standards
MOU	memorandum of understanding
MPS	maintenance processor subsystem
MPT	meter point time

MSAD	monitor safety and analyzed data
MSRD	monitor safety related data
MTSR	maintenance test system replacements
MUX	Multiplexer
MWO	Meteorological Watch Office
--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
NCIME	navigation aids control, interlock and monitoring equipment
NCP	NAS change proposal
NCV	national ceiling and visibility
NDB	non-directional beacon
NEISS	NAS enterprise information system security
NEO	network enabled operations
NEXCOM	next generation air/ground communications
NEXRAD	next generation weather radar
NextGen	next generation air transportation system
NEXTOR	National Center of Excellence for Aviation Operations Research
NIEC	NextGen integration and evaluation capability
NISC	national airspace system implementation support contract
NLIHA	NEXRAD legacy, icing, and hail algorithm
NLN	national logging network
NMCS	network management control system
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 system
NWP	NextGen weather processor
NWS	National Weather Service
--O--	
OASIS	operational and supportability implementation system
OCAT	oceanic conflict advisory tool
OCD	operational capability demonstration
OCS	operational control segment

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
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--	
P#	program element #
P3I	pre-planed product improvement
PAPI	precision approach path indicator
PATM	performance-based air traffic management
PBN	performance based navigation
PBWP	product based work plan
PCB	polychlorinated biphenyl
PCS	permanent change of station
PDARS	performance data analysis and reporting system
PDD	presidential decision directive
PDR	preliminary design review
PDU	power distribution unit
PER3	post ERAM release 3
PGW	protocol gateway
PIREPS	pilot reports
PLM	programming language for microcomputers
PM	meter points
PMC	program management committee
PNT	position, navigation and timing
POCC	pacific operations control center
PRM	precision runway monitor
PRM-A	precision runway monitor alternate
PS3	power systems sustain support
--R--	
R#	release number
RA	resolution advisory
RAIM	reliability and integrity monitor
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
RCLR	radio communications link repeater
RCLT	radio communications link terminal
RCO	remote communications outlet
RCOM	recovery communications
R&D	research and development
RDA	radar data acquisition
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
RI	runway incursion
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
ROC	Radar Operations Center
RPG	radar product generator
RPM	revenue passenger mile
RSA	runway safety areas or assessments
R-side	radar controller position
RTA	required time of arrival
RTP	resource tracking program
RTR	remote transmitter/receiver
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
SAPA	simplified aircraft-based paired approach
SAR	search and rescue
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
SCIP	surveillance communication interface processor

SDAT	sector design and analysis tool
SDP	signal data processor
SESAR	Single European Sky ATM Research
SFA	special flight authorizations
SID	standard instrument departure
SIGWX	significant weather
SIM	surveillance interface modernization
SIR	screening information request
SITS	security integrated tool set
SLEP	service life extension program
SMA	surface movement advisor
SMS	safety management system or surface management system
SNT	staffed NextGen tower
SOA	service oriented architecture
SOP/LOA	standard operating procedure/letters of agreement
SpclAC	special airworthiness certifications
SPMO	Special Program Management Office
SPO	safety policy
SPR	safety promotion
SPS	standard positioning service
SRM	safety risk management
SRMD	safety risk management document
SRMDM	safety risk management decision memo
SSA	system safety assessment
SSB	single sideband
SSMIMO	subscriber station multi-input multi-output
STAR	standard terminal arrival routes
STARS	standard terminal automation replacement system
STARS/SL	STARS Lite
STBO	surface trajectory based operation
STD	standard
StdAC	standard airworthiness certifications
STDDS	SWIM terminal data distribution system
STEP	sustainment and technology evolution plan
STM	surface traffic management
STMP	special traffic management program
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

TFDM	tower flight data manager
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
TPC	TFM processing center
TR	technical refresh
TRACON	terminal radar approach control
TRAMS	TCAS resolution advisory (RA) monitoring system
TRS-R	TFM remote site – reengineeting
TSA w/A	traffic situation awareness with alerts
TSDE	traffic situation display re-engineering
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
UFPF	unified flight planning and filing
UHF	ultra high frequency
UIS	unstaffed infrastructure sustainment
UPS	uninterruptible power source
URET	user request evaluation tool
USNS	U.S. Notices to Airmen system
--V--	
VASI	visual approach slope indicator
VDL	VHF data link
VDMR	VSCS display module replacement
VFR	visual flight rules
VHF	very high frequency
VITS	VSCS integrated test suite
VMC	visual meteorological conditions
VNAV	vertical navigation
VOIP	voice over internet protocol
VOR	very high frequency omni-directional range
VORTAC	very high frequency omni-directional range collocated with tactical air navigation
VRS	viewer response system
VSCS	voice switching and control system
VSPB	voice switch bypass system
--W--	
WAAS	wide-area augmentation system
WAFS	world area forecast system

WAM	wide are multilateration
WARP	weather and radar processor
WAT	work activity tracking
WBS	work breakdown structure
WiMAX	worldwide interoperability for microwave access
WINS	weather information network server
WJHTC	William J. Hughes Technical Center
WME	wind measuring equipment
WMO	World Meteorological Organization
WMSCR	weather message switching center replacement
WMSS	WARP maintenance and sustainment services
WP	work package
WRR	weather radar replacement
WRS	WAAS reference stations
WSDS	wind shear detection services
WSP	weather systems processor
WTMA	wake turbulence mitigation for arrivals
WTMD	wake turbulence mitigation for departures
WTMSR	wake turbulence mitigation for single runway
WTS	work tracking software
WTS-BMgmt	work tracking software - budget management
Wx	weather