National Airspace System Capital Investment Plan

FY 2013–2017

Federal Aviation Administration

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Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2013–2017

1 Introduction

1.1 The Capital Investment Plan

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) describes the planned investments in the National Airspace System (NAS) for the next 5 years. A provision in annual appropriations laws requires submission of a comprehensive capital investment plan for the FAA which includes funding for each budget line item (BLI) for Fiscal Years (FY) 2013 through 2017.

1.2 Strategic Planning and the CIP

FAA's capital programs support the Agency's Strategic Plan (Destination 2025) Goals, Outcomes and Performance Metrics. The Strategic Plan articulates the most important goals for improving performance in the delivery of aviation services. These goals guide the Agency in upgrading NAS systems and operating procedures to meet the demands of future growth. Outcomes and Strategies have been developed with Performance Metrics to track progress towards accomplishment of the Strategic Goals. These Outcomes and Strategies determine the actions (including capital investments) needed to meet the goals. Actual performance is then compared to the Performance Metrics to determine whether the actions are successful and, if not, adjustments can be made to improve performance.

The FAA strategic plan (Destination 2025) covers five goal areas:

- **Move to the Next Level of Safety —** By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide.
- **Workplace of Choice —** We will create a workplace of choice marked by integrity, fairness, diversity, accountability, safety and innovation. Our workforce will have the skills, abilities, and support systems required to achieve and sustain NextGen.
- **Delivering Aviation Access through Innovation —** Enhance the flying experience of the traveling public and other users by improved access to and increased capacity of the nation's aviation system. Ensure airport and airspace capacity are more efficient, predictable, cost-effective and matched to public needs.
- **Sustaining our Future —** To develop and operate an aviation system that reduces aviation's environmental and energy impacts to a level that does not constrain growth and is a model for sustainability.
- **Improved Global Performance through Collaboration —** Achieve enhanced safety, efficiency, and sustainability of aviation around the world. Provide leadership in collaborative standard setting and creation of a seamless global aviation system.

Each capital investment program summary identifies the primary Goal, Outcome and Performance Metric it supports. Many FAA programs will contribute to more than one Goal, Outcome or Performance Metric; however, the program linkage in the CIP (appendices A and B) is for the program's most significant contribution. In the summary tables in appendix A, several programs may appear under each performance measure because many programs are interdependent; one program may not be successful in meeting a performance metric without completing other supporting programs. 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 programs to address each of the variables, which individually contribute to overall system improvements.

To better explain how a program contributes to a strategic goal, a section titled "Relationship of Program to FAA Performance Metric" in Appendix B gives more specific information about how each program helps meet a Strategic Plan Performance Metric.

1.3 Management Process for Selecting Modernization Programs

The first AMS decision, concept and requirements definition readiness decision (CRD), is the point that separates problem definition and solution identification and implementation. A CRD readiness decision is management's recognition that there is a problem expressed as a capability shortfall that needs attention and solution identification activity. Following investment analysis which focuses on identifying alternatives to satisfy the capability shortfall, the Investment Decision Authority (IDA) approves the initiation of the modernization program to proceed to solution implementation with the selected alternative.

FAA management then uses a disciplined and rigorous process for determining funding amounts for modernization programs.   Each year, every program is required to submit a request for funding with justification and details concerning cost, schedule and benefits.   Programs must be consistent with the NAS Architecture and with any approved baselines. A Capital Investment Team composed of representatives from budget and finance, and, as appropriate, representatives of Air Traffic Organization (ATO) vice-presidents and other FAA organizations, reviews these requests to determine whether the program should be funded. The consolidated budget request is then reviewed and approved by the Joint Resources Council (JRC) prior to submittal to the Office of the Secretary of Transportation (OST), OMB and finally Congress as part of the President's budget request.

Investment Types have been defined to facilitate the establishment of Acquisition Categories. Acquisition Categories (ACATs) ensure the appropriate level of oversight and documentation are applied to each FAA modernization program. ACATs apply to all FAA organizations, all appropriations, and all modernization programs. This includes all capital investments in the NAS and FAA administrative and mission support systems.

Programs will be assigned to the highest level ACAT (e.g. starting with ACAT 1) in which they meet one or more of the designation criteria. Designation criteria includes factors such as total F&E costs, single year F&E costs, Operations and Maintenance (O&M) costs, and factors such as complexity, risk, political sensitivity, safety and security. During CRD, the sponsoring service organization recommends an ACAT to the FAA Acquisition Executive Board, which makes the categorization decision and notifies the Joint Resource Council (JRC). The ACAT categorization is finalized at the Investment Analysis Readiness Decision (IARD).

At the Final Investment Decision (FID) the IDA approves the investment program for solution implementation. At this point the investments Acquisition Program Baseline is established and marks the initiation of acquisition baseline performance measurement.

The Acquisition Management System approval process can be found at http://fast.faa.gov.

Appendix D reflects ACAT 1, 2, and 3 programs that have completed FID and are being measured against the established APBs. Appendix D provides a status of those programs that have experienced baseline changes and describes the impact of those changes. There are several reasons for changes to a program's baseline. The most common reason is unforeseen technical problems that require additional engineering design or software development and testing. Occasionally, requirements for the program may have to be adjusted to meet new unforeseen operational needs. Siting issues relating to permits or environmental impacts can also delay completion of a program within its schedule parameters. If authorized funding is below the established baseline, work may have to be deferred to a later period which may introduce cost or schedule variances.

The Federal Aviation Reauthorization Act of 1996, Title II, subtitle B, Section 252, "Air Traffic control Modernization Reviews", dated October 9, 1996 (Public Law 104-264) requires the FAA to report program baseline breaches and to consider terminating a program when substantial actual or projected variances from its program baselines occur.

To manage programs within the established baselines, program oversight continues after the initial approval at FID. The JRC conducts acquisition program quarterly reviews of programs performance against a series of performance metrics. Cost, schedule and technical performance is reviewed to determine the program's potential to deliver the planned capabilities within the planned baseline parameters.

Included in the CIP Introduction are NextGen Service and Infrastructure roadmaps which have schedule information with a longer time horizon than the 5 year window of the CIP. 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 implementing Next Generation Air Transportation System (NextGen) operational improvements and system upgrades that are planned now through 2025. Section 4 contains the infrastructure roadmaps that system engineers have developed to show the hardware and software changes needed to operate the NAS and implement those improvements. These roadmaps are an essential part of the Enterprise Architecture and ensure that modernization efforts are integrated and coordinated.

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 ATO Performance Analysis and Strategy Service Unit, "The Economic Impact of Civil Aviation on the U.S. Economy," published in August 2011, estimated that aviation accounted for over $1.3 trillion in economic activity in 2009, which is 5.2 percent of the total U.S. economic activity. The spending on aviation-related economic activity supported an estimated 10.2 million aviation-related jobs, and air carriers transported over 53 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.

Aviation spending also has a significant impact on the economy of most states as shown in Figure 1 below. It encourages the growth of local economies and supports employment opportunities in a variety of occupations. Civil aviation contribution to state economies is as high as 20.1 percent in Hawaii. A significant factor in the amount of the economic impact of aviation is the contribution from tourism. Spending on air services and the related spending on food, hotels and entertainment provide a boost to several segments of local economies. In addition, in states like Alaska air service is an economic necessity for transporting a wide variety of goods and services due to lack of other modes of transportation. And, several states' economies benefit from a large manufacturing base dedicated to producing aircraft and related aviation equipment.

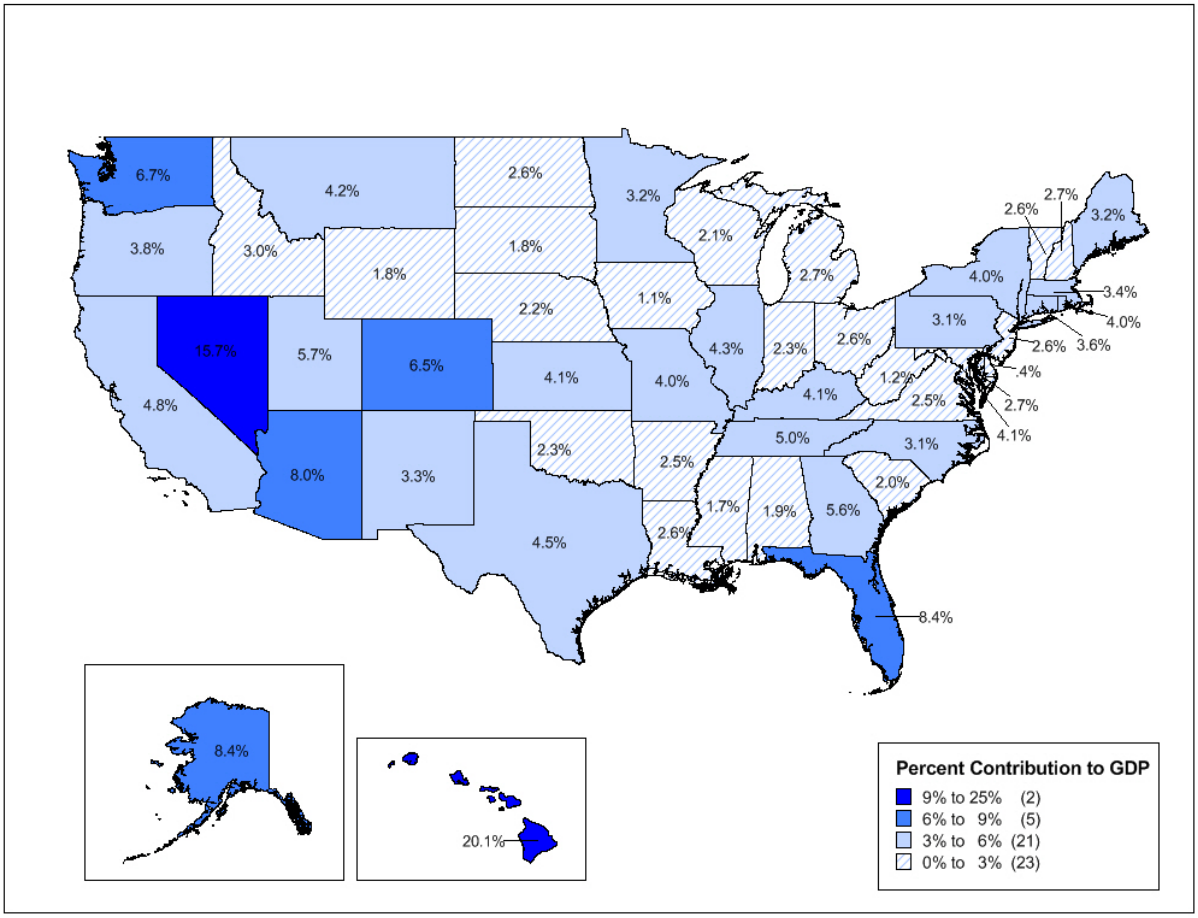

Figure 1 Aviation Percent of State Gross Domestic Product[1]

1.4.2 Air Travel Demand

Historically, 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 2011, but economic growth has resumed. FAA expects 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, therefore advanced

[1] Source: "The Economic Impact of Civil Aviation on the U.S. Economy", August 2011.

NextGen capabilities to provide the improved services must be implemented to handle this growth.

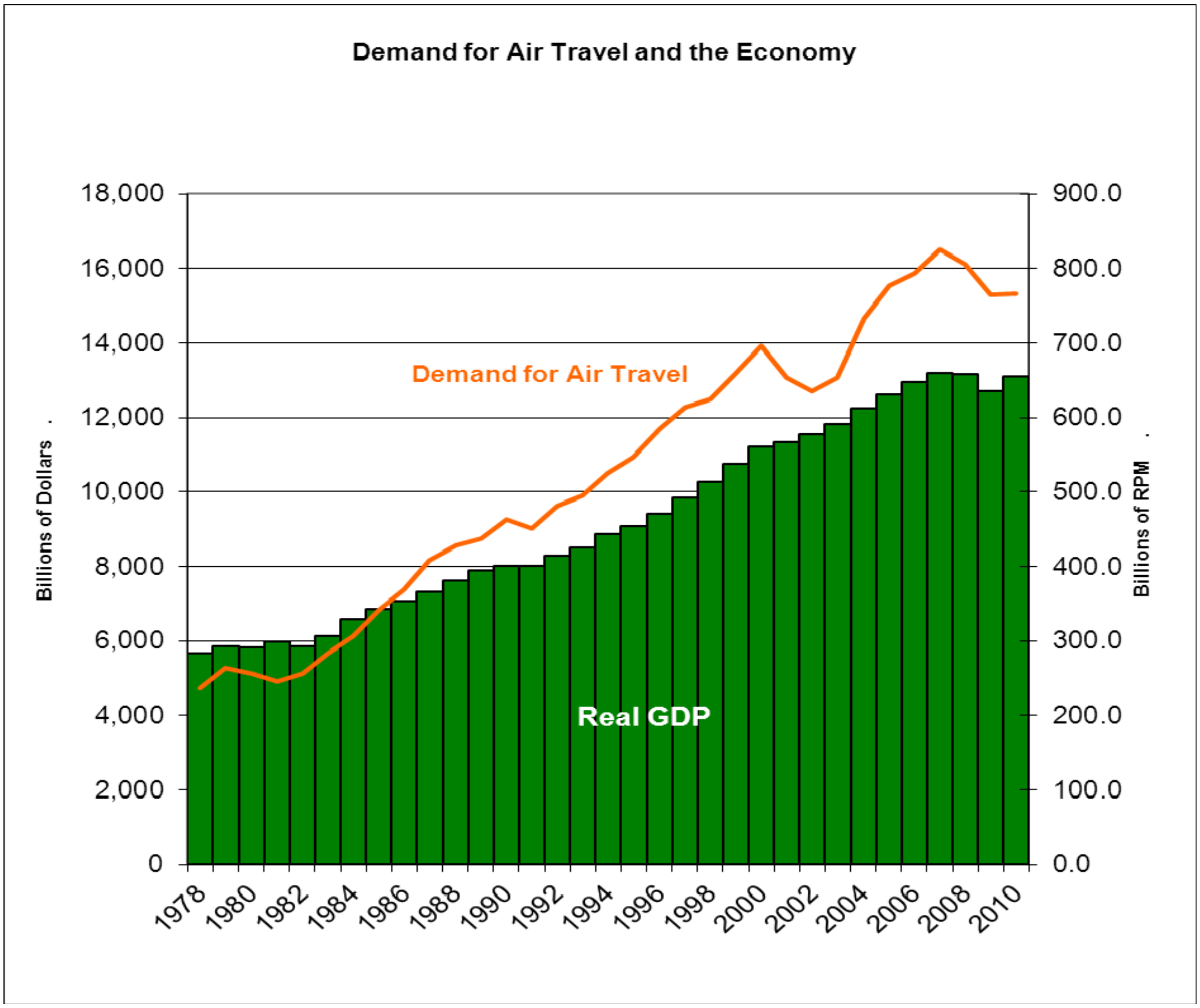

Figure 2 Air Travel Demand Growth Compared to Growth in GDP

A study by the National Center of Excellence for Aviation Operations Research (NEXTOR) Universities estimated the total cost of delay in the current national aerospace system and the potential for increases in future costs. 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.”

1.4.3 Growth in Operations

Preliminary data show that 2011 airport operations are down slightly from 2010 due to increased cost of fuel and air carriers' adjusting their level of service to enhance profitability. Once carriers have exhausted their ability to absorb demand with increased load factors and larger aircraft, operations are expected to increase.

Congestion and delays will increase if modernization is not completed 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 four active projects to extend runways: Anchorage, Atlanta, Ft Lauderdale, and San Antonio. Chicago O'Hare and Philadelphia airports have major airfield reconfiguration projects underway to improve efficiency of operations. Increasing capacity at large, delay-prone airports is critical to overall NAS performance because these airports handle very large numbers of connecting passengers who may miss connections, and these delays at the large airports may propagate to other airports where passengers are waiting for incoming flights. The 29 large hub airports handle about 60% of airline enplanements. The combined total of 65 large and medium hubs supports about 88% of all U.S. passenger enplanements.

When local airport authorities build new runways or otherwise expand capacity, the FAA, depending on the size of the airport, must add supporting equipment and develop procedures to make that capacity fully usable. New or relocated 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, approach lights must be installed and visibility sensors positioned 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. Capital investment may also be needed to expand or relocate air traffic control facilities. In cases where significant increases in demand occur, additional controller positions may be needed.

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. Additionally, program managers must plan for the operational requirements for many years into the future. To help program managers assess the future operating environment, the FAA annually prepares a detailed forecast of future aviation activity (FAA Aerospace Forecast).

Capital planning requires balancing investing so that adequate funding is provided to sustain the performance of the current air traffic control system while providing funds for developing a more capable system to handle future growth. Current operational facilities and equipment must continue to deliver reliable and accurate services until investments in new technology are ready to deliver the operational improvements which will 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 communication, navigation and surveillance systems. Each system in the NAS has a high level of redundancy to support system reliability and to minimize service disruptions. Equipment must be replaced regularly to reduce the potential for system failures and prevent deterioration in system performance.

There are nearly 60,000 NAS operational facilities and over 500 large buildings that house major Air Traffic Control (ATC) functions. The FAA currently allocates a significant portion of the Facilities and Equipment (F&E) appropriation to upgrade and replace buildings and systems that have degraded over time. Uncorrected problems with buildings or the systems inside can cause expensive and unsafe disruptions in air traffic control.

Equipment is also replaced to reduce costs for maintenance and operation. When equipment becomes expensive to maintain due to outmoded hardware or software, the payback period to replace it can be as short as 1 or 2 years.

2.2 NextGen Investments

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

The FY 2013 budget includes $516 million to deploy transformational programs including Automatic Dependent Surveillance - Broadcast (ADS-B), Data Communications (DataComm), NAS Voice System (NVS), Collaborative Air Traffic Management Technologies (CATMT) and System Wide Information Management (SWIM) including the Common Support Services for information for which weather is the first offering. These core technologies provide the communication, navigation, and surveillance technology which will allow introduction of new NextGen operational improvements.

In addition to the funding for the transformational programs, $406 million is requested to develop procedures and technology to support the NextGen solution sets as described in section 3.

This CIP shows that the transition to NextGen is well underway. We are carefully planning a responsible transformation of the existing air traffic control system to a newer system with far greater capabilities while maintaining the current system at peak operational performance. As we complete some of the existing CIP programs during this period, a larger proportion of the field installation and infrastructure funding shown in figure 3 will be available for NextGen development and implementation.

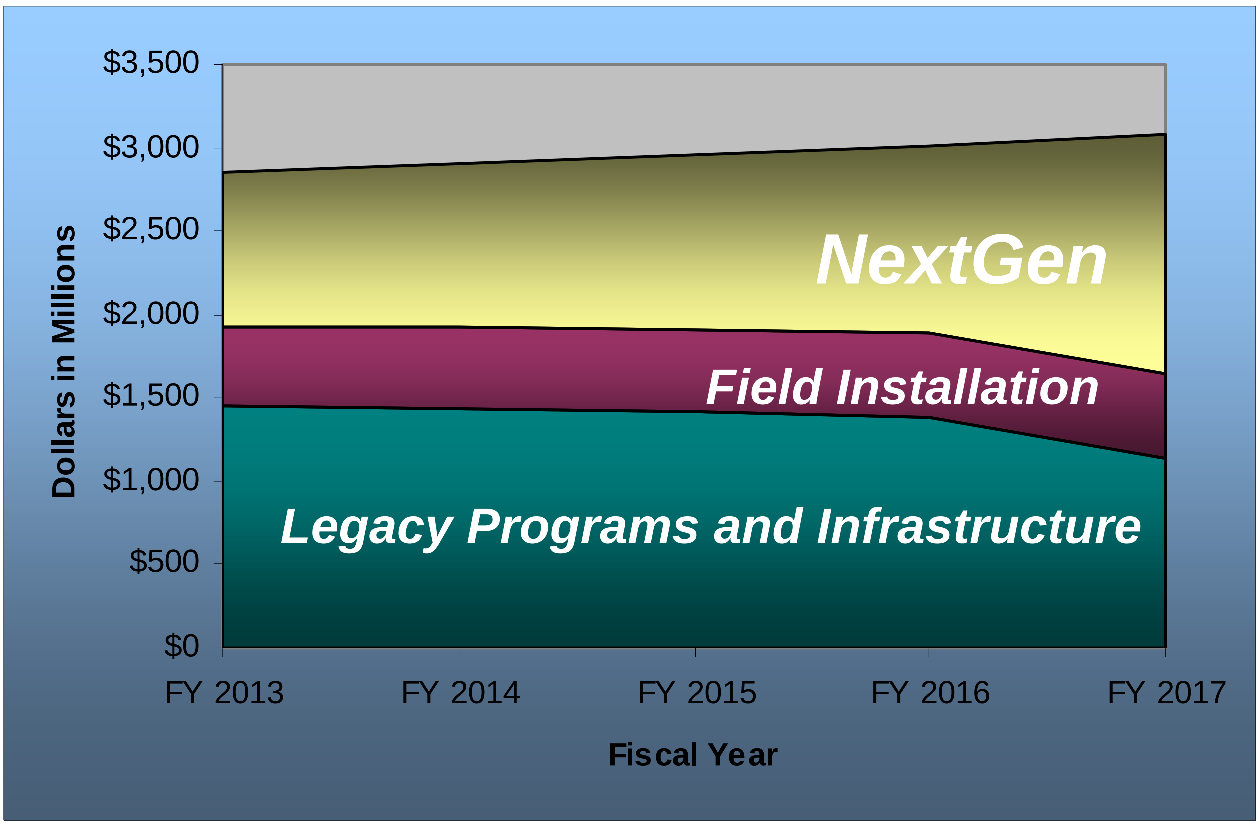

Figure 3 NextGen Portfolio Relative to the Total Capital Request

3 Next Generation Air Transportation System (NextGen)

The NextGen Program is evaluating and demonstrating improvements to the existing air traffic control system to meet current and future demand. The program contains 6 transformational programs and 50 operational improvement programs. The transformational programs are:

- **ADS-B** – Automatic Dependent Surveillance-Broadcast Provides improved surveillance data,
- **DataComm –** Provides data communications between controller and pilot,
- **NVS –** NAS Voice System provides a digital nationwide network of voice switches for terminal and en route air traffic facilities, which will provide voice switch configuration flexibility required to support NextGen operational improvements,
- **CATMT –** Collaborative Air Traffic Management Technologies Provides improvements to the traffic flow management functions required to support NextGen operational improvements, and
- **SWIM –** System Wide Information Management provides the standards and software to enable information management and data sharing required to support NextGen operational improvements.
  - **Common Support Services – Weather.** In conjunction with the deployment of the SWIM Enterprise Service a common information dissemination capability will be deployed for which the dissemination of weather is the first offering. This subsumes the major functions ascribed to NextGen Networked Enabled Weather (NNEW) and will over time include additional information types – aeronautical information, flight information - as these move to new information protocols and formats.

NextGen operational improvement programs are grouped into 7 Solution Sets:

- Trajectory Based Operations (TBO),
- Reduce Weather Impact (RWI),
- Arrival/Departures at High Density Airports (HD),
- Collaborative Air Traffic Management (CATM),
- Flexible Terminal Environment (FLEX),
- Safety Security and Environment (SSE), and
- Transform Facilities (FAC).

NextGen Benefits

NextGen will provide benefits across many aspects of the NAS. Safety will be increased by improving pilot situational awareness, reducing runway incursions, improving controller awareness of conditions in the airspace and better communications via data messages. Environmental impacts will be reduced by demonstrations that lead to the adoption of advanced aircraft technologies, deployment of commercial aviation alternative fuels and improved efficiency of flight operations which result in lower emissions, noise and fuel burn. System capacity will be increased by reduced separation, improved weather information, and more efficient en route and terminal routing. Operators will see benefits from collaborative efforts in flight planning to reduce unnecessary delays by adjusting trajectories and departure and arrival times. FAA facilities will be more flexible to adjust to changing demands resulting in more efficient operation. See the NextGen Implementation Plan for more information on NextGen benefits.

Solution Set Descriptions

In this section, the mid term (through 2018) operational improvements (OIs) included in each NextGen solution set are identified and briefly described. The capital improvements and their timelines necessary for implementation of these improvements have been identified and are shown in the Enterprise Architecture roadmaps in Section 4.

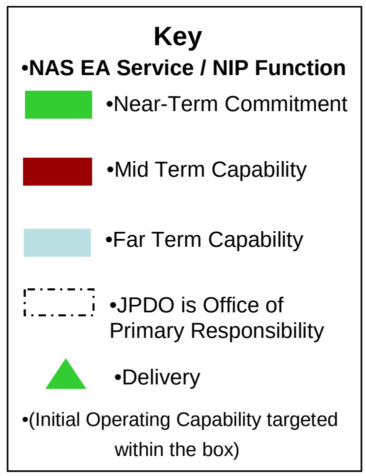

Figure 4 Service Roadmap Legend

3.1 Initiate Trajectory Based Operations

Summary Description:

Trajectory-Based Operations (TBO) improve efficiency. 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 with pilots via DataComm 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:

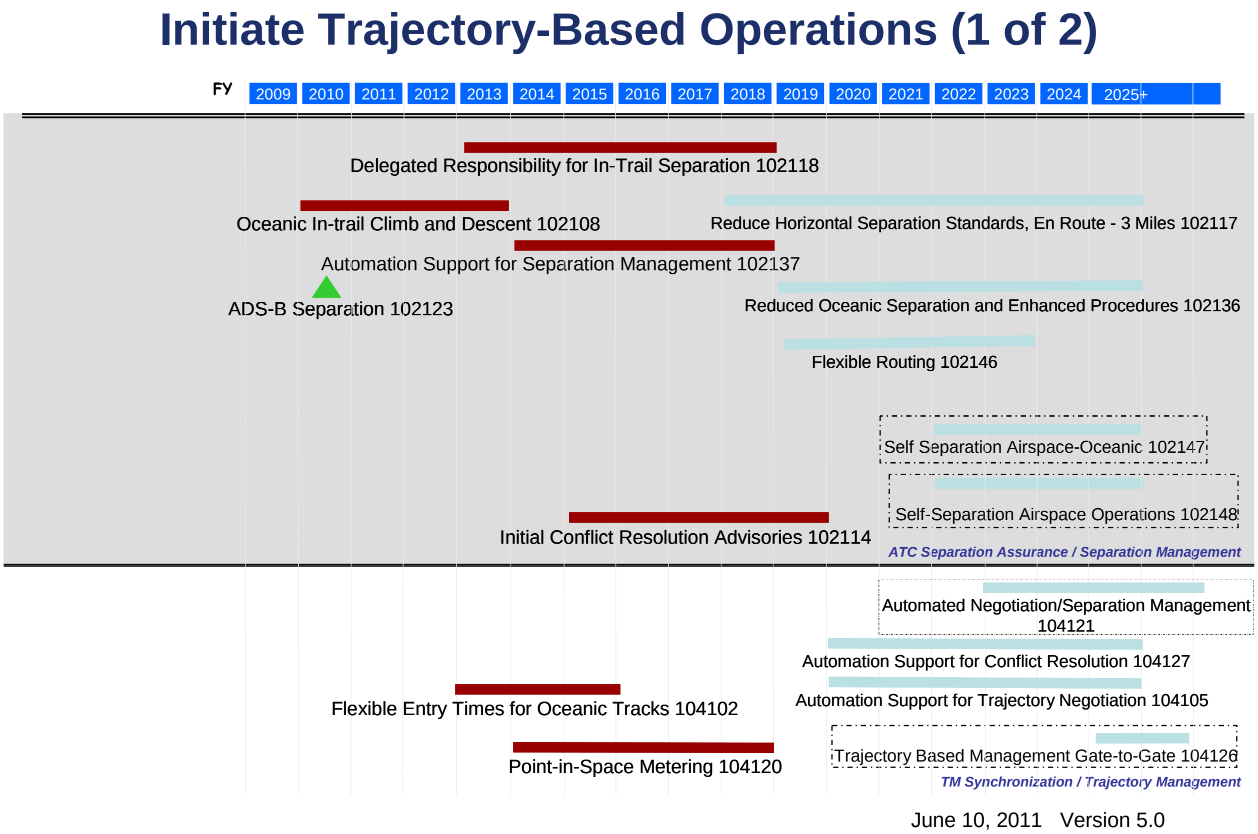

Figure 5 Trajectory Based Operations (1)

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 provides a cockpit display of surrounding aircraft. Improvements supporting this improvement are En Route Automation Modernization (ERAM) Mid-Term Work Package and ADS-B.

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 also fly more optimal descent profiles on arrival to save fuel. Separate procedures for ADS-B and ADS-C based In-Trail Climb and Decent are being evaluated via trials in the Pacific. The aircraft would have to be equipped with ADS-B or 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).

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. Investments supporting this improvement are ERAM D-Position Upgrade and System Enhancements and Terminal Automation Modernization Replacement (TAMR).
4. 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. The investment supporting this improvement is ERAM Mid Term Work Package.

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

1. Flexible Entry Times for Oceanic Tracks will allow aircraft to reach their preferred trajectories sooner, which will minimize fuel burn. The investments supporting this improvement are Time Based Flow Management (TBFM), Dynamic Ocean Track System (DOTS) or 4D Oceanic Trajectory Management (OTM4D) system and the accelerated Terminal Data Link System (TDLS). DOTS analyzes weather data and calculates the most efficient tracks for oceanic flights, and the TDLS provides automated departure clearances to aircraft.
2. Point-in-Space Metering uses scheduling tools to ensure smooth flow of traffic and efficient use of airspace. 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. Investments supporting this improvement are Collaborative Air Traffic Management Technologies (CATMT); ERAM D-Position Upgrade and System Enhancements; System Wide Information Management (SWIM) and the TBFM tool.

Timeline:

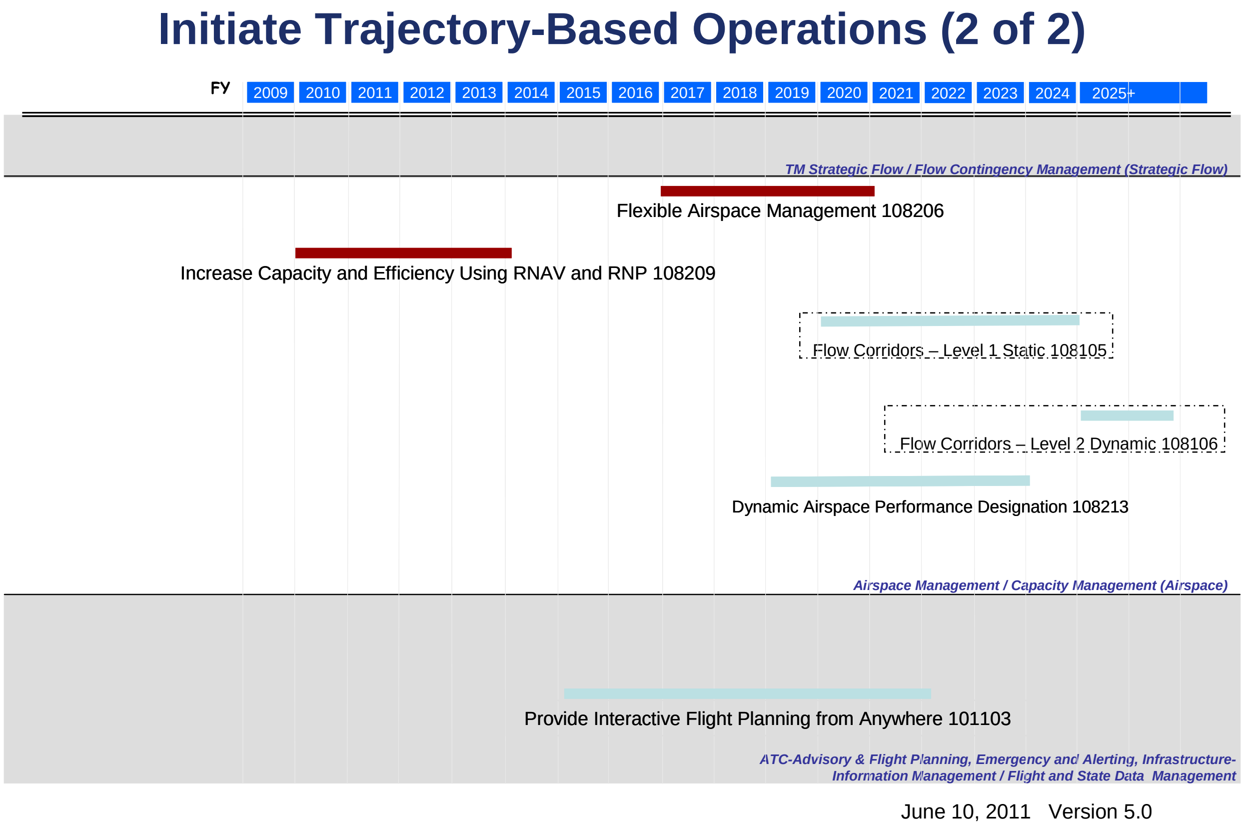

Figure 6 Trajectory Based Operations (2)

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 are Airspace Information Management (AIM) system, CATMT, the ERAM Mid Term Work Package, TAMR, TBFM, Surveillance Interface Modernization (SIM), System Wide Information Management (SWIM) including Common Support Services, and the NAS Voice System (NVS).
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 investments to implement this capability include CATMT, ERAM D-Position Upgrade and System Enhancements, and additional Distance Measuring Equipment (DME) systems.

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 use of runway capacity is not possible. Differences in aircraft arrival speed or the effect of wake turbulence from heavy category aircraft require increased separation between aircraft. Wake turbulence from a heavy category aircraft requires controllers to increase separation to 5 miles or more between the two aircraft when a small aircraft is following a heavy category 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:

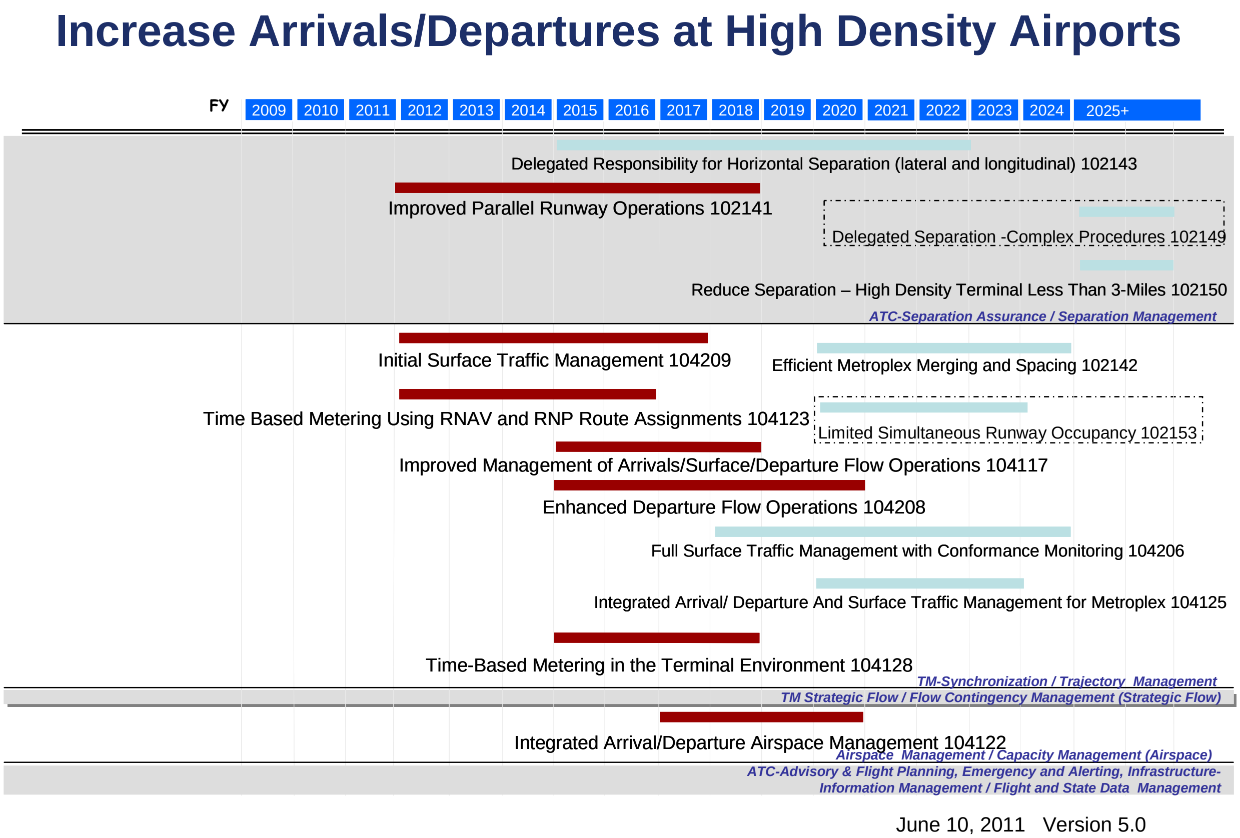

Figure 7 Increase Arrivals/Departures at High Density Airports

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 will 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. The investments supporting this capability are Terminal Automation Modernization Replacement (TAMR) and Wake Turbulence Mitigation Arrivals (WTMA).

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 improvement are Time Based Flow Management (TBFM), Tower Flight Data Manager (TFDM), Airport Surface Detection Equipment (ASDE), and the System Wide Information Management (SWIM).
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 improvement include the ERAM Mid Term Work Package, TBFM, and Distance Measuring Equipment (DME).
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 improvement are Collaborative Air Traffic Management Technologies (CATMT), TFDM, SWIM and DataComm.
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 improvement are

CATMT, ERAM Mid Term Work Package, TBFM, TAMR, TFDM, DME, SWIM, and Surveillance Interface Modernization (SIM).

3.3 Increase Flexibility in the Terminal Environment

Summary Description:

This solution set concentrates on improvements in the access, situational awareness, and separation services at airports. 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. 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:

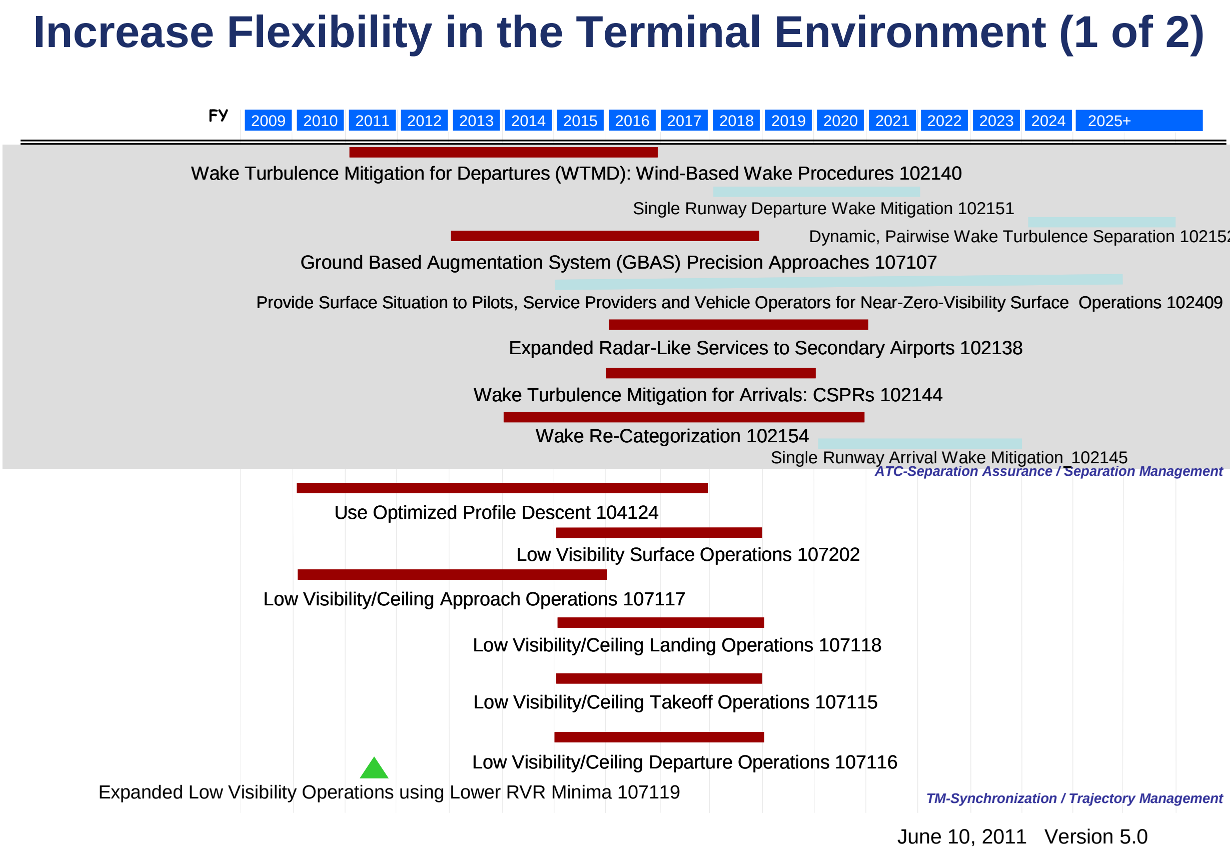

Figure 8 Increase Flexibility in the Terminal Environment (1)

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): Based on wind measurements, 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. Observed and forecasted airport wind information can be processed and displayed in the tower to indicate which runways can be used for immediate departures after a heavy category aircraft departs on an adjacent CSPR. 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 GPS augmentation capability at an airport to support precision approaches to Category I

and eventually Category II/III minimums for properly equipped runways. GBAS can support curved precision approaches and high-integrity surface movement requirements. This is an economical way to increase the number of runways with instrument approaches that allow operations in low-visibility conditions. Investment in GBAS supports this improvement.

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. Observed and forecasted airport wind information will be processed and provided to controller displays to show the minimum diagonal separation between approaching aircraft. Investments that support this improvement are: Terminal Automation Modernization Replacement (TAMR), WTMA, and Integrated Terminal Weather System (ITWS).
5. Wake Re-Categorization - Legacy world-wide air traffic control wake mitigation separation standards are updated based on data collected and subsequent analysis of aircraft wake generation, wake decay, and wake encounter effects for representative aircraft. The updated standards will allow more efficient use of existing airport runways. As more automation and information sharing NextGen capabilities are enabled, even more efficient wake separation standards can be established that consider real-time atmospheric and aircraft configuration information.

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 improvement include ERAM D-Position Upgrade and System Enhancements and TAMR.
2. Low Visibility Surface Operations will use ground surveillance systems to inform controllers of surface movements and runway status lights will alert pilots when it is unsafe to enter or cross a runway. Investments that support this improvement are: TFDM, Automatic Dependent Surveillance – Broadcast (ADS-B), GBAS, Airport Surface Detection Equipment (ASDE 3 and ASDE-X), and Runway Status Lights (RWSL).
3. Low Visibility/Ceiling Approach Operations improves the ability of aircraft to complete approaches in low visibility/ceiling conditions. Investments that support this improvement are GBAS and SWIM Common Support Services.

4. Low Visibility/Ceiling Landing Operations permit aircraft to land in low visibility/ceiling conditions when equipped with augmented Global Positioning System (GPS), Instrument Landing System (ILS) or combinations of cockpit technologies and ground infrastructure. GBAS supports this improvement.
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 improvement are SWIM Common Support Services and GBAS.

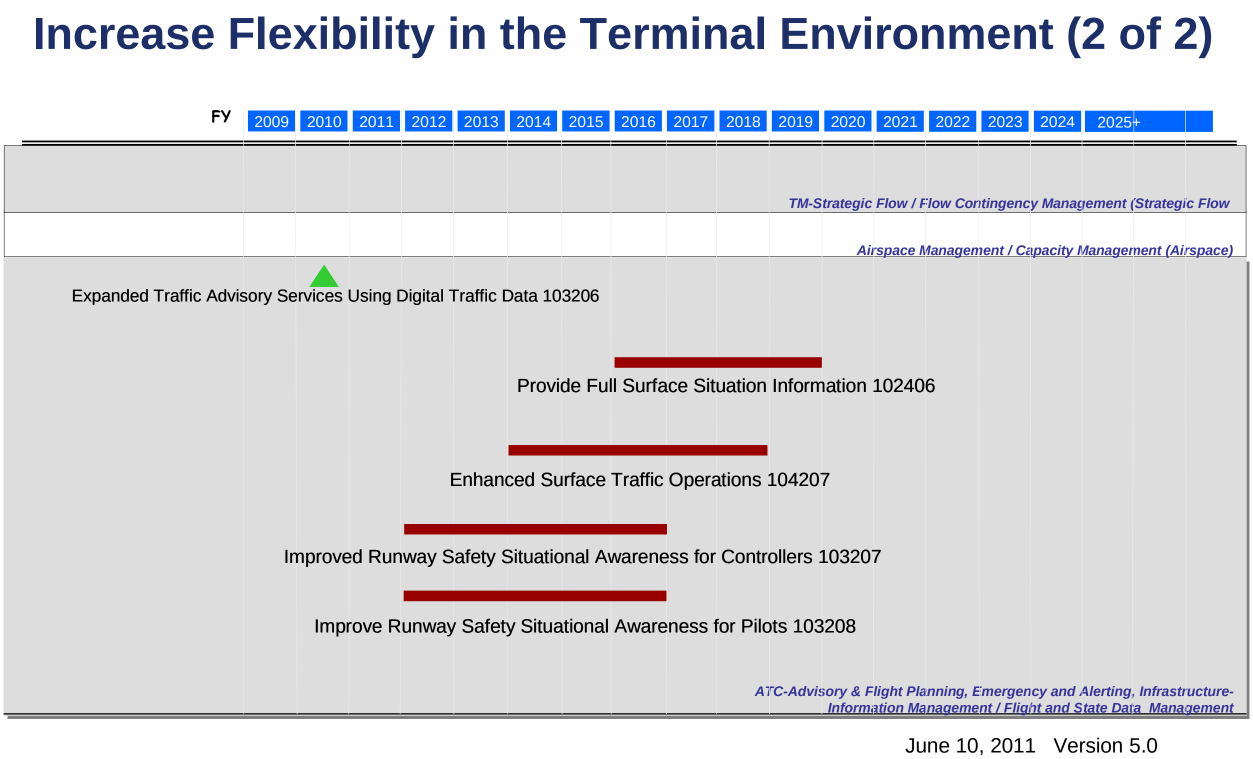

Figure 9 Increase Flexibility in the Terminal Environment (2)

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 operational improvement are TFDM, SWIM and TAMR.
2. Enhanced Surface Traffic Operations would use data communications 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 improvement are DataComm, TFDM, and Future Flight Service Program (FFSP).

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 improvement are TFDM and ASDE.

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 improvement are TFDM, ASDE, ADS-B, and Runway Status Lights (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 when 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:

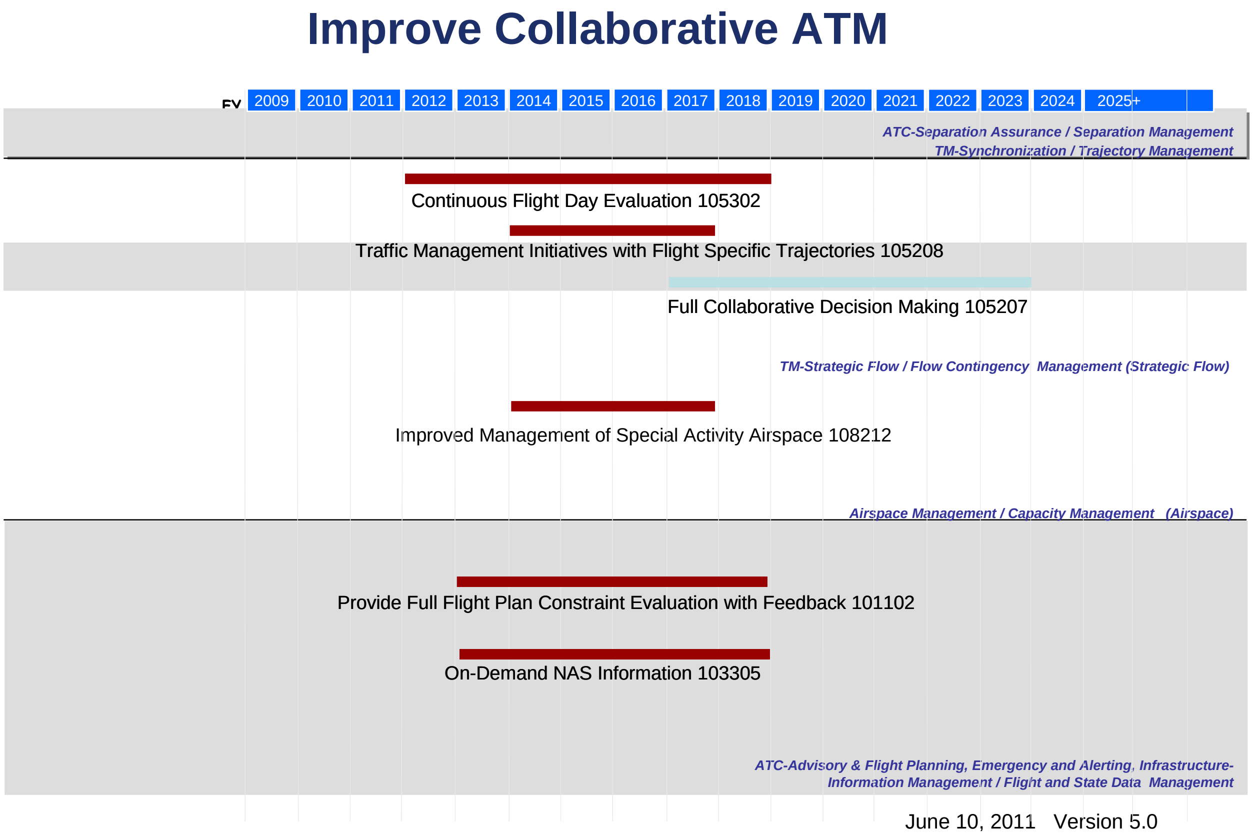

Figure 10 Improve Collaborative ATM

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 improvement are the Aeronautical Information Management (AIM), CATM, and System Wide Information Management (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 ability to adjust and respond to dynamically changing conditions such as severe weather, air traffic congestion, and system outages. Investments that support this improvement are CATM, ERAM D-position upgrade and system enhancements, and SWIM.

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 status of airspace reserved for special purposes such as military operations. Status changes are transmitted to the flight deck via voice or DataComm. Trajectory planning can then be managed dynamically based on real-time information. 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 improvement are Aeronautical Information Management (AIM), Collaborative Air Traffic Management Technologies CATMT, ERAM D-position upgrade and system enhancements, ADS-B and SWIM.

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 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 improvement are Future Flight Service Program (FFSP), AIM, ERAM D-position upgrade and system enhancements, CATMT and SWIM including Common Support Services.
2. On-Demand NAS Information will provide NAS status and aeronautical information to authorized users and equipped aircraft on demand. This will allow pilots to make informed decisions on routes and conditions at departure and destination airports. Investments that support this improvement include FFSP, AIM, CATMT, ERAM D-position upgrade and system enhancements, ADS-B, and SWIM including Common Support Services.

3.5 Reduce Weather Impact:

Summary Description:

Currently, 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 proactive planning operations rather than 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. 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 developing the best response to potential weather-related operational effects, thus minimizing the level of traffic restrictions required in 0–8 hours planning horizons.

The FAA will deploy a Common Data Distribution capability as part of its enterprise solution for information management in conjunction with the SWIM Segment 2 Enterprise Solution. The Common Data Distribution capability will provide as its first products weather information in for the dissemination of weather information to support both real-time operations as well as strategic planning products to enhance collaborative and dynamic NAS decision making. It will provide network access to weather information from many different sources.

Timeline:

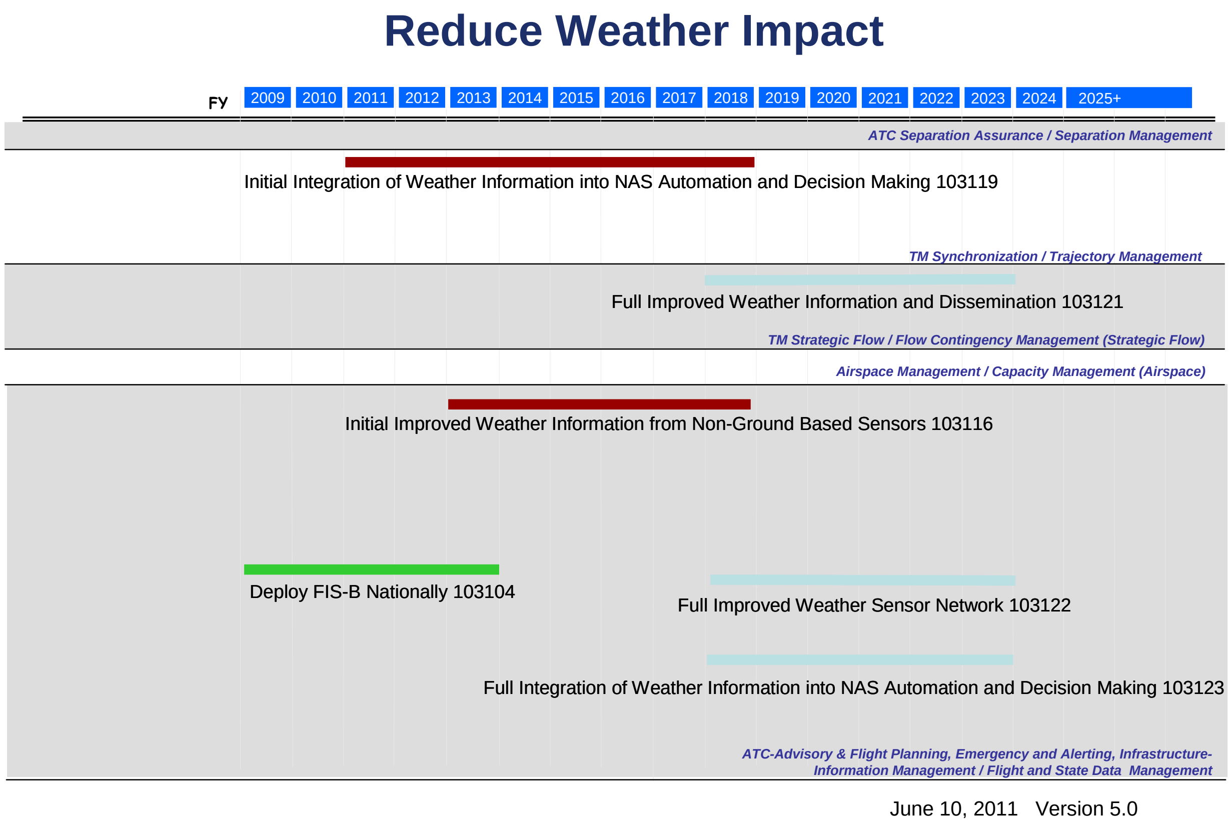

Figure 11 Reduce Weather Impact

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 will disseminate timely, more accurate weather information to the FAA and airline dispatch decision support tools. Better access to improved weather forecasts and integrating this information into decision support tools will improve efficiency of operations by avoiding unnecessary deviations from planned flight paths resulting in time and fuel savings. Investments that support this improvement are Future Flight Services Program (FFSP), Aeronautical Information Management (AIM), Collaborative Air Traffic Management Technologies (CATMT), ERAM Mid Term Work Package, Terminal Automation Modernization Replacement (TAMR), Tower Flight Data Manager (TFDM), Time Based Flow Management (TBFM), System Wide Information Management (SWIM) and SWIM Common Support Service.

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. It will increase the reliability of forecasts of turbulence, convective weather, and in-flight icing. The improved accuracy of this weather information will be route and altitude specific improving both safety and efficiency. Investments that support this improvement are: AIM, data link from aircraft to ground, and SWIM including Common Support Service.

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. This also includes individual system safety risk assessments to ensure that system and procedure related specific hazards are identified and controlled. 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 groups 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:

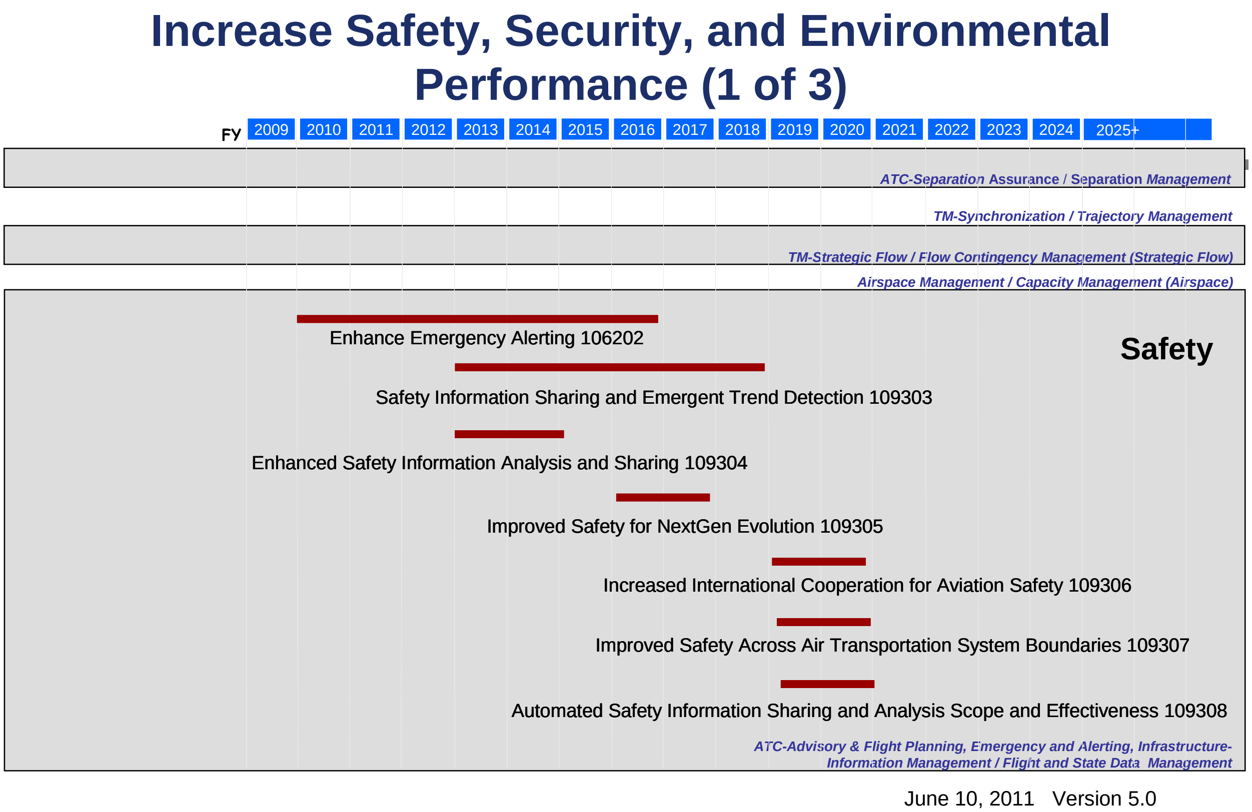

Figure 12 Increase Safety

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 flights not under ATC control. 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. Aircraft using ADS-B report their position frequently, and the coverage can be more comprehensive than radar. Investments that support this improvement are Future Flight Services Program (FFSP), ADS-B and the integration of ADS-B into all automation systems.

2. Safety Information Sharing and Emergent Trend Detection. The System Safety Management Transformation and the Aviation Safety and Information Analysis and Sharing (ASIAS) activities will integrate, evaluate and share high-quality, relevant, and timely safety information that is critical to the success of the Safety Management System (SMS). These activities directly support safety promotion and safety assurance initiatives with analytical results such as baseline information and trends. They also support safety risk management through identifying issues and providing tools for analysis of hazards. Investments that support this improvement are Aeronautical Information Management (AIM), ADS-B, ERAM D-position upgrade and system enhancements, Remote Monitoring and Logging System (RMLS), DataComm, NAS Voice System (NVS), and System Wide Information Management (SWIM).
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 improvement 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 improvement are DataComm, NVS, Performance Data Analysis and Reporting System (PDARS), Integrated Reporting Information System (IRIS), System Safety Management Transformation, implementation of SMS, Independent Operational Test and Evaluation (IOT&E) 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. Automated Safety Information Sharing and Analysis Scope and Effectiveness will automate risk identification and notification processes. This capability will be expanded to include additional data sources and enhanced by actions that improve data security, quality and scope. Investment required for this operational improvement is ASIAS.

Security:

Summary Description:

NAS operations require facility and information security. Facility security deals with protecting air traffic control, communication, and navigation facilities. Information security protects the data within the NAS and is a baseline requirement of each new and existing NAS program. Continuous upgrades are provided as information security technology and best practices improve.

Security Timeline:

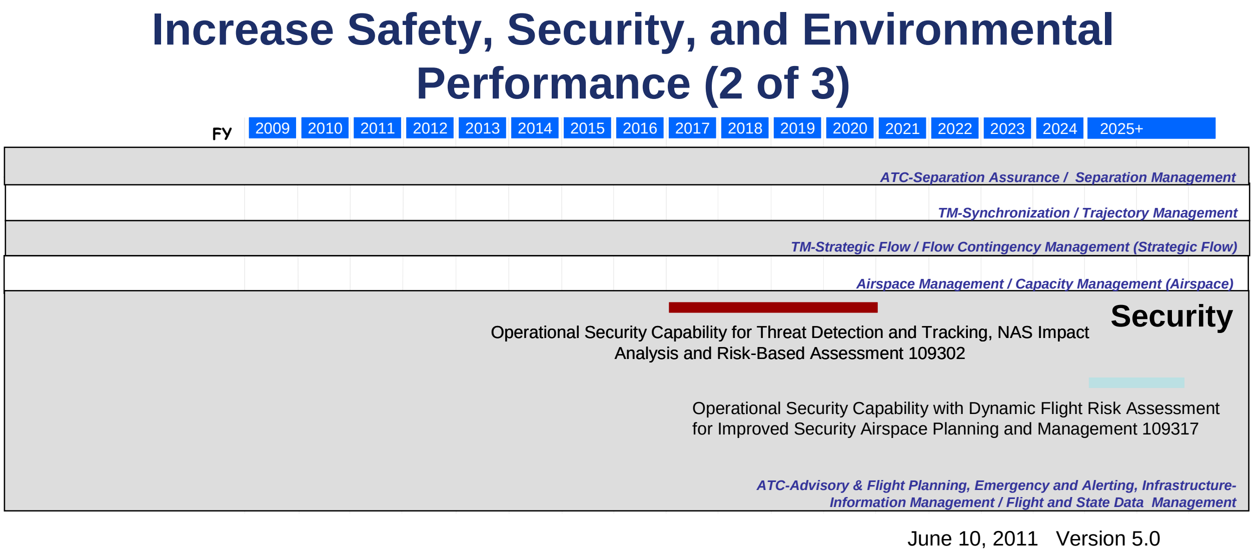

Figure 13 Improve Security

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 airborne 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.

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 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 planning must consider and minimize environmental consequences of emissions and noise caused by NextGen operational improvements while improving energy efficiency.

Environmental Timeline:

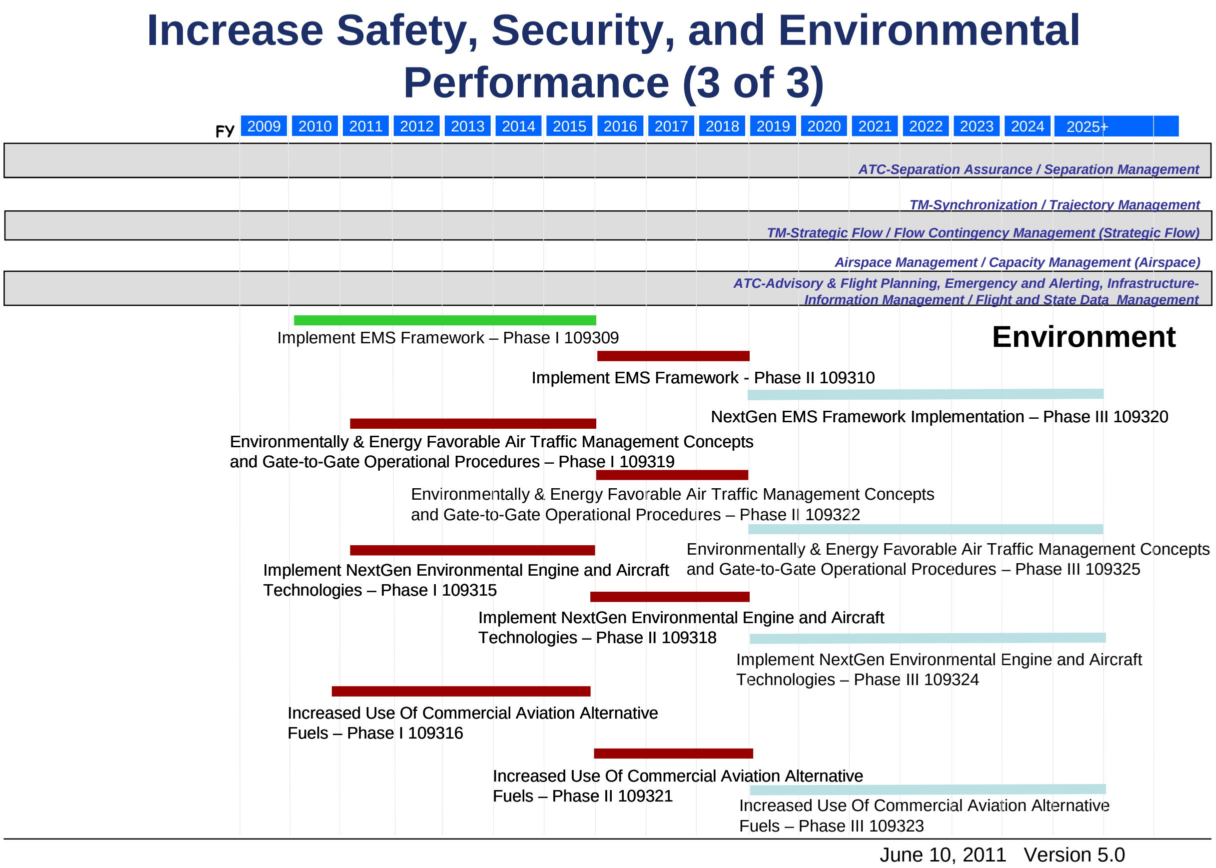

Figure 14 Improve Environmental Performance

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 program – Environment & Energy – which provides the funds to model and demonstrate the initiatives aimed at achieving these improvements.

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

1. Implement Environment Management System (EMS) Framework – Phases I and II will refine EMS framework, communication and outreach activities for stakeholders' coordination and participation in developing decision support tools to mitigate environmental issues.
2. Environmentally and Energy Favorable Air Traffic Management Concepts And Gate to Gate Operational Procedures Phases I and II will explore, develop, demonstrate, evaluate and support the implementation and deployment of operational changes to the NAS that have the potential to reduce the environmental impacts of aviation.

3. Implement NextGen Environmental Engine and Aircraft Technologies Phases I and II 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.
4. Increased Use of Commercial Aviation Alternative Fuels Phases I and II will determine the feasibility and market viability of alternative aviation fuels for civil aviation use. This effort will seek to 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:

Future air traffic control facilities will be more flexible, scalable and maintainable. Airspace boundaries will no longer be based on geographical boundaries. Infrastructure, automation, equipage, procedures and regulations will support a seamless operational concept as the NAS evolves from a geographic focus to a broader air traffic management concept.

To support this new approach to the NAS, Future Facilities will optimize resources by establishing new facilities, changing the number and sizes of existing facilities and combining/eliminating other facilities. Allocation of staffing and facilities, continuity of operations and training the workforce will also be considered.

To support the transformation to NextGen facilities, FAA operates specialized test and evaluation facilities to support the development and implementation of NextGen capabilities. These facilities are unique in their flexibility to assess multiple capabilities; integrate new technologies into a realistic NAS environment and assess groups of capabilities.

Timeline:

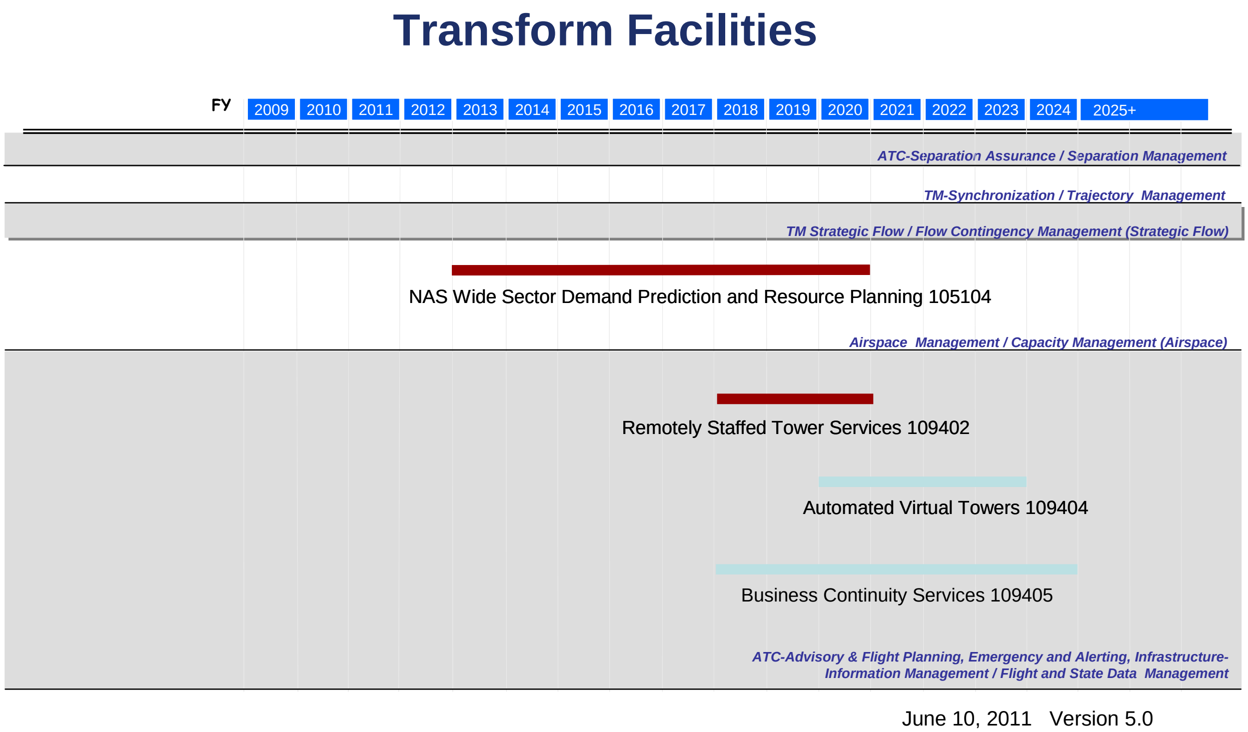

Figure 15 Transform Facilities

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 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 airline business decisions. Future traffic loads are modeled against various solutions to mitigate adverse impacts to users. These variables will affect the design and location of NextGen facilities.

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 improvement are Terminal Automation Modernization Replacement (TAMR), Tower Flight Data Manager (TFDM), DataComm, NAS Voice System (NVS), ADS-B, Runway Status Lights (RWSL), Airport Surface Detection Equipment (ASDE), Runway Incursion Reduction Program (RIRP), NextGen Facilities and System Wide Information Management (SWIM).

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 the plan for an achievable transition to the sophisticated capabilities needed in order to meet expected future growth in an organized and timely manner. They also help to ensure that the interim steps taken to modernize the existing system are consistent with the future system.

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. These roadmaps are updated 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 programs that are shown in the roadmap and those that are included in an overall FAA Enterprise Architecture. Some programs 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 programs with estimated funding anytime within the next 5 years (except Activity 5 Personnel Compensation, Benefits and Travel) 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.

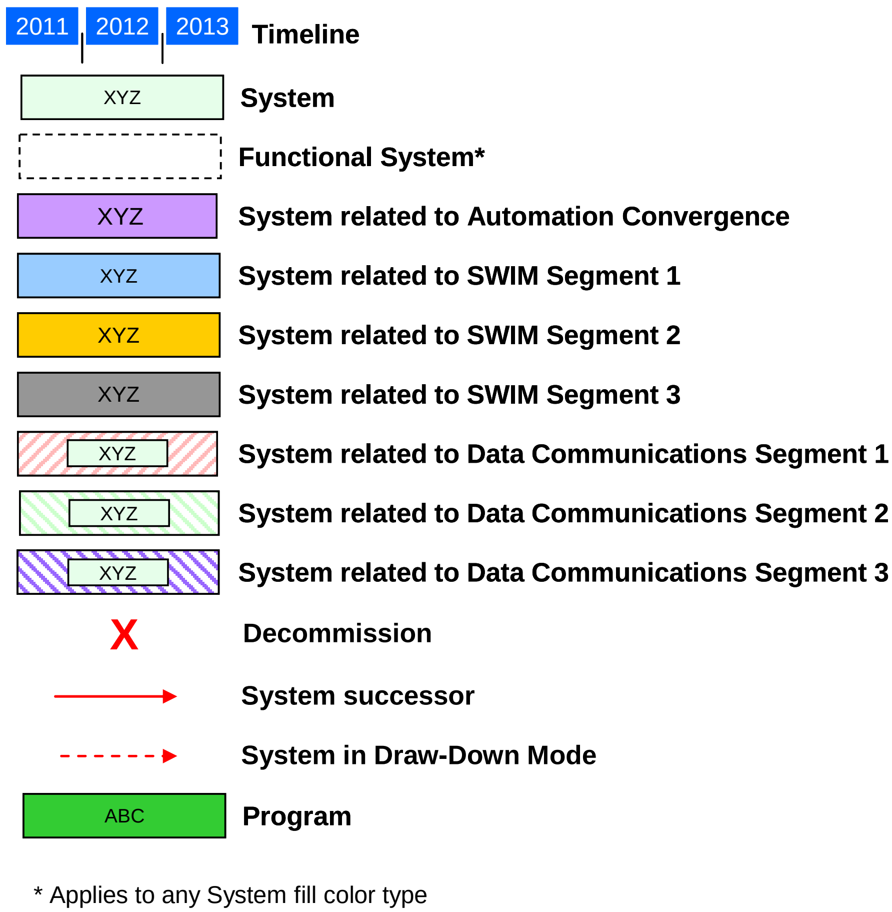

Figure 16 Roadmap Legend

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:

- Maintaining flight information and controller-in-charge data from pre-flight to post-flight, 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.
- Generating symbols displaying information on routes, restricted areas, and several other fixed features of the controller's sector.

- Providing automated alerts to controllers regarding potential aircraft conflicts and warnings that an aircraft may be approaching a terrain hazard.
- Supporting 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.
- Providing traffic management capabilities and decision support tools to forecast and provide solutions for future demand. The solutions may involve adjusting routes or speed, controlling airport departures, or other actions.

The automation roadmaps in figures 17 and 18 depict the planned architecture from 2011 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.

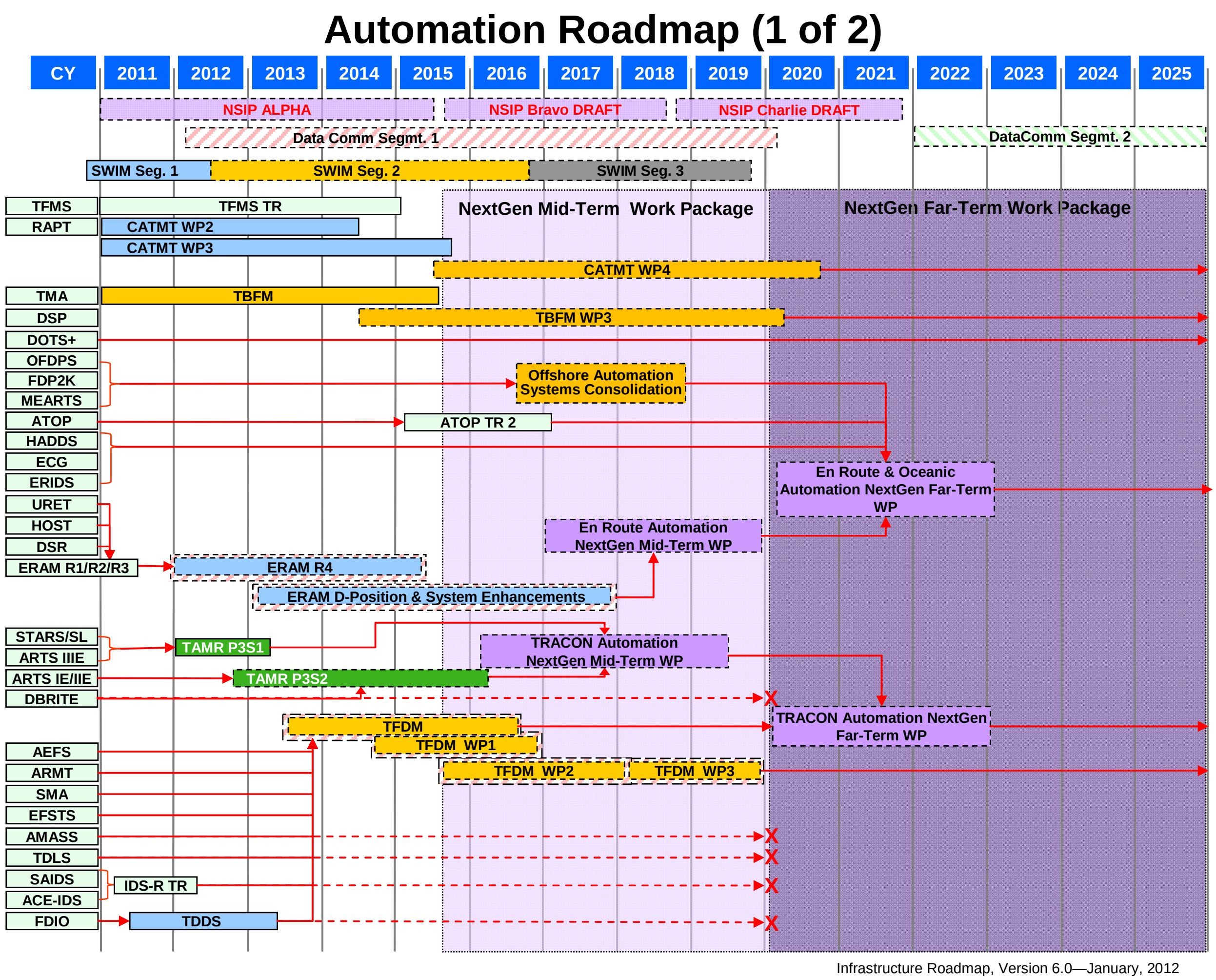

Figure 17 Automation Roadmap (1 of 2)

At the top of the roadmap are the symbols for the various stages of the NextGen System Implementation Plan (NSIP). As NextGen becomes operational, the plans will reflect current capabilities and next steps for further improvements.

Two of the enabling technologies for NextGen appear at the top of the automation roadmaps: Data Communications (DataComm) Segments 1 & 2 and System-Wide Information Management (SWIM) Segments 1, 2, & 3. 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 first four systems on the left side of the roadmap contain 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 group of five programs on the left side comprises the oceanic control programs. The DOTS+ system uses weather information to determine the most fuel-efficient routes based on wind velocity and direction. It will continue in operation through the timeframe of the roadmap. The oceanic automation systems (OFDPS, FDP2K, ATOP, and MEARTS) process data regarding the position of aircraft on oceanic and offshore flights to aid controllers in separating flights in FAA controlled airspace. The FAA plans to establish a program to replace the San Juan, Honolulu, Guam and Anchorage automation systems in 2015 and deploy the replacement automation systems in the 2020 timeframe.

The next seven blocks on the left side are components of the en route control system. The En Route Automation Modernization (ERAM) program replaces five of the component pieces with new hardware and revised ATC software, but the ECG, which formats data for ERAM, remains a separate program. ERAM is needed to replace 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. Improvements to ERAM will be added with a series of releases to take advantage of new capabilities it offers. The ERAM D-position upgrade and system enhancements will build in new software to fully support Trajectory Based Operations.

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 Segment 1 (TAMR P3 S1) will initially update 11 larger ARTS systems and TAMR Phase 3 Segment 2 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. DBRITE is a tower display that allows tower controllers to determine the location of approaching traffic before it becomes visible to them.

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 NAS subsystems. TFDM Phase 1 is the initial capability that will integrate data from existing systems. Flight Data Input/Output (FDIO) provides flight plan and other data to operational facilities. The Terminal Data Display System (TDDS) is a project within the SWIM Program to provide publish/subscribe capability for a limited amount of Terminal Data. The Advanced Electronic Flight Strip (AEFS) and Electronic Flight Strip Transfer System (EFSTS) provide printed flight plan information to controllers. The Airport Resource Management Tool (ARMT) provides an assessment of available airport capacity. The Surface Movement Advisor (SMA) provides the status of aircraft moving from the gates to the runways and improves taxiing efficiency. The Airport Movement Area Safety System (AMASS) provides automated warnings of potential runway incursions. The Tower Data Link Services (TDLS) function provides datalink clearances to pilots preparing to depart an airport. The Automated Surface Observing System (ASOS) Controller Equipment-Information Display System (ACE-IDS), and the System Atlanta Information Display System (SAIDS) provide weather and other information to tower controllers.

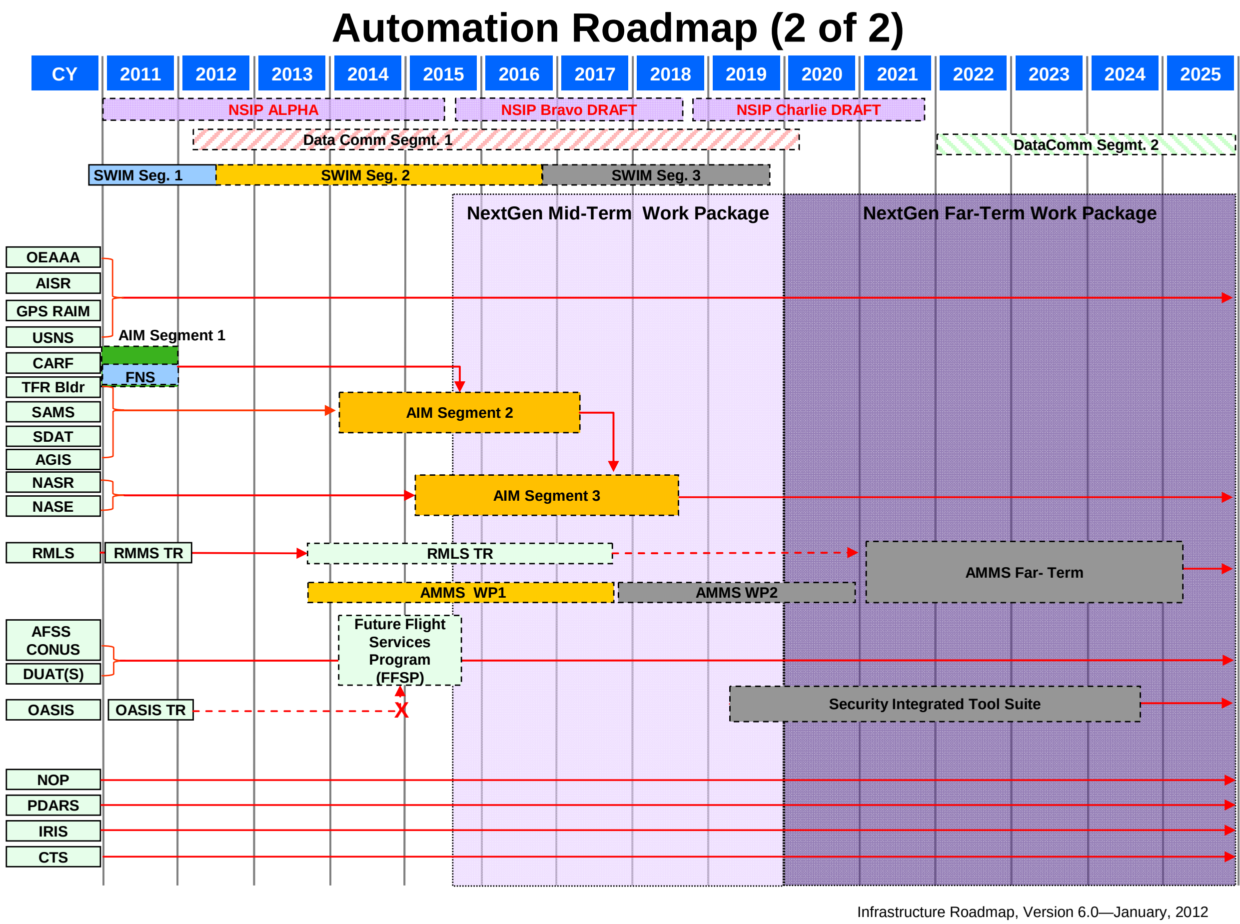

Figure 18 Automation Roadmap (2 of 2)

The first four systems on the left side of figure 18 are automation tools that gather information on airspace and airport conditions and approved routes and approaches:

- OEAAA — Obstruction Evaluation/Airport Airspace Analysis,
- AISR – Aeronautical Information System Replacement,
- GPS RAIM — Global Positioning System Receiver Autonomous Integrity Monitor, and
- USNS — United States NOTAM (Notice to Airmen) System.

The GPS RAIM determines whether there are enough 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. NOTAMs are notices of temporary changes, such as temporary flight restrictions and runway closures for construction.

The next 7 systems (see following bullets) mainly provide status information on airports, airspace, and navigation facilities, but the FAA uses some of them to evaluate airspace. These individual systems will be replaced in three segments with a modernized and consolidated

Aeronautical Information Management (AIM) system including the FNS (Federal NOTAM System) supporting Aeronautical Common Services.

- 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,
- NASR — National Airspace System Resources, and
- NASE — NAS Adaptation Services Environment.

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 NAS infrastructure and its status 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 Logging System (RMLS) 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.

AFSS CONUS, DUATS and OASIS 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, Hawaii and Puerto Rico, and flight service specialists use Automated Flight Service Systems (AFSS CONUS) to record flight plans and provide weather briefings to pilots. Future Flight Service Program (FFSP) 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 FFSP; 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.

The Security Integrated Tool Set (SITS) is a security system that validates the identity and legitimacy of aircraft within or entering the NAS.

There are three systems used to analyze traffic flows and controller actions to determine the most effective ways to handle air traffic. The National Offload Program (NOP) allows FAA to download radar information from en route automation systems for analysis and review. The Performance Data and Analysis System (PDARS) has the same function for terminal systems. The Integrated Reporting Information System (IRIS) works in conjunction with NOP for analysis of en route data.

The Coded Time Source (CTS) program 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.

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

BLI Number	Program Name	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Automation Functional Area	**$773.6**	**$701.8**	**$833.7**	**$899.5**	**$809.4**
1A06	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$24.6	$24.6	$24.6	$24.6	$27.0
1A07	Next Generation Air Transportation System (NextGen) - System Development	$61.0	$61.5	$65.5	$65.5	$74.0
1A08	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations (TBO)	$16.5	$18.0	$18.0	$33.0	$46.0
1A10	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$11.0	$8.0	$28.4	$42.4	$37.0
1A11	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$24.2	$34.0	$36.0	$32.0	$34.0
1A12	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$30.5	$30.5	$25.5	$15.5	$30.5
2A01	En Route Automation Modernization (ERAM)	$144.0	$25.6	$0.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements	$10.0	$70.0	$204.0	$165.0	$220.0
2A03	En Route Communications Gateway (ECG)	$3.1	$4.8	$4.9	$5.1	$0.0
2A06	Air Traffic Management (ATM)	$21.7	$8.1	$1.9	$0.0	$0.0
2A10	Oceanic Automation System	$4.0	$4.8	$2.0	$0.0	$0.0
2A12	System-Wide Information Management (SWIM)	$57.2	$53.0	$69.3	$71.7	$59.2
2A15	Collaborative Air Traffic Management Technologies (CATMT)	$34.4	$29.4	$3.3	$15.6	$25.0
2A17	Tactical Flow Time Based Flow Management (TBFM)	$12.9	$10.5	$0.5	$3.6	$1.8
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$34.5	$42.5	$56.7	$82.3	$55.0
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$153.0	$136.2	$143.6	$144.8	$25.7
2B05	Terminal Automation Program	$2.5	$2.6	$2.6	$2.7	$2.7
2B14	Integrated Display System (IDS)	$4.2	$8.2	$6.9	$2.3	$1.3
2B18	Terminal Flight Data Manager (TFDM)	$37.6	$40.0	$42.0	$83.3	$117.1
2C01	Future Flight Services Program (FFSP) - formerly referred to as Flight Service Automation Modernization (FSAM)	$8.0	$25.0	$30.0	$37.0	$8.0
2D08	Instrument Flight Procedures Automation (IFPA)	$7.1	$4.5	$2.4	$3.0	$2.0
3A02	Aviation Safety Analysis System (ASAS)	$15.8	$12.7	$11.9	$20.2	$11.3
3A07	System Approach for Safety Oversight (SASO)	$23.0	$11.5	$10.5	$9.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$12.8	$12.2	$10.2	$7.5	$4.2
3A11	Aviation Safety Information Analysis and Sharing (ASIAS)	$15.0	$15.0	$15.0	$15.0	$15.0
3A14	Aerospace Medicine Safety Information System (AMSIS)	$3.0	$1.9	$3.0	$3.0	$3.1
4A09	Aeronautical Information Management Program	$2.0	$6.7	$15.0	$15.0	$0.0

Figure 19 Expenditures in the Automation Functional Area[2]

Figure 19 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),
- Aviation Safety Information Analysis and Sharing (ASIAS), and

[2] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

- Aerospace Medicine Safety Information System (AMSIS).

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

The Instrument Flight Procedures Automation (IFPA) system shown in the Figure 19 funding chart automates the development of new instrument flight procedures and maintains the existing inventory of 20,000 instrument flight procedures.

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.

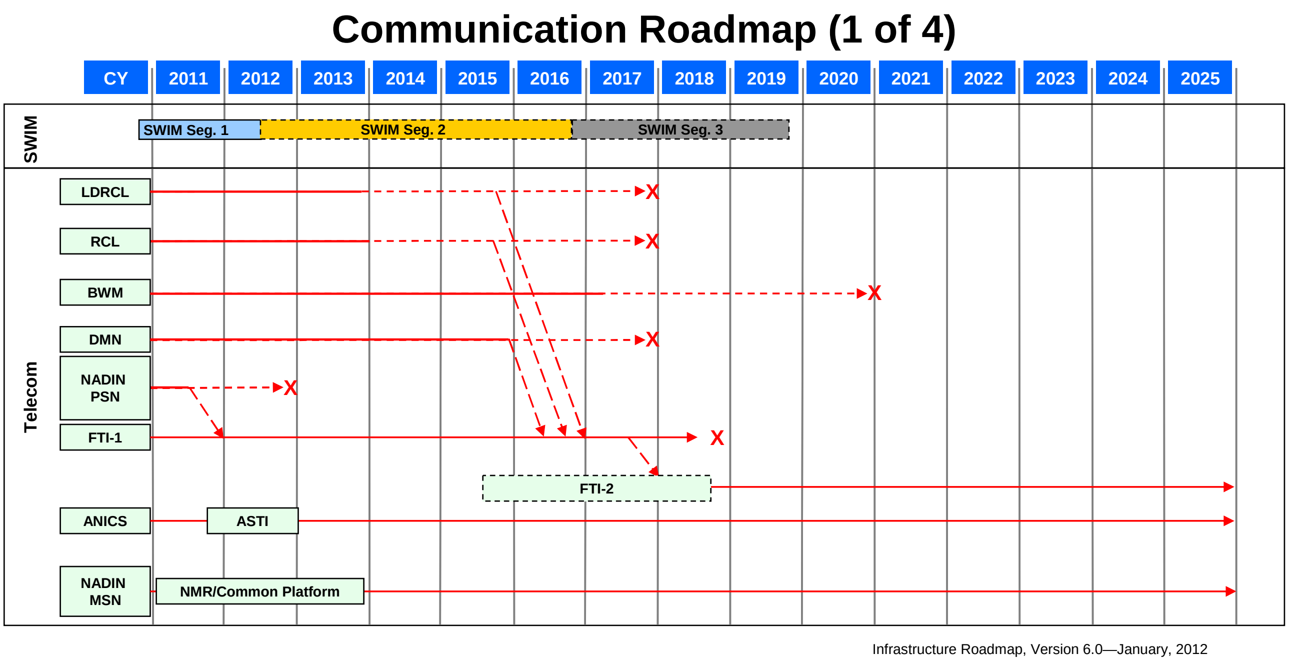

Figure 20 Communications Roadmap (1 of 4)

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 functions of NADIN PSN and DMN to the FTI network and its follow on contract. NADIN MSN (Message Switching Network) will be sustained 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. It has been renamed ASTI (Alaska Satellite Telecommunications Infrastructure) program and it is the follow-on effort to ANICS to modernize the infrastructure. Because there are far fewer ground telecommunications connections in Alaska, a satellite system is used 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.

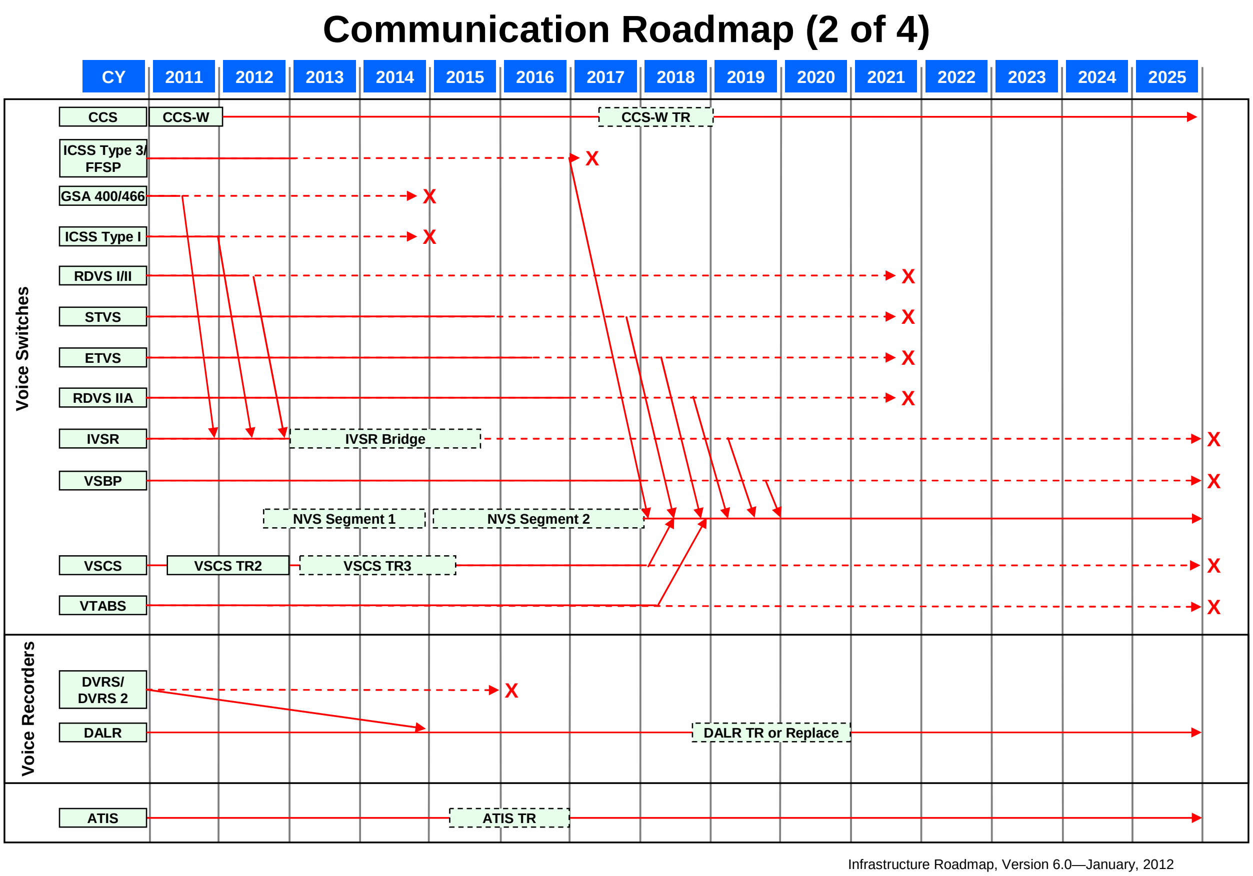

Figure 21 Communications Roadmap (2 of 4)

The Command Center Conference Control Switch (CCS) installed at the facility in Warrenton, Virginia 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. They can coordinate with centers, TRACONs, and users to decide how best to implement traffic management initiatives and when to use severe weather avoidance programs. A tech refresh is planned to begin in 2017.

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

- ICSS Type 1 and 3 – Integrated Communication Switching System,
- GSA 400/466 – A voice switch developed by Litton/Amecom purchased through a national program/contract,
- RDVS I and II– Rapid Deployment Voice Switch,
- STVS – Small Tower Voice Switch,

- ETVS – Enhanced Terminal Voice Switch, and
- IVSR – Interim Voice Switch Replacement.

The ETVS program is replacing terminal voice switches at the rate of about 10 per year, as well as installing voice switches in newly constructed airport traffic control towers.

The VSBP (Voice Switch By Pass) is a backup voice switch that terminal controllers can use to stay in communication with pilots if there is a failure in the primary voice switch installed in their facility.

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 VTABS (VSCS Training and Backup Switch) will maintain critical air-to-ground and ground-to-ground communications if the main communications system becomes inoperable as a result of a power outage, a catastrophic system failure, or during system maintenance or upgrade activities.

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.

The Digital Voice Recorder System Replacement (DVRS) 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, and a technical refreshment of ATIS is scheduled in 2013.

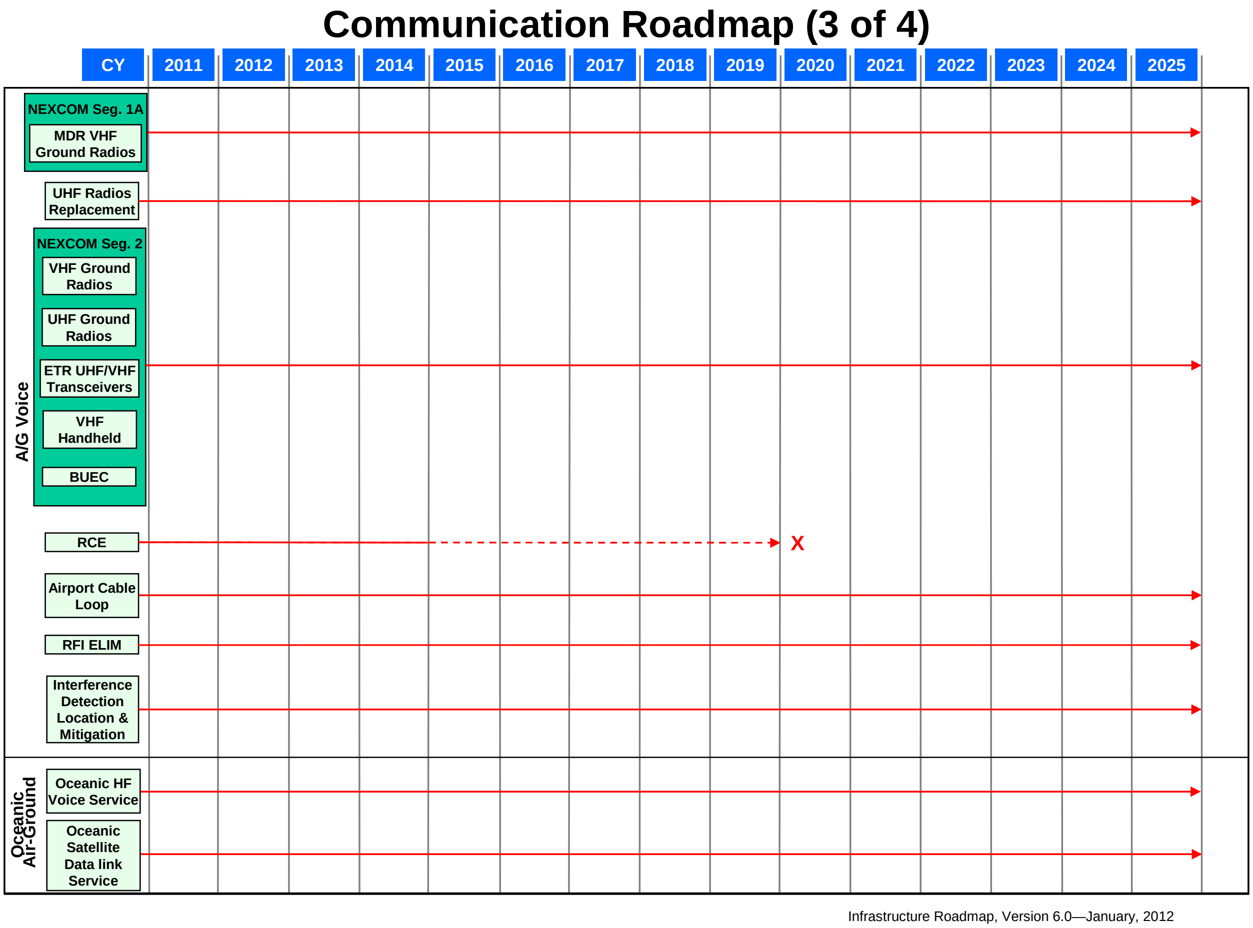

Figure 22 Communications Roadmap (3 of 4)

The third communications roadmap (figure 22) 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 (ETR) 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 control and report the condition of equipment necessary for airport operations such as the Airport Surveillance Radar. FAA is 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.

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.

The last two items on the roadmap are communications systems used for oceanic air traffic control. The first one 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.

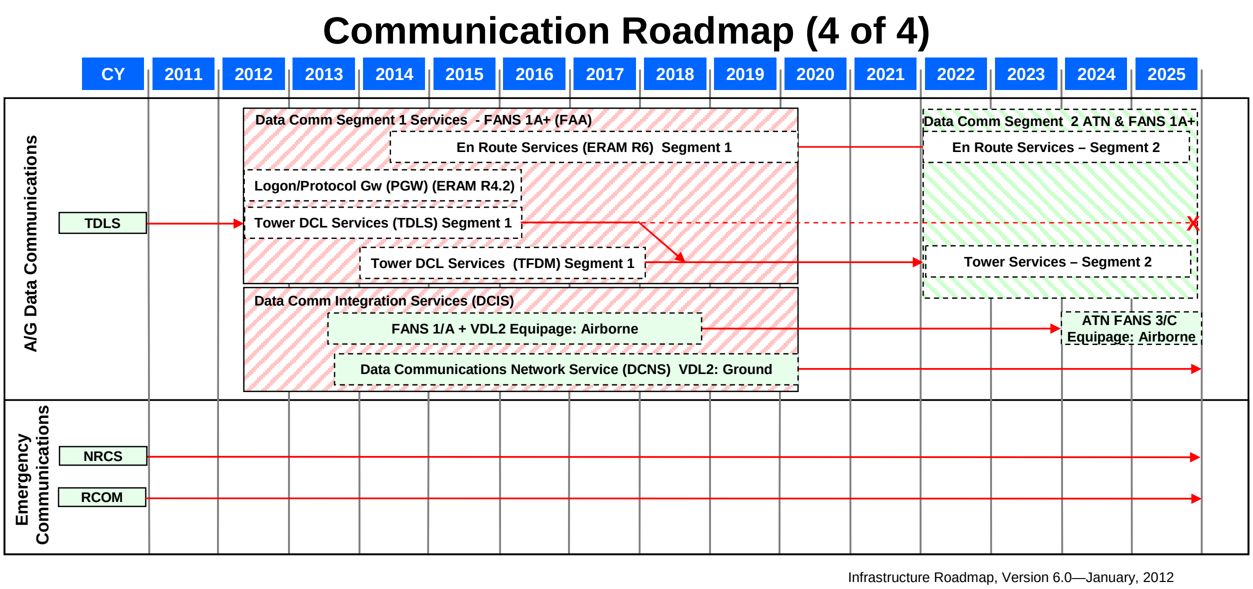

Figure 23 Communications Roadmap (4 of 4)

The fourth communications roadmap (figure 23) shows the planned transition to data communications services for routine communications from controllers to pilots that can be data linked from en route and terminal ATC automation system

Data Comm en route services segment 1 will provide services to pilots after ERAM Release 6 is installed. More sophisticated applications will be developed through the entire period to 2025. A log-on protocol will begin development in 2012 to assure security of transmissions to pilots. 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 in Data Comm Segment 1 and will be transferred to Tower Flight Data Management (TFDM). The DataComm Integrated Services (DCIS) will consolidate information flows to and from aircraft flying oceanic routes. Aircraft that are FANS (Future Air Navigation Systems) equipped will experience more sophisticated data link connections with ATC facilities as new systems evolve during the roadmap timeframe.

The two programs on the bottom of the roadmap are the NRCS (National Radio Communications System) which is used by FAA's maintenance workforce to coordinate activities related to modernizing and maintaining ATC equipment, and RCOM (Recovery communications) which is an emergency network to be used for command and control of the ATC system when all other communications systems fail.

Figure 24 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 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Communication Functional Area	**$233.3**	**$228.1**	**$282.7**	**$251.1**	**$416.0**
1A05	Data Communication in support of Next Generation Air Transportation System (NextGen)	$142.6	$120.1	$161.1	$134.8	$315.8
2A07	Air/Ground Communications Infrastructure	$4.0	$3.0	$3.2	$3.2	$3.2
2A09	Voice Switching Control System (VSCS)	$15.0	$20.0	$20.0	$15.0	$0.0
2A11	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$33.7	$22.0	$40.0	$40.0	$50.0
2B08	Terminal Voice Switch Replacement (TVSR)	$4.0	$5.0	$0.0	$0.0	$0.0
2B13	National Airspace System Voice System (NVS)	$10.3	$30.0	$30.0	$30.0	$30.0
2E04	Airport Cable Loop Systems - Sustained Support	$5.0	$5.0	$5.0	$5.0	$5.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$6.8	$11.0	$11.4	$11.1	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0

Figure 24 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. Surveillance data is provided by the following technologies: Primary radar – The radar beam is reflected off the aircraft back to the radar receiver; Secondary radar – A reply is generated by the aircraft transponder back to the radar in response to a radar signal; Multilateration – Multiple ground sensors receive aircraft transponder signals allowing triangulation for position; and ADS-B – Aircraft determines its location using GPS and broadcasts that information. 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 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 supplement the position display for each aircraft.

[3] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

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 merges primary, secondary, multilateration and ADS-B information to improve detection of aircraft and provides a clear display of the positions of aircraft and vehicles on or near taxiways and runways.

Figure 25 is one of the two roadmaps for surveillance systems.

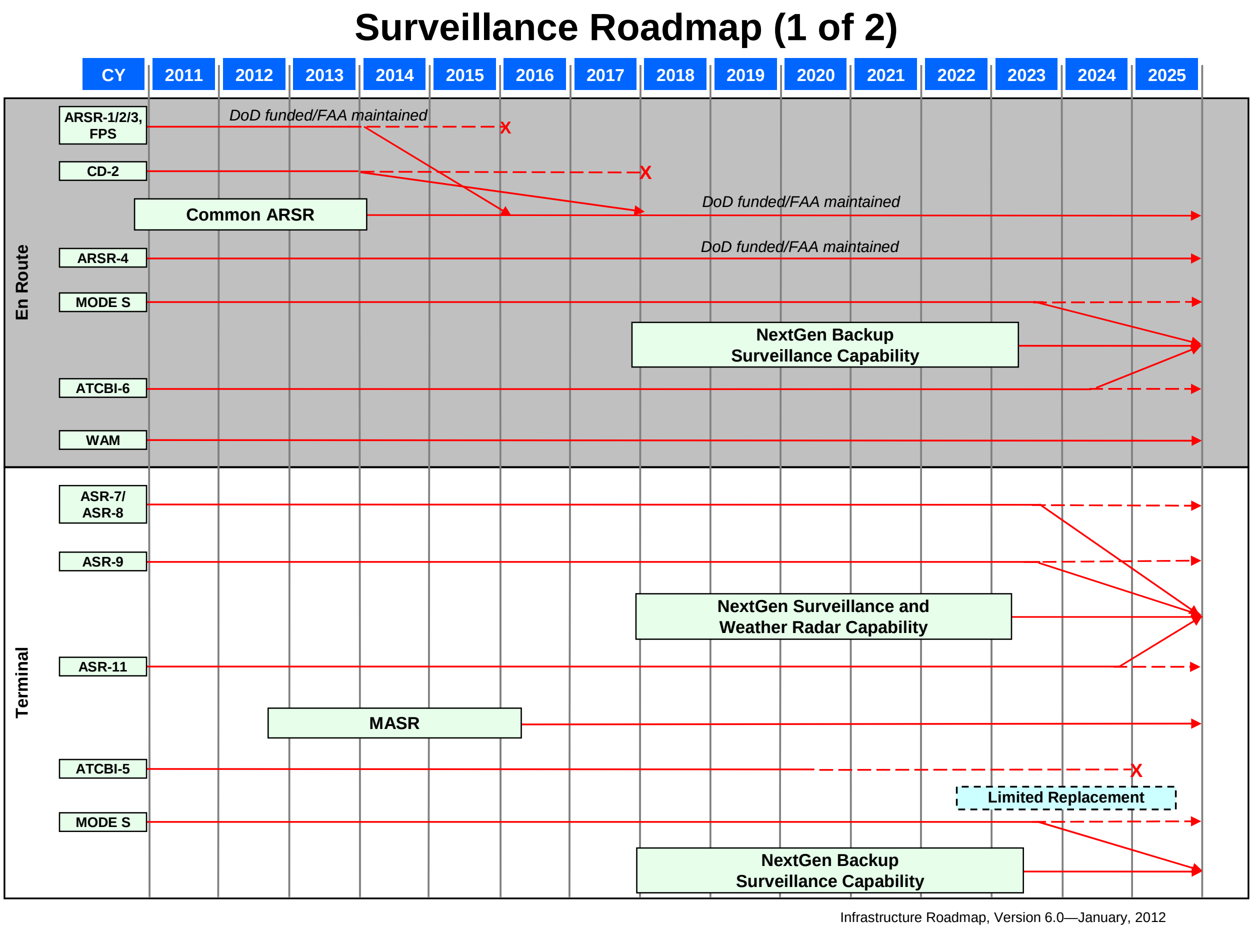

Figure 25 Surveillance Roadmap (1 of 2)

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 Wide Area Multilateration (WAM) system uses multilateration technology over a large area to detect aircraft position in areas where the radar signal may be unavailable or blocked by mountainous terrain.

The Department of Defense will fund FAA maintenance of the ARSR through 2025 due to aviation security concerns. An evaluation of a next-generation backup surveillance capability will begin in 2013 and a decision 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 radars that the ASR-9 program did not replace. The ASR-9 will have a Service Life Extension Programs (SLEP) to update and modernize its components, and the FAA will decide in 2017 whether to replace existing systems with new systems providing NextGen surveillance and weather capability. Current planning calls for keeping terminal primary radar systems as a backup to the other technologies to address safety, security, and weather detection requirements.

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.

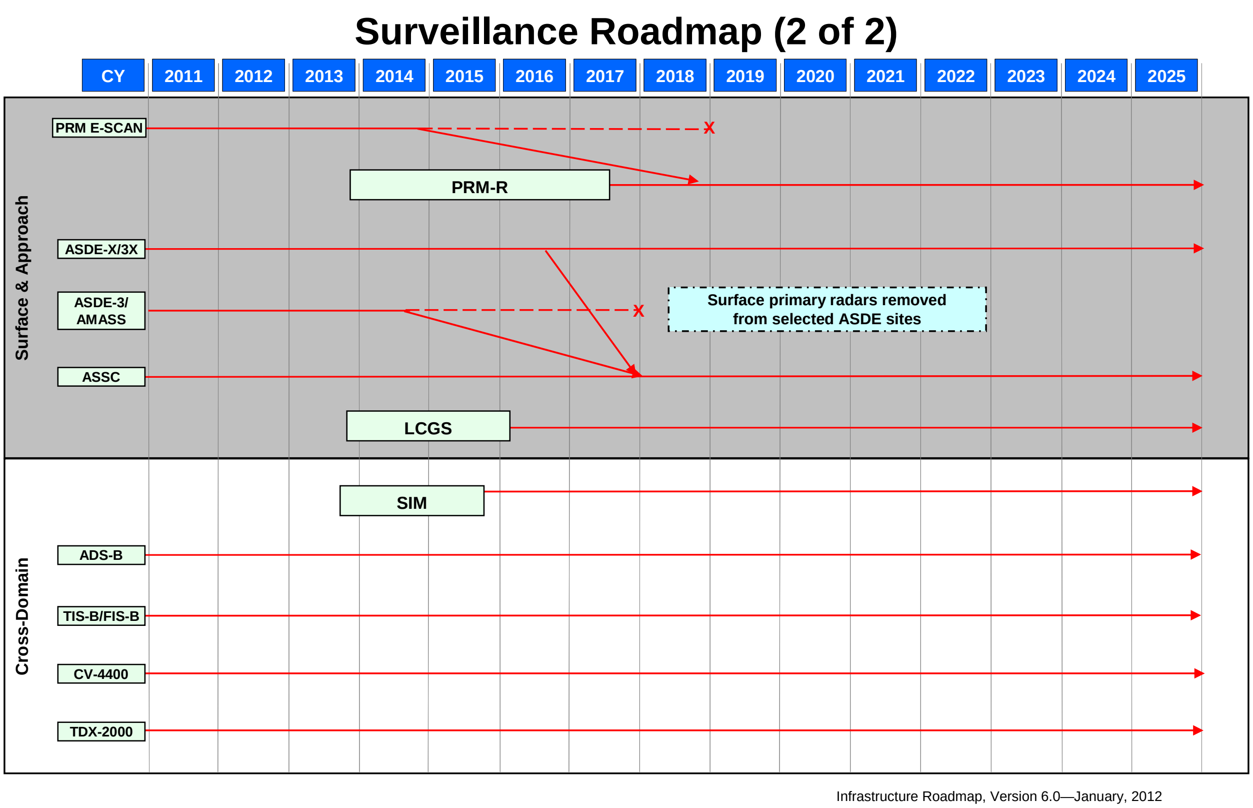

Figure 26 Surveillance Roadmap (2 of 2)

The second Surveillance roadmap (figure 26) 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 secondary 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. The PRM-R refers to a replacement PRM system which is in investment analysis.

Controllers use two systems to maintain aircraft separation on the airport surface. Some airports have ASDE-3/AMASS, 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 ASDE-X sites were formerly ASDE-3/AMASS sites. The Airport Surface Surveillance Capability (ASSC) program will replace the 9 ASDE-3s which have not been upgraded to the ASDE-X configuration. The ASSC will use multilateration and ADS-B aircraft information to display aircraft location for the airport tower controllers. FAA is still evaluating the Low Cost Ground Surveillance System (LCGS) to determine whether it would be beneficial to install it at lower activity airports.

Over the next 2 years, the FAA will be evaluating whether to install Surveillance Interface Modernization (SIM) equipment at terminal and en route radar locations. SIM will modernize the interfaces between FAA radars and automation systems, which will improve surveillance processing performance, reduce life cycle costs, and enable efficient distribution of radar data in the NAS.

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. 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, and the Flight Information System (FIS-B) broadcasts weather and airspace information to aircraft that are equipped with the capability to receive it.

The CV-4400 is a legacy system that allows use of terminal radar information for en route automation systems, e.g., using terminal radar to fill gaps in en route radar coverage at selected en route centers. The TDX-2000 is also a legacy system that digitizes the output of legacy analog radars (for example, ASR-8) for use by more modern digital automation systems, such as STARS.

Figure 27 shows the CIP costs associated with upgrading the surveillance units. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Surveillance Functional Area		**$306.9**	**$325.2**	**$209.9**	**$203.3**	**$206.5**
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.9	$5.9	$6.0	$0.0	$0.0
2A13	Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide	$271.6	$272.3	$157.3	$156.5	$160.6
2A16	Colorado ADS-B Wide Area Multilateration (WAM) Cost Share	$1.4	$3.4	$1.4	$1.4	$1.5
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$7.4	$11.1	$13.4	$10.5	$0.0
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$6.4	$13.3	$14.5	$13.4	$20.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$8.2	$9.4	$6.3	$4.4	$4.4
2B16	Mode S Service Life Extension Program (SLEP)	$4.0	$9.9	$11.0	$17.1	$20.0
2B17	Surveillance Interface Modernization (SIM)	$2.0	$0.0	$0.0	$0.0	$0.0

Figure 27 Expenditures in the Surveillance Functional Area[4]

[4] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

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 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 NextGen is implemented and more aircraft are equipped, 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. The ADS-B capability also allows GPS receivers in the aircraft to report an aircraft's position.

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.

Figures 28 and 29 show the roadmaps for navigation aids.

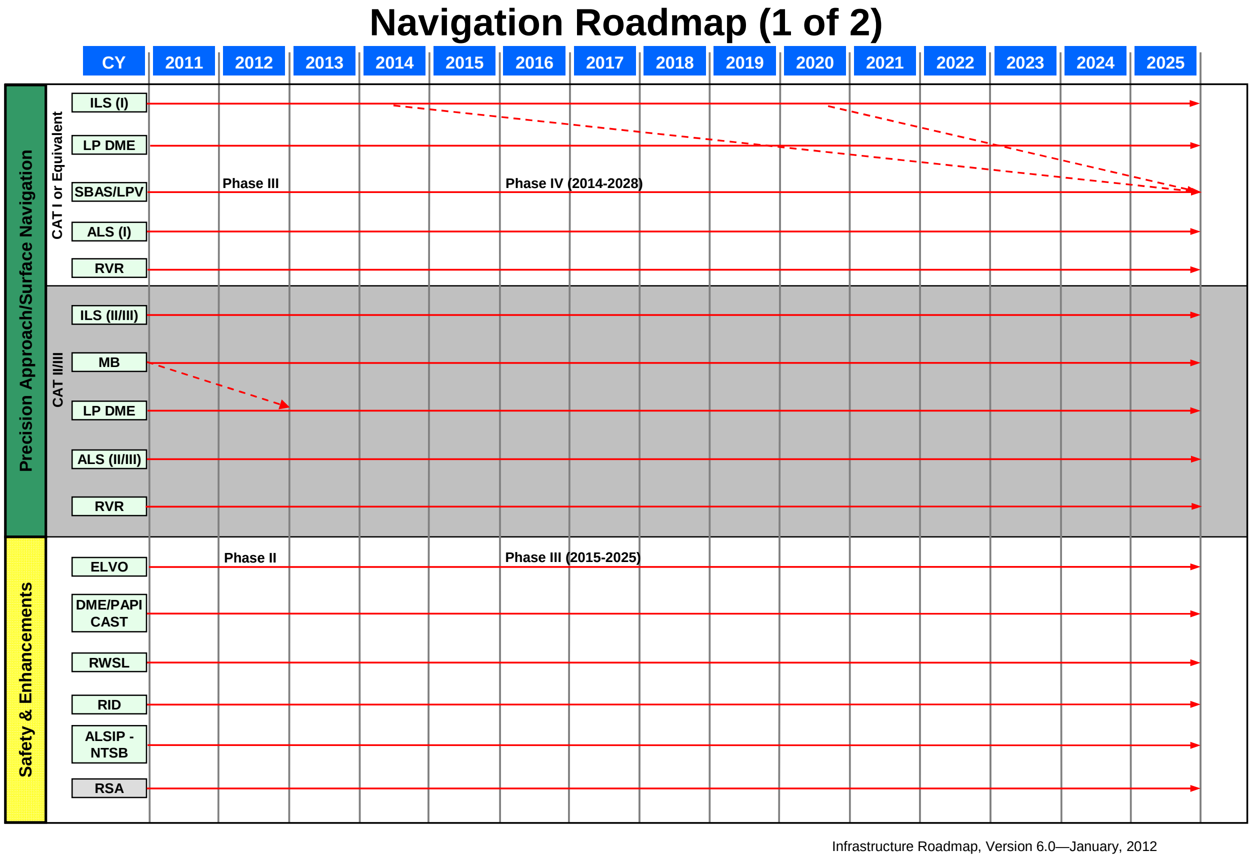

Figure 28 Navigation Roadmap (1 of 2)

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. An alternative for precision approach guidance is the SBAS LPV. As this alternative comes into broader use, the FAA can consider decommissioning ILS. 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.

The Low Power DME (LPDME) is being installed to support advanced procedures requiring performance based navigation equipage and specially trained pilots to minimize approach paths and, as discussed below, to replace marker beacons.

In both Category I and 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 end of 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. In the Category II section the existing MB (Marker Beacon) installations are being evaluated to determine how many of these existing systems can be replaced by DMEs. 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.

The Safety Enhancements section of the roadmap shows several systems designed to assist pilots to operate safely. They are:

- ELVO – Enhanced Low Visibility Operations which is a technology to help pilots see the runways in very limited visibility conditions,
- DME/PAPI CAST – Additional DME are installed to improve navigation and to meet the recommendations of the Civil Aviation Safety Task Force (CAST). The number of Precision Approach Path Indicators (PAPI) is increased to improve visual guidance to pilots as they approach a runway,
- RWSL – Runway Status Lights are designed to give pilots a stop signal if it is dangerous to enter or cross a runway,
- RID – Runway Incursion Devices are various pieces of equipment to warn aircraft and other vehicles of potential runway incursions,
- ALSIP/NTSB – The Airport Lighting System Improvement program is a response to the National Transportation Safety Board recommendation to replace steel airport light supports with breakable structures to minimize damage to aircraft that descend below the glidepath, and
- RSA – Runway Safety Area is a program to replace all structures in the safety area surrounding a runway with low impact supports to minimize damage to aircraft that veer off the runway.

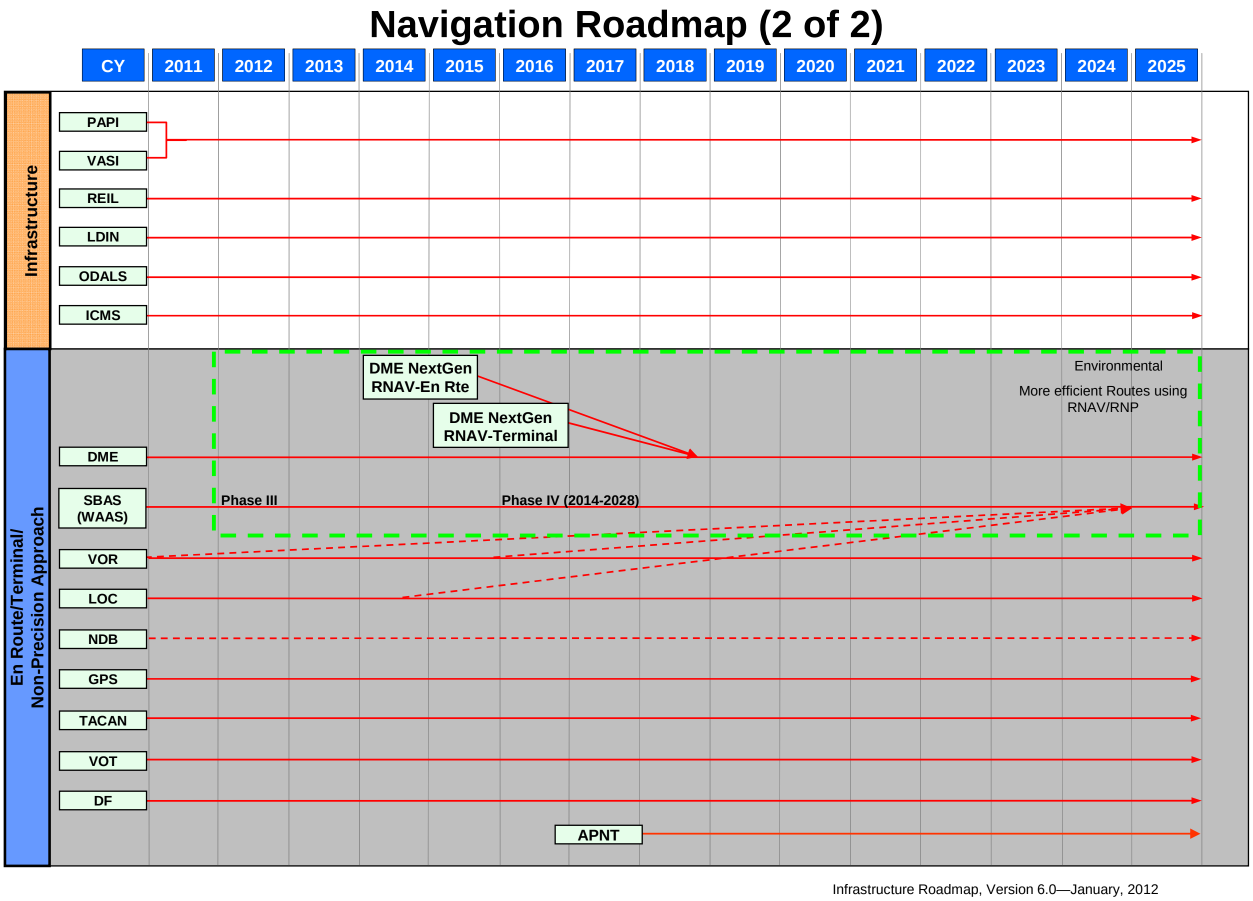

Figure 29 Navigation Roadmap (2 of 2)

As shown in Figure 29, the Precision Approach Path Indicator (PAPI) and the Vertical Approach Slope Indicator (VASI) are being combined because the PAPI is replacing the VASI, which uses an older technology to help pilots ensure they are on the proper glideslope for landing. The Runway End Identification Lights (REIL) help pilots to visually align with the runway for both precision and non-precision approaches. The PAPI and REIL will continue operating throughout the roadmap timeframe. The LDIN (Lead In Light System) and the ODALS (Omnidirectional Airport Lighting System) are lights installed at the end of runways to help pilots determine the active runway for landing. The Interlock Control and Monitoring System (ICMS) will be installed to assist controllers to rapidly activate and deactivate the navigational aids in use at an airport.

The NextGen Distance Measuring Equipment (DME - NextGen) will support NextGen en route and terminal DME operations. They will be installed beginning in the 2014 timeframe to support Area Navigation/Required Navigation Performance (RNAV/RNP) operations.

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; however, SBAS (WAAS) will support non-precision approach operations, if the FAA decides to decommission VORs. The FAA has more than 4,000 GPS-WAAS non-precision approach procedures in place.

The en route and terminal domains have traditionally relied on the system of VORs to define airways within the NAS. In 2015, a decision will be made whether to continue operating VORs as a backup for GPS or remove all VORs by 2025. If VORs are retained, they will need a service life extension program (SLEP).

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 FAA is phasing out and decommissioning Non-Directional Beacons (NDB), because NDB only provide limited directional information. NDBs are still used at some remote areas, but 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 the aircraft's antenna. Two GPS upgrades are expected in future years. The next generation of satellites 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. GPS Civil Requirements budget item will provide ground monitoring stations to measure accuracy and reliability of civil frequencies to be added to the GPS constellation.

The TACAN (Tactical Navigation System) is the military equivalent of the VOR and DME. They are often collocated with VOR systems. The VOT (VOR Test Range) is used to check and calibrate VOR receivers in aircraft. The DF (Direction Finder) is installed at flight service stations and can be used to locate lost pilots. The APNT (Alternate Positioning Navigation and Timing System) is a program to determine the appropriate back up navigation system in case GPS service is disrupted.

Figure 30 shows the future capital investments for navigation systems included in the CIP. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Navigation Functional Area	**$274.5**	**$269.0**	**$227.9**	**$189.9**	**$139.1**
1A15	Next Generation Air Transportation System (NextGen) - Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$36.2	$21.2	$16.7	$16.7	$16.7
2B12	Runway Status Lights (RWSL)	$35.3	$32.6	$26.2	$23.0	$0.0
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$2.5	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$7.0	$7.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$96.0	$115.7	$121.4	$105.7	$97.9
2D04	Runway Visual Range (RVR)	$4.0	$4.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$5.0	$0.0	$0.0	$0.0	$0.0
2D07	Visual Navaids - Establish/Expand	$3.5	$0.0	$0.0	$0.0	$0.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$8.0	$3.0	$3.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$40.0	$40.0	$9.1	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$30.0	$35.0	$30.0	$20.0	$0.0

Figure 30 Expenditures in the Navigation Functional Area[5]

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 FAA 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

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[5] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

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.

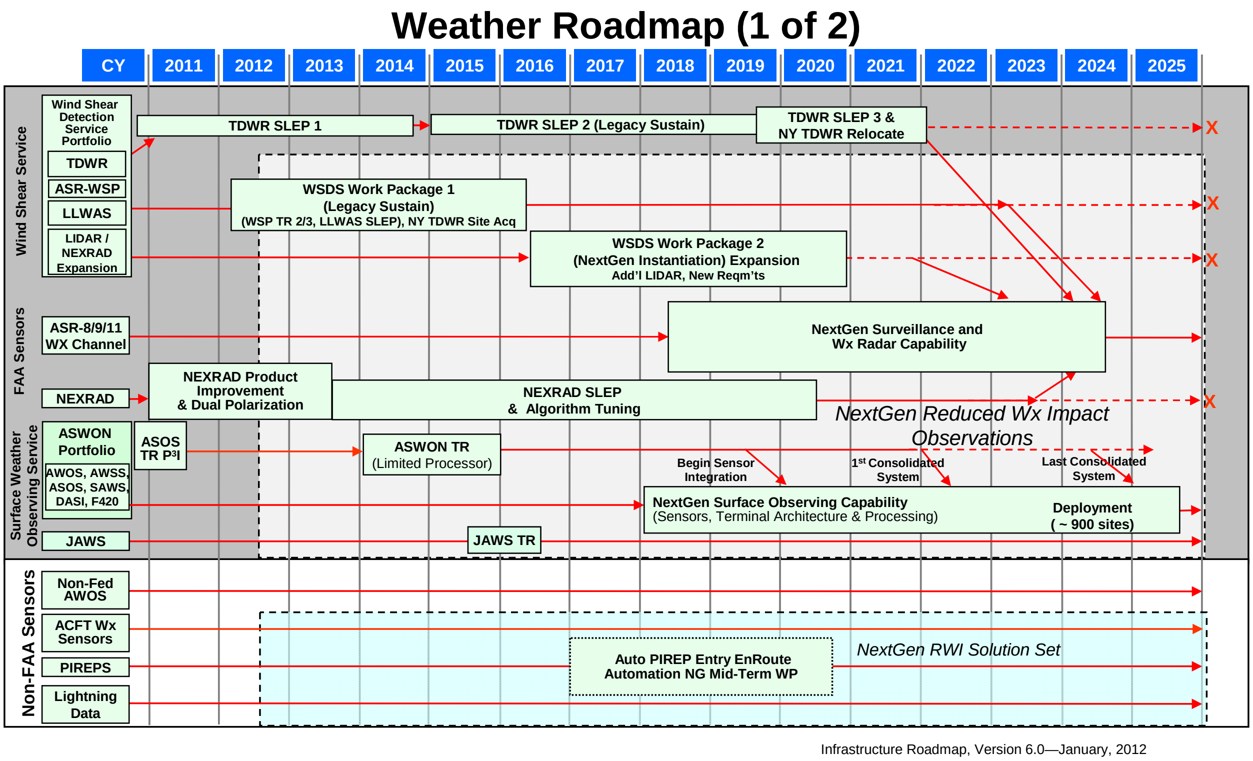

Figure 31 Weather Sensor Roadmap

Figure 31 shows the current and planned status of weather sensors. The Wind Shear Detection Services Portfolio 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). 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 ASR-8/9/11 Weather Channel and the Next Generation Weather Radar (NEXRAD) detect precipitation, wind, and thunderstorms that affect aircraft in flight. Replacing the weather information that the ASR-8/9 radars generate will be necessary only if these 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, upgrades such as Dual Polarization (Dual Pol) and software improvements are being funded. 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 the partner agencies, a decision will be made by 2018 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/DASI/F-420) 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 a decision is made to implement the NextGen Surface Observing Capability. The Digital Altimeter Setting Indicator (DASI) shows tower controllers the current altimeter setting so they can inform pilots of the proper setting so the aircraft's altimeter will read the correct runway elevation at touchdown. The F-420 is an indicator that shows the wind on the runways.

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.

The non-FAA sensors shown at the bottom of the roadmap are valuable sources of weather information that improve FAA's overall knowledge of weather conditions. Some states and smaller airports operate AWOS for weather observations. Inputs from these systems are valuable additions to the data from FAA sensors. Aircraft weather sensors can provide atmospheric pressure readings that are helpful in forecasting weather conditions. Pilot Reports (PIREPS) are invaluable because they are real time reports on the weather along major flight routes. Lightning Data provides air traffic facilities important information about the location and intensity of thunderstorms.

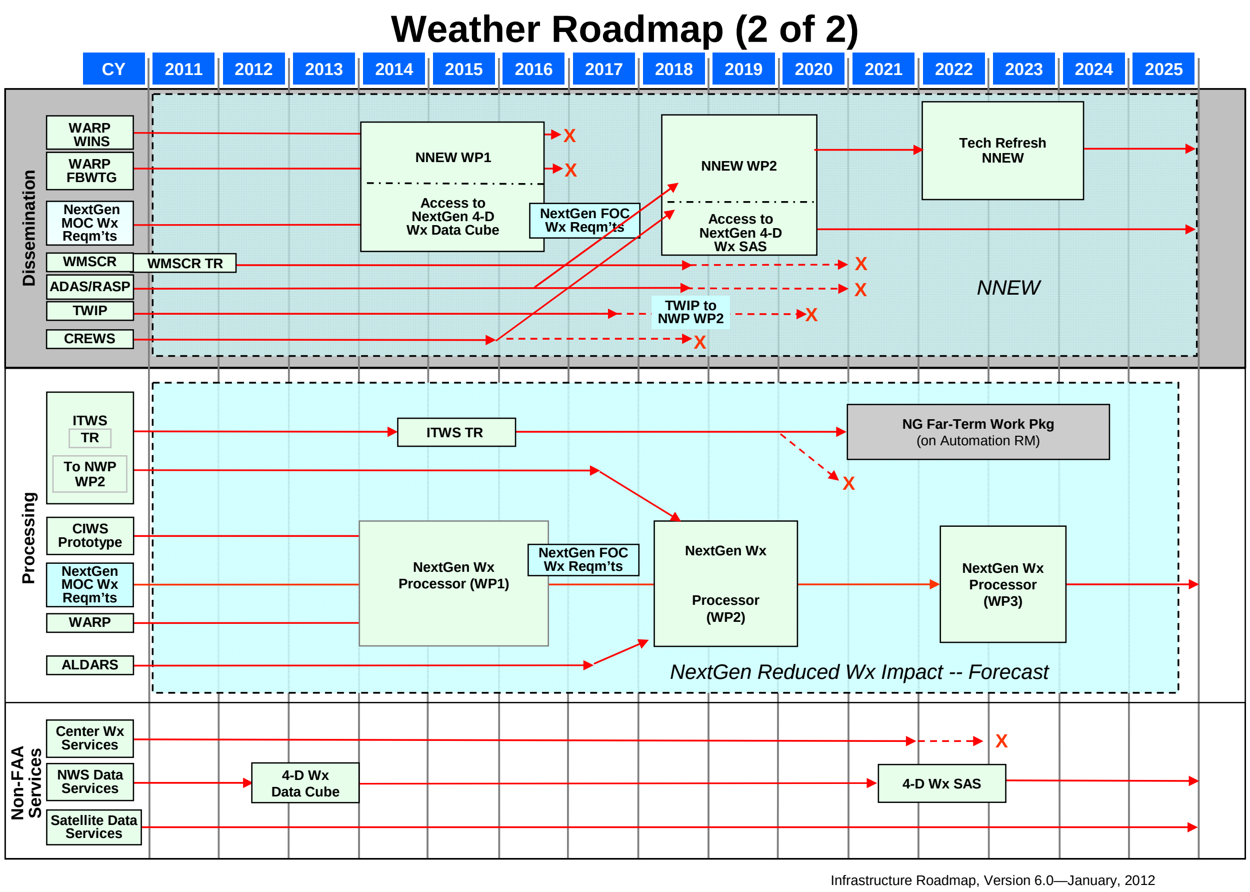

Figure 32 Weather Dissemination, Processing, and Display Roadmap

Figure 32 shows that NextGen systems will consolidate 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. NNEW (note NNEW common information dissemination capabilities are now subsumed within SWIM Common Support Services) and interconnections with the NextGen 4-D Weather Cube is being developed to enhance the collection and dissemination of weather information and provide access to all users throughout the NAS.

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. 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 WARP FBWTG (FAA Bulk Weather Communications Gateway) provides National Weather service data to the center weather service units to aid in their forecast of weather conditions in the center's airspace. The roadmap shows the efforts to define NextGen mid-term and long-term operational capabilities (MOC and FOC) preceding the implementation of the SWIM Common Support Services (NNEW).

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 FAA will decide during 2014 whether to migrate WMSCR functionality into the SWIM Common Support Services (NNEW) for weather information distribution.

The Automated Weather Observation System Data Acquisition System/Regional ADAS Service Processor (ADAS/RASP) 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 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 CTAS Remote Weather System (CREWS) transmits weather data to the Center TRACON Automation System (CTAS) so the traffic management units that meter air traffic transitioning from en route to terminal airspace have the benefit of wind information to improve their efficiency in optimal spacing of the aircraft as they approach terminal airspace.

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. ITWS has been installed 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 and ITWS capabilities. Further upgrades of weather-predicting algorithms will also be added in WP 3 to include Wind Shear/Microburst and Wake Vortex Detection and prediction advisories.

The Automated Lightning Detection and Reporting System (ALDARS) will become part of the NextGen weather processor after 2018 and its information will be consolidated with other weather inputs.

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. As shown in the roadmap the 4-D Weather Cube will be hosted by the National Weather Service and accessed by FAA as the Single Authoritative Weather Source by all users of the NAS.

Figure 33 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 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Weather Functional Area	**$27.3**	**$29.0**	**$33.2**	**$29.2**	**$39.5**
1A09	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact	$16.6	$22.0	$22.0	$22.0	$36.0
2A04	Next Generation Weather Radar (NEXRAD)	$3.3	$1.2	$1.3	$1.2	$1.3
2A14	Weather and Radar Processor (WARP)	$0.5	$0.7	$0.0	$0.0	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) - Provide	$2.5	$2.6	$0.0	$0.0	$0.0
2B19X	Integrated Terminal Weather System (ITWS)*	$0.0	$1.3	$9.7	$5.9	$2.0
2C03	Weather Camera Program	$4.4	$1.2	$0.2	$0.1	$0.2

Figure 33 Expenditures in the Weather Functional Area[6]

[6] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

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, electric power generators, 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 2013 and beyond to upgrade buildings and infrastructure such as roads. Annual funding is provided to reconfigure the research laboratories to accommodate acceptance testing for new equipment and to test modifications to existing equipment.

There are two budget line items for tower and TRACON investments, which have significant funding. The first is the Terminal Air Traffic Control Facilities – Replace program, which includes funding for both airport traffic control towers (ATCT) and TRACON facilities. This line item funds replacement of existing towers and TRACONs and construction of towers for new airports. In most years, there are between 10 and 20 projects in progress to replace towers that are either too small to handle the traffic growth that has occurred since they were built or have inadequate visibility. 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 upgrades and improves Air Route Traffic Control Center (ARTCC) facilities by replacing heating and cooling systems, upgrading electrical power distribution systems and providing other facility needs to meet mission requirements.

The FAA is evaluating the design and configuration of future NextGen facilities to support the planned NextGen improvements and the potential changes in airspace that these facilities control. It is important that these NextGen facilities are sized correctly so that the full benefits of the NextGen Architecture can be realized. The potential benefits include accommodating NextGen capabilities such as Integrated Arrival and Departure Services, High Altitude Generic En Route Services, Flexible Airspace Management, Staffed NextGen Towers, and integrated business continuity services. An investment analysis is in process for Segment 1 which addresses the New York to Chicago corridor.

Figure 34 shows the planned expenditures for facilities programs for the air traffic control system. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Facilities Functional Area	**$448.5**	**$552.6**	**$559.2**	**$625.2**	**$641.5**
1A03	William J. Hughes Technical Center Facilities	$11.5	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$8.0	$6.0	$8.1	$9.2	$10.3
1A13	Next Generation Air Transportation System (NextGen) - System Networked Facilities	$11.0	$11.0	$11.0	$11.0	$11.0
1A14	Next Generation Air Transportation System (NextGen) - Future Facilities	$95.0	$92.5	$95.7	$157.9	$172.3
2A05	ARTCC Building Improvements/Plant Improvements	$46.0	$52.4	$52.4	$62.4	$62.4
2B06	Terminal Air Traffic Control Facilities - Replace	$64.9	$108.0	$109.0	$110.0	$110.0
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$25.2	$52.7	$52.7	$52.7	$52.7
2C02	Alaska Flight Service Facility Modernization (AFSFM)	$2.9	$2.9	$2.9	$2.0	$2.0
2E01	Fuel Storage Tank Replacement and Monitoring	$6.6	$6.7	$6.8	$6.8	$6.0
2E02	Unstaffed Infrastructure Sustainment	$18.0	$32.6	$32.9	$33.3	$34.4
2E06	Facilities Decommissioning	$5.0	$5.0	$5.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$85.0	$100.0	$100.0	$100.0	$100.0
2E09	FAA Employee Housing and Life Safety Shelter System Services	$2.5	$2.5	$0.0	$0.0	$0.0
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A05	Facility Security Risk Management	$14.2	$15.0	$15.1	$15.0	$15.1
3A09	Data Center Optimization	$1.0	$0.0	$0.0	$0.0	$0.0
3A13	Mobile Assets Management Program	$1.7	$3.0	$4.0	$0.0	$0.0
3B01	Aeronautical Center Infrastructure Modernization	$12.5	$12.3	$13.1	$14.1	$14.0
4A04	Mike Monroney Aeronautical Center Leases	$17.5	$17.9	$18.4	$18.8	$19.3

Figure 34 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 efforts and simulate the improvements of implementing new concepts and new equipment on air traffic management. 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

[7] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

programs on schedule, including programs with equipment deliveries and those associated with relocation and/or removal of equipment. The Transition Engineering Support 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.

Figure 35 shows planned expenditures for specific mission support programs. Expenditures are in Millions of Dollars.

BLI Number	Program Name	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
	Mission Support Functional Area	**$305.9**	**$308.3**	**$312.5**	**$307.7**	**$308.0**
1A01	Advanced Technology Development and Prototyping (ATDP)	$33.1	$26.7	$32.2	$29.4	$33.3
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$26.0
2B15	Remote Monitoring and Logging System (RMLS) Technology Refresh	$4.7	$1.0	$2.2	$1.1	$1.9
2E03	Aircraft Related Equipment Program	$10.1	$10.4	$9.0	$11.4	$9.0
2E08	Aircraft Fleet Modernization	$2.1	$0.0	$0.0	$0.0	$0.0
2E10X	Independent Operational Test/Evaluation*	$0.0	$3.5	$3.5	$3.5	$3.5
3A03	Logistics Support Systems and Facilities (LSSF)	$10.0	$10.0	$0.2	$0.0	$1.1
3A06	Information Security	$14.0	$12.0	$12.0	$12.0	$12.0
3A10	Aerospace Medical Equipment Needs (AMEN)	$3.0	$5.0	$0.0	$2.5	$0.0
3A12	National Test Equipment Program	$2.0	$2.0	$2.0	$2.0	$0.0
3B02	Distance Learning	$1.5	$1.0	$1.0	$1.0	$1.0
4A01	System Engineering and Development Support	$35.0	$35.6	$36.2	$35.0	$35.0
4A02	Program Support Leases	$40.9	$42.1	$55.2	$56.7	$58.2
4A03	Logistics Support Services (LSS)	$11.5	$11.5	$11.5	$11.0	$11.0
4A05	Transition Engineering Support	$14.0	$16.5	$16.5	$15.0	$15.0
4A06	Technical Support Services Contract (TSSC)	$23.0	$25.0	$25.0	$25.0	$25.0
4A07	Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$0.0	$0.0
4A08	Center for Advanced Aviation System Development (CAASD)	$70.0	$75.0	$75.0	$75.0	$75.0

Figure 35 Expenditures in the Mission Support Functional Area[8]

[8] * BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget. FY 2014 – 2017 Out-year funding amounts are estimates.

5 Conclusion

The airline industry is still adjusting to economic conditions beyond its control, but travel demand growth is expected. Average yield is increasing and additional fees appear to have returned the industry to profitability. Flight operations increased only marginally in 2010 and decreased slightly in 2011. The decrease was caused by airline adjustments in the service offered; however, demand is expected to increase and the ability to absorb it with higher load factors and larger aircraft may soon reach its limits.

Economic growth appears to be on an up-trend. 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 by 2025.

The near-term leveling in operations may suggest that we could defer system modernization, but there are several reasons why that course of action would be detrimental. 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 in its 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.

In addition to operational considerations, 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, outcomes, and performance metrics.
- Associates CIP programs with strategic outcomes and performance metrics.

Appendix B
- Provides CIP program descriptions and the relationship of programs to strategic goals.
- Describes the programs contribution to meeting the performance metric.
- Lists performance output goals for FY 2013–2017.
- Shows system implementation schedules.

Appendix C
- Provides estimated expenditures from FY 2013 through FY 2017 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.

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix A

Fiscal Years 2013 – 2017

APPENDIX A

GOAL MATRIX

The Capital Investment Plan (CIP) programs have been aligned to the goals, outcomes, and performance metrics in the Federal Aviation Administration (FAA) Strategic Plan, Destination 2025. Many FAA programs will contribute to more than one goal, outcome, or performance metric; however the program linkages in the CIP (Appendix A and B) are aligned to a single goal, outcome, and performance metric where a program's contribution is most significant. Only CIP programs with Fiscal Year (FY) 2013-2017 funding are included in Appendix A, B, and C.

The FAA's Strategic Plan has five Goals and the table below shows how they support DOT Goals.

FAA Strategic Goals	DOT Strategic Goals
1) Next Level of Safety	*Safety*
2) Workplace of Choice	*Organizational Excellence*
3) Delivering Aviation Access through Innovation	*State of Good Repair* *Economic Competitiveness* *Livable Communities*
4) Sustaining our Future	*Environmental Sustainability*
5) Improved Global Performance through Collaboration	*Economic Competiveness*

Each FAA Goal has Outcomes, Strategies and Performance Metrics identified in Destination 2025. Each program in the CIP is aligned with one Goal, Outcome and Performance Metric. Each Goal has several Outcomes that support the Goal and each Outcome may have one or more Performance Metric identified that will be used to measure accomplishment of the outcome and goal.

Since Destination 2025 is a long term strategic view, metrics are not focused on near term operational needs such as cost savings. Therefore, some metrics have been incorporated from other sources to account for the contribution of programs that support these near term operational needs. These metrics and their source are identified in the tables.

Programs are shown under their respective performance metric and each has the following information, FY 13 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 2013 President's Budget. These Programs/projects are new starts or future programs not currently in the President's budget but with planned funding within the FY 14-17 timeframe 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 outcomes and performance metrics to the CIP programs.

STRATEGIC GOAL

A general statement of the broad agency purpose in carrying out its mission, such as: "By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide."

OUTCOME

A statement of the desired improvement which will contribute to the overall goal, such as: "No accident-related fatalities on commercial service aircraft in the U.S."

PERFORMANCE METRIC

A quantifiable metric of the improvement in a goal area that sets a target for specific improvements in outcomes that affect FAA customers, such as: “Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over a 9-year period (2010-2018). No more than 6.2 in 2018.”

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1. STRATEGIC GOAL: NEXT LEVEL OF SAFETY

By achieving the lowest possible accident rate and always improving safety, all users of our aviation system can arrive safely at their destinations. We will advance aviation safety worldwide.

- **Outcome 1:** No accident-related fatalities on commercial service aircraft in the US.
  - **Performance Metric 1:** Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in 2018.

FY 2013 BLI	CIP #	CIP Name
1A01G	A28.01-01	Traffic Alert & Collision Avoidance System (TCAS)
1A01K	M08.32-03	Safety Analysis System
1A07G	G07M.02-01	NextGen – Safety, Security, Environment – System Dev – Systems Safety Mgmt Transformation
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
2E03X	M12.01-04	Airbus Simulator Purchase – Advanced Fly-By-Wire Simulator – Add'l Tech Refresh Projects
2E08	M11.02-01	Flight Standards Inspector Aircraft Replacement – Segment 2
3A02	A17.01-02	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 2
3A02X	A17.01-03	Aviation Safety Analysis System – Regulation and Certification Infrastructure System Safety (ASAS – RCISS) – Segment 3
3A07	A25.02-01	System Approach for Safety Oversight (SASO) – Phase 2A
3A07	A25.02-02	System Approach for Safety Oversight (SASO) – Phase 2B
3A08	A26.01-01	Aviation Safety Knowledge Management Environment (ASKME) Phase 2
3A10	M53.01-01	Aerospace Medical Equipment Needs (AMEN) – Tech Refresh Phase 1
3A10X	M53.01-02	Aerospace Medical Equip Needs (AMEN) – Tech Refresh Phase 2
3A11	G07A.02-01	NextGen – Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS)
3A14	A35.01-01	Aerospace Medicine Safety Information System (AMSIS)
4A09	G05A.02-05	CATM – Flight & State Data Mgmt – AIM Segment 2

- **Outcome 2:** Aviation risk is reduced through all phases of flight (gate-to-gate).
  - **Performance Metric 1:** Reduce Category A & B (most serious) runway incursions to a rate of no more than 0.395 per million operations, and maintain or improve thought FY 2013.

FY 2013 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) – Implementation

– **Performance Metric 2:** Ensure no cyber security event significantly degrades or disables a mission critical FAA system.

FY 2013 BLI	CIP #	CIP Name
3A06A	M31.00-00	Information Systems Security
3A06B	M31.03-01	Enterprise Information System Security (EISS)
3A06C	M31.04-01	FAA Identity and Access Management (FIAM)
3A09	F30.01-01	Data Center Optimization

– **Performance Metric 3:** 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 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Measure.

– **Performance Metric 4:** Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent. (FAA Business Planning Metric)

FY 2013 BLI	CIP #	CIP Name
3A04	C18.00-00	Command & Control Communications (C3)

- **Outcome 3:** There is a reduction in the general aviation fatal accident rate.

– **Performance Metric 1:** Reduce the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.

FY 2013 BLI	CIP #	CIP Name
2C01	A34.01-01	Future Flight Service Program
2C03	M08.31-01	Weather Camera Program – Segment 1
2C03X	M08.31-02	Weather Camera Program – Future Segments
2D03A	N12.01-00	Wide Area Augmentation System (WAAS)
2D03B	N12.01-06	Wide Area Augmentation System (WAAS) – Surveys
2E05	C17.02-01	Alaskan Satellite Telecommunication Infrastructure (ASTI)

- **Outcome 4:** There are no fatal accidents on certificated airports.

– **Performance Metric 1:** Implement 40 percent of mitigating strategies for the top 5 airport risk areas.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 5:** There are no fatalities resulting from commercial space launches.
  - **Performance Metric 1:** No fatalities, serious injuries, or significant property damage to the uninvolved public during licensed or permitted space launch and reentry activities.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

2. STRATEGIC GOAL: WORKPLACE OF CHOICE

We will create a workplace of choice marked by integrity, fairness, diversity, accountability, safety and innovation. Our workforce will have the skills, abilities, and support systems required to achieve and sustain NextGen.

- **Outcome 1:** FAA has the right people with the right skills in the right position at the right time to achieve our goals.
  - **Performance Metric 1:** Achieve a 90% success rate in the areas of financial management and human resources management: Receive annual Unqualified Audits with no material weaknesses; Maintain the competitive status of all FAA employees within the federal personnel system; Improve the "effective leadership" index score on the OPM Employee Viewpoint survey by 8 percent; Improve the "talent management" index score on the OPM Employee viewpoint survey by 8 percent.

FY 2013 BLI	CIP #	CIP Name
2D11	N12.03-01	GPS Civil Requirements

- **Outcome 2:** FAA is widely recognized as an employer of choice.
  - **Performance Metric 1:** The FAA is rated in the top 25 percent of places to work in the federal government by employees.

FY 2013 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

- **Outcome 3:** FAA workplace reflects the diversity of the nation.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** FAA provides the safest and most secure facilities in which our employees and equipment operate.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

3. STRATEGIC GOAL: DELIVERING AVIATION ACCESS THOUGH INNOVATION

Enhance the flying experience of the traveling public and other users by improved access to and increased capacity of the nation's aviation system. Ensure airport and airspace capacity are more efficient, predictable, cost effective and matched to public needs.

- **Outcome 1:** System capacity and user demands are matched to ensure reliable, predictable and cost-effective air navigation and airport services.

  – **Performance Metric 1:** Optimize airspace and Performance Based navigation (PBN) procedures to improve efficiency an average of 10 percent across core airports by 2018.

FY 2013 BLI	CIP #	CIP Name
1A15	G05N.01-01	NextGen – Collaborative ATM (CATM) – NextGen Performance Based Navigation - Metroplex Area Navigation (RNAV)/Required navigation Performance (RNP)

  – **Performance Metric 2:** Achieve a 5 percent reduction in average taxi-time at Core airports, identified by the Future Airport Capacity Task 3 (FACT 3) for surface traffic management.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

  – **Performance Metric 3:** Improve flight predictability by reducing variances in flying time between core airports based on a 2012 baseline.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

  – **Performance Metric 4:** Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013. (DOT Strategic Metric)

FY 2013 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	M08.28-04	Airspace Management Program (AMP) – ATDP
1A01E	M46.01-01	Strategy and Evaluation
1A01H	M52.01-01	Operational Modeling Analysis and Data
1A05	G01C.01-01	NextGen – Data Communications – Segment 1a/1b
1A06	G08M.01-01	NextGen – Demonstrations and Infrastructure Development
1A07A	G01M.02-01	NextGen – System Dev – ATC/Tech Ops Human Factors
1A07B	G01M.02-02	NextGen – System Dev – New ATM Requirements
1A07C	G01M.02-03	NextGen – System Dev – Ops Concept Validation Modeling
1A07D	G03M.04-01	NextGen – System Dev – Staffed NextGen Towers (SNT)

FY 2013 BLI	CIP #	CIP Name
1A07F	G06M.02-02	NextGen – System Dev – Wake Turbulence Re-Categorization
1A08A	G01A.01-01	NextGen – TBO – Separation Mgmt – Modern Procedures
1A08B	G01A.02-02	NextGen – TBO – Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt
1A08X	G01A.02-03	NextGen – TBO – Trajectory Mgmt – Conflict Advisories
1A09A	G04W.02-01	NextGen – RWI – Weather Observation Improvements
1A09B	G04W.03-01	NextGen – RWI – Weather Forecast Improvements
1A10A	G02A.01-01	NextGen – HD – Trajectory Mgmt – Surface Tactical Flow
1A10B	G02A.01-02	NextGen – HD – Trajectory Mgmt – Surface Conformance Monitor
1A10C	G02A.01-06	HD Trajectory Mgmt – Time Based Flow Management (TBFM) Work Package 3
1A11A	G05A.01-01	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Integration
1A11B	G05A.01-02	NextGen – CATM – Flow Control Mgmt – Strategic Flow Mgmt Enhance
1A11C	G05A.02-01	NextGen – CATM – Flight & State Data Mgmt – Common Status & Structure Data
1A11D	G05A.02-02	NextGen – CATM – Flight & State Data Mgmt – Advanced Methods
1A11E	G05A.02-03	NextGen – CATM – Flight & State Data Mgmt – Flight Object
1A11F	G05A.02-04	NextGen – CATM – Flight & State Data Mgmt – Concept Dev for Integrated NAS Design and Procedure Planning
1A11G	G05M.02-01	NextGen – CATM – Collaborative Information Management (CIM)
1A11H	G05M.03-01	NextGen – CATM – Sys Dev – Information Management
1A12A	G06A.01-01	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Departures (WTMD)
1A12B	G06A.01-02	NextGen – FLEX – Separation Mgmt – Wake Turbulence Mitigation for Arrivals (WTMA)
1A12C	G06A.02-01	NextGen – FLEX – Surface/Tower/Terminal Systems Engineering
1A12D	G06C.01-01	FLEX – Flight & State Data Mgmt – Future Comm Infra
1A12E	G06N.01-01	NextGen – FLEX – Separation Mgmt – Approaches, Ground Based Augmentation System
1A12F	G06N.01-02	NextGen – FLEX – Separation Mgmt – Closely Spaced Parallel Rwy Ops
1A12G	G06N.01-03	NextGen – FLEX – Separation Mgmt – Approaches, NextGen Nav Init
1A12I	G06N.02-01	NextGen – FLEX – Trajectory Mgmt – Arrivals
1A12J	G06N.02-02	FLEX – Trajectory Mgmt – Reduced RVR Minima
1A14	G03F.01-01	FAC – Future Facilities Investment Planning
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
2A12B	G05C.01-06	NextGen – CATM System Wide Info Management (SWIM) – Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW)
2A16X	G08M.03-02	Colorado WAM – MLAT Services
2A17	G02A.01-03	HD Trajectory management – Time Based Flow Management (TBFM) Work Package 2
2A17X2	G02A.01-07	HD Trajectory Mgmt – TBFM – Tech Refresh
2B04	A04.07-01	Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 1

2B04	A04.07-02	Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 2
2B18	G06A.03-01	NextGen – FLEX – Terminal Flight Data Manager (TFDM)
2D02	N03.01-00	Instrument Landing Systems (ILS)
2D06	N09.00-00	Sustain Distance Measuring Equipment (DME)

– **Performance Metric 5:** Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013. (DOT Strategic Metric)

FY 2013 BLI	CIP #	CIP Name
2A06	A05.01-12	TFM-Infrastructure Modernization – Tech Refresh
2A10	A10.03-00	Advanced Technologies and Oceanic Procedures (ATOP)
2A13	G02S.01-01	Automatic Dependent Surveillance – Broadcast (ADS-B) – National Implementation – Segment 1 and 2
2A13X	G02S.01-02	Automatic Dependent Surveillance Broadcast (ADS-B) – Future Segment
2A15	G05A.05-01	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2
2A15	G05A.05-02	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3
2A15X	G05A.05-03	Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4
2D10	N04.02-00	Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI)
4A08	M03.02-00	CIP Systems Engineering & Technical Assistance – MITRE

- **Outcome 2:** System capacity, performance and predictability are maintained during adverse weather.

– **Performance Metric 1:** Improve throughput at core airports during adverse weather by 14 percent by 2018.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 3:** Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.

– **Performance Metric 1:** Increase throughput at core airports by 12 percent to reduce delays by 27 percent using a 2009 operations baseline.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

– **Performance Metric 2:** Maintain operational availability of the National Airspace System (NAS) at 99.7 percent. (DOT Strategic Metric)

FY 2013 BLI	CIP #	CIP Name
1A12H	G06N.01-06	NextGen – Separation Management – Alternative Positioning Navigation and Timing (APNT)
2A03	A01.12-02	En Route Communication Gateway – Technology Refresh

FY 2013 BLI	CIP #	CIP Name
2A04	W02.02-01	NEXRAD – Legacy, Icing & Hail Algorithms
2A04X	W02.02-02	NEXRAD – Service Life Extension Program (SLEP)
2A05	F06.01-00	ARTCC Plant Modernization/Expansion – ARTCC Modernization
2A07	C06.01-00	Communications Facilities Enhancement – Expansion
2A08	S04.02-03	LRR Improvements – Infrastructure Upgrades/Sustain
2A09	C01.02-04	Voice Switching and Control System (VSCS) – Tech Refresh – Phase 3
2A11	C21.01-01 C21.02-01	Next-Generation VHF A/G Communication System (NEXCOM) – Segment 1a and Segment 2 Phase 1 of 2
2A14	W04.03-01	Weather and Radar Processor (WARP) Sustain
2B03	A04.01-01	Standard Terminal Automation Replacement System – Technical Refresh (TAMR Phase 1)
2B03	A04.01-02	Standard Terminal Automation Replacement System – Terminal Enhancements (TAMR Phase 1)
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	S03.01-09	ASR-9 SLEP – Phase 2 and 3
2B10	S03.01-10	ASR-9 SLEP – Antenna Raises and UPS Establishments
2B11B	S03.02-06	Terminal Radar (ASR) Program – ASR-11 – Mobile Airport Surveillance Radar (MASR)
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
2B15A	M07.04-01	Remote Monitoring and Logging System (RMLS) – National Remote Maintenance Monitoring (RMM) Network (NRN
2B15B	M07.05-01	Automated Maintenance Management System (AMMS)
2B15X	M07.04-02	Remote Monitoring and Logging System (RMLS) – Tech Refresh
2B16	S03.01-08	MODE S SLEP, Phase 2 and 3
2B17	S13.01-01	Surveillance Interface Modernization (SIM)
2B19X	W07.01-02	ITWS – Technical Refresh & Disposition
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
2E03A	M12.00-00	Aircraft Related Equipment Program
2E04	F10.00-00	Airport Cable Loop Systems Sustained Support
2E07	F11.01-01	Power Systems Sustained Support
3A03	M21.04-01	Logistics Center Support System (LCSS)
3A03X	M21.04-02	Logistics Support Systems & Facilities (LSSF) – Logistics Center Support

FY 2013 BLI	CIP #	CIP Name
		System (LCSS) – Technical Refresh
3A05	F24.01-02	Facility and Infrastructure Security Program
3A12	M17.01-01	National Test Equipment Program
3A13	F31.01-01	Mobile Assets Management Program

– **Performance Metric 3:** Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings. (FAA Business Planning Metric)

FY 2013 BLI	CIP #	CIP Name
1A01I	M08.46-01	Unified Contracting System
1A01J	M29.01-01	Workforce Scheduling Tool
1A02 / 1A03	F14.00-00	System Support Laboratory Sustained Support
1A04	F16.00-00	William J. Hughes Technical Center Building and Plan Support
1A13A	G03M.02-01	NextGen – FAC Integration, Development, and Operations Analysis Cap.
1A13B	G03M.03-01	NextGen – Test Bed Demonstration
2A12	G05C.01-01	System-Wide Information Management (SWIM) – Segment 1
2A12X	G05C.01-04	System Wide Information Management (SWIM) – Segment 2
2B11A	S03.02-04	Terminal Radar (ASR) Program – ASR-11 – Tech Refresh – Segment 1
2B11X	S03.02-05	Terminal Radar (ASR) Program – ASR-11 – Tech Refresh – Segment 2
2D08	A14.02-02	Instrument Flight Procedures Automation (IFPA) – Tech Refresh
2D08X	A14.02-03	Instrument Flight Procedures Automation (IFPA) – Tech Refresh, Segment 2
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
4A05A	M22.00-00	NAS Integration Support Contract (NISC)
4A05B	M03.01-02	Configuration Management Automation (CMA)
4A06	M02.00-00	Technical Support Services Contract (TSSC) Program

- **Outcome 4:** NextGen capabilities are fully implemented and utilized based on U.S. aviation community system needs.
  - **Performance Metric 1:** Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.

FY 2013 BLI	CIP #	CIP Name
1A01F	M47.01-01	Dynamic Capital Planning
4A07	M08.14-00	Resource Tracking Program (RTP)

- **Outcome 5:** Safety, funding, airport infrastructure and environmental issues are advanced and leveraged by full utilization of NextGen capabilities.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 6:** The general aviation airport system supports the full range of functions for remote populations and emergency response capabilities.
  - **Performance Metric 1:** Ensure Localizer Performance with Vertical (LPV) or Localizer Performance (LP) procedures are available at 5,218 runways in the NAS by 2018.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

4. STRATEGIC GOAL: SUSTAINING OUR FUTURE

To develop and operate an aviation system that reduces aviation's environmental and energy impacts to a level that does not constrain growth and is a model for sustainability.

- **Outcome 1:** U.S. aviation sector is a model for sustainable growth.
  - **Performance Metric 1:** One billion gallons of renewable jet fuel is used by aviation by 2018.
  - **Performance Metric 2:** A replacement fuel for leaded aviation gasoline is available by 2018 that is usable by most general aviation aircraft.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support these Metrics.

  - **Performance Metric 3:** Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.

FY 2013 BLI	CIP #	CIP Name
1A07E	G06M.02-01	NextGen – Systems Dev – Environment & Energy – Environmental Mgmt Sys & Noise/Emission Reduction
1A07H	G07M.02-02	NextGen – Systems Dev – Operational Assessments

- **Outcome 2:** Community noise concerns are not a significant constraint on growth.
  - **Performance Metric 1:** The U.S. population exposed to significant aircraft noise around airports has been reduced to less than 300,000 persons.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 3:** Aviation emissions do not contribute to significant adverse health impacts.
  - **Performance Metric 1:** Aviation emissions contribute 50 percent less to significant health impacts and are on a trajectory for carbon neutral growth using a 2005 baseline.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** Aviation's carbon footprint does not become a constraint to growth.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 5:** Aviation operations have no significant adverse effect on water and air quality.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 6:** Airports will be environmentally and economically sustainable.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

5. STRATEGIC GOAL: IMPROVE GLOBAL PERFORMANCE THROUGH COLLABORATION

Goal: Achieve enhanced safety, efficiency, and sustainability of aviation around the world. Provide leadership in collaborative standard setting and creation of a seamless global aviation system.

- **Outcome 1:** Reduce aviation accidents and fatalities worldwide.
  - **Performance Metric 1:** World-wide fatal aviation accident rate declines 10 percent compared to 2010.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 2:** Achieve seamless operations integrating advanced technologies and capabilities through harmonized air navigation approaches.
  - **Performance Metric 1:** None.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 3:** Reduce aviation's environmental footprint internationally.
  - **Performance Metric 1:** States representing 85 percent of international activity are taking actions to contribute to ICAO's 2 percent global annual fuel efficiency improvement goal by 2018.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

- **Outcome 4:** Provide effective global air navigation capacity.
  - **Performance Metric 1:** 40 percent of all commercial aircraft from the top 25 aviation states are using fully interoperable NextGen technologies and capabilities by 2018.

FY 2013 BLI	CIP #	CIP Name
		Currently no Capital programs are required to support this Metric.

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Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix B

Fiscal Years 2013 – 2017

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APPENDIX B

DETAILED PROGRAM PLAN DATA

LINKING FAA CIP PROGRAMS TO GOALS

The Capital Investment Plan (CIP) programs support the goals, outcomes, and performance metrics in the Federal Aviation Administration (FAA) Strategic Plan and the Department of Transportation's (DOT) strategic plan. Programs are linked to a single outcome and the data provided in Appendix B describes how these programs contribute to the performance metric under those outcomes. For each program output goals are described for the 5 years of this CIP, and, if the CIP program 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) 2013 President's submission to Congress. Several CIP programs may be included in one BLI. In those cases when all of the CIP programs pertain to one specific purpose, they are grouped. However, when the CIP programs have different purposes, they are described with separate CIP entries.

Programs in Appendix B contain a Program Description and Relationship to Performance Metric description. FY 2013 through 2017 Performance Output Goals for all Capital funded CIP programs are reported as outlined below. To support FAA's Business Plan development and management CIP Performance Output Goals will be separated for FY13 through FY17. The example below shows the new format.

BLI numbers with an X (i.e., 1A09X) or program titles with X before the name (X, NEXRAD – Technical Refresh, W02.02-02) are used to designate programs that are not in the FY 2013 President's Budget (ATO and Safety and Operations Capital) but are planned for future years. Accordingly, their inputs are reflected as follows:

- Programs 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 are required to reflect FY 2013-2017 Performance Output Goals, with the exception of the following:

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

Where, 'None' is reflected in the FY 2013-2017 Performance Output Goals sections, it denotes that no funding was allocated for that fiscal year.

EXAMPLE

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

2B12, RUNWAY STATUS LIGHTS (RWSL)
FY 2013 Request $35.3M

- Runway Status Lights (RWSL) – Implementation, 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….

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Reduce Category A & B (most serious) runway incursions to a rate of no more than 0.395 per million operations, and maintain or improve thought FY 2013.*

Relationship to Performance Metric

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 they cross the hold line or an aircraft begins its takeoff. The FY 2014 RWSL projected benefits include a reduction in cumulative A&B runway incursions at the 23 RWSL airports by ~17% (from 9.68 in baseline to 8.02 with RWSL); and a reduction in cumulative runway incursions caused by Pilot Deviations by ~22% (from 41.03 in baseline to 32.17 with RWSL).

Program Plans FY 2013 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Complete installation at 2 of 23 operational sites.
- Achieve IOC at 3 of 23 (43%).

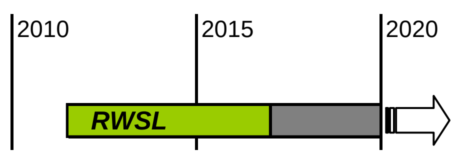
Program Plans FY 2014 – Performance Output Goals
- Start construction at 4 of 23 operational sites.
- Complete installation at 2 of 23 operational sites.
- Achieve IOC at 3 of 23 (57%) operational sites.

Program Plans FY 2015 – Performance Output Goals
- Start construction at 4 of 23 operational sites.
- Complete installation at 6 of 23 operational sites.
- Achieve IOC at 2 of 23 (65%) operational sites.

Program Plans FY 2016 – Performance Output Goals
- Complete installation at 1 of 23 operational sites.
- Achieve IOC at 8 of 23 (100%) operational sites.
- Achieve last site ORD at 23rd airport, September 2016.

System Implementation Schedule

Runway Status Lights (RWSL)
First site IOC: July 2011 -- Last site IOC: August 2016



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ACTIVITY 1: ENGINEERING, DEVELOPMENT, TEST AND EVALUATION

1A01, ADVANCED TECHNOLOGY DEVELOPMENT AND PROTOTYPING (ATDP)

FY 2013 Request $33.1M

- 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, Airspace Management Program (AMP) – ATDP, M08.28-04
- E, Strategy and Evaluation – ATDP, M46.01-01
- F, Dynamic Capital Planning, M47.01-01
- G, Traffic Alert and Collision Avoidance System (TCAS), A28.01-01
- H, Operational Modeling Analysis and Data, M52.01-01
- I, Unified Contracting System (UCS), M08.46-01
- J, Workforce Scheduling Tool, M29.01-01
- K, Safety Analysis System, M08.32-03

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 Destination 2025, research emphasis will remain on technologies that provide for direct safety indications and alerts 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 (RWSL) technology enhancements such as Runway Intersection Lights (RIL) logic, Light Emitting Diode (LED) technology, Low Cost Ground Surveillance (LCGS) pilot sites, Runway Safety Assessment (RSA) studies, Final Approach Runway Occupancy Signal (FAROS) and Enhanced Final Approach Runway Occupancy Signal (eFAROS) 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Reduce Category A & B (most serious) runway incursions to a rate of no more than 0.395 per million operations, and maintain or improve thought FY 2013.*

Relationship to Performance Metric

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 explore other technologies that further support the performance metric.

Program Plans FY 2013 – Performance Output Goals
- Complete initial draft of LCGS Business Case Analysis Report (BCAR).
- Complete report of technical assessment and user evaluations of LCGS test bed and four (4) LCGS pilot systems.
- Complete initial RWSL RIL requirements documents for Runway Intersection Lights (RELs).
- Complete development of the interface required for activation of direct to pilot indications using the LCGS platform as the sensor.
- Complete initial system integration of the interface developed for activation of direct to pilot alerting safety logic using the LCGS platform as the sensor.
- Publish OpEval and luminosity assessment of San Diego (SAN) LED fixtures.
- Publish initial Cost-Benefit Analysis for eFAROS.
- Publish initial Preliminary Requirements document for eFAROS.
- Install and implement eFAROS units at Boston (BOS) or SAN prototype location.
- Publish report on Human-in-the-Loop (HITL) testing scenario to evaluate direct to cockpit indications and/or alerts of potential or occurring runway incursions.

Program Plans FY 2014 – Performance Output Goals
- Complete annual report on user evaluations and technical evaluation of RWSL test beds.
- Complete annual report on user evaluations and technical evaluation of pilot LCGS systems.
- Complete report on results of initial shadow operations testing of Runway Incursion (RI) prevention logic using LCGS surveillance input.
- Complete report on cockpit simulations at MITRE CAASD HITL testing Human Factors (HF), safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete initial study on evaluation and testing of camera, acoustic, or other emerging runway incursion detection and prevention system proposed for eventual deployment in the NAS.
- Complete report on testing of safety logic enhancements to RI detection and prevention products.
- Complete initial requirements document for eFAROS.
- Complete preliminary report on D-Lighting Application (surveillance integration).
- Complete report on initial Runway Excursion data collection and analysis.

Program Plans FY 2015 – Performance Output Goals
- Complete annual report on user and technical evaluations of RWSL test beds.
- Complete report on evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS.
- Complete report on testing of safety logic enhancements to RI detection and prevention products or procedures.
- Complete initial study for demonstration and testing of emerging direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD HITL testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Develop D-Lighting Application modeling and testing plan.
- Complete development of Runway Excursion modeling and testing.

Program Plans FY 2016 – Performance Output Goals
- Complete annual report of user and technical evaluation of RWSL test beds.
- Complete report on evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS.
- Complete test report on safety logic enhancements to any RI detection and prevention products or procedures.
- Complete test plan for demonstration and testing of emerging direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD HITL testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete initial prototype of D-Lighting Application.
- Complete initial Fiber Optics prototype surveillance test plan.

Program Plans FY 2017 – Performance Output Goals
- Complete annual report of user and technical evaluation of RIRP test beds.
- Complete report on evaluation and testing of emerging RI prevention technology for eventual deployment in the NAS.
- Complete test report on safety logic enhancements to RI detection and prevention products or procedures.
- Complete annual report for development, demonstration and testing of a direct to cockpit indication and alerting capability.
- Complete annual report documenting results of cockpit simulators at MITRE CAASD HITL testing HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications.
- Complete initial Fiber Optics prototype surveillance evaluation report.
- Complete initial D-Traffic Application ConOps development.

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

Program Description

The System Capacity, Planning, and Improvements program provides data and analyses on NAS operations to FAA executives and managers to help them identify deficiencies and develop proposals to improve NAS performance.

This work includes:
- Airport modeling and analysis using actual data collected from ATC systems in the field to determine the value of potential improvements in airspace or airfield modifications,
- Enhancements of the Performance Data Analysis and Reporting System (PDARS) which is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the Air Traffic Control (ATC) system and their environmental impacts. The PDARS also provides operational data to baseline the measurement and analysis of NextGen capability improvements.
- Development of new Agency level metrics to enhance management awareness of, and response to, system performance,
- Sponsor operations research to evaluate concepts to improve future NAS performance in support of the Destination 2025 Science, Technology, Engineering and Math (STEM) strategic initiative, and,
- The benchmarking of ATO performance with other Air Navigation Service Provider (ANSP) to support joint projects done as part of ICAO, Civil Air Navigation Services Organization (CANSO) or Aerospace Transportation Advisory Group (ATAG) work plans. These efforts are performed to respond to inquiries on global flight efficiency performance targets for ATM or more general inquiries on the overall flight inefficiency that may be attributed to ATM.

This program also sponsors NAS performance 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. It has the added capability of using its performance measurement systems and operations research to quantify the efficiency of the NAS and form the basis of proposals for overall system improvements.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

This program will facilitate the modeling, measurement 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 2013 – Performance Output Goals
- Complete PDARS connectivity with ASDE-X at all Core Airports.
- Transition PDARS communication links to the FTI network.
- Initiate connectivity to ERAM and ADS-B.
- Complete planning phase to Integrate Ocean 21data into a full automated gate-to-gate analysis capability.
- Conduct operations research tasks to support the Destination 2025 STEM strategic initiative.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Prepare annual report on joint capacity and performance modeling and analysis with EUROCONTROL.

Program Plans FY 2014 – Performance Output Goals
- Complete PDARS connectivity with ASDE-X at other key locations.
- Complete PDARS conversion to the FTI network.
- Complete PDARS connectivity to ERAM (10 sites) and other NextGen technologies.
- Initiate integration of Ocean 21 data into a full automated gate-to-gate analysis capability.
- Expand PDARS analysis capabilities to evaluate NextGen technology demonstrations as they come on line.
- Incorporate noise profiling technology via the Aviation Environmental Design Tool (AEDT) module.
- Conduct operations research tasks to support the Destination 2025 STEM strategic initiative.
- Prepare annual report on joint capacity and performance modeling and analysis with EUROCONTROL.

Program Plans FY 2015 – Performance Output Goals
- Complete PDARS connectivity to ERAM (10 sites).
- Complete PDARS connectivity to ADS-B and other NextGen technologies.
- Provide PDARS baseline data for before/after analysis of NextGen programs.
- Complete integration of Ocean 21 data into a full automated gate-to-gate analysis capability.
- Complete noise profiling technology via the AEDT module.
- Conduct operations research tasks to support the Destination 2025 STEM strategic initiative.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.
- Prepare annual report on joint capacity and performance modeling and analysis with EUROCONTROL.

Program Plans FY 2016 – Performance Output Goals
- Develop concept of operations to convert PDARS into a net centric system.
- Provide airport capacity modeling and annual service volume analysis report to support the Future Airport Capacity Task (FACT) report
- Conduct operations research tasks to support the Destination 2025 STEM strategic initiative.
- Prepare annual report on joint capacity and performance modeling and analysis with EUROCONTROL.
- Prepare white paper on methodologies to standardize international measurement of system capacity, through put, predictability and efficiency.

Program Plans FY 2017 – Performance Output Goals
- Design and implement PDARS into a net centric system.
- Complete FACT report with airport capacity modeling and annual service volume analysis.
- Conduct operations research tasks to support the Destination 2025 STEM strategic initiative.
- Prepare annual report on joint capacity and performance modeling and analysis with EUROCONTROL.
- Conduct a workshop to examine development and coordination of international standardized measurement of system capacity, through put, predictability and efficiency.
- Produce Bi-Annual Joint Performance Benchmark Report with EUROCONTROL.

C, Operations Concept Validation and Infrastructure Evolution – ATDP, M08.29-00

Program Description

This program manages NAS evolution through management of NAS operational requirements and the NAS Operational Concept through the development, assessment, and refinement of NAS concepts to ensure feasibility and viability within the NAS. It develops NAS enterprise-level Operational Requirements to derive functional requirements. It allocates the operational requirements to operational improvements and identifies those existing operational requirements that either are subsumed into new NextGen operations or need to be sustained. It executes research, engineering analysis, and evaluation in support of mission analysis and investment analysis. This program conducts shortfall analyses as part of service analysis and ensures the linkage of proposed solutions back to validated operational needs to support budget planning and investment decisions.

Developing operational concepts is an Office of Management and Budget (OMB) recommended first step in developing an Enterprise Architecture. This program develops and validates NAS level 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 the NAS level concept of operations and detailed second level concepts that support validation and requirements development. Second level concepts identify the personnel and functional changes necessary for the FAA 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 FAA'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 2013 – Performance Output Goals
- Annual RTCA support.
- Develop and sustain cognitive / analytic models to support assessments of new air traffic control operational concepts.
- Coordinate concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Conduct operational concept development to include 2nd-level concepts, fast-time analyses and concept system design.
- Develop operational, information and performance requirements.

Program Plans FY 2014 – Performance Output Goals
- Annual RTCA support.
- Develop and sustain cognitive / analytic models to support assessments of new air traffic control operational concepts.
- Coordinate concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Conduct operational concept development to include 2nd-level concepts, fast-time analyses and concept system design.
- Develop operational, information and performance requirements.

Program Plans FY 2015 – Performance Output Goals
- Annual RTCA support.
- Develop and sustain cognitive / analytic models to support assessments of new air traffic control operational concepts.
- Coordinate concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Conduct operational concept development to include 2nd-level concepts, fast-time analyses and concept system design.
- Develop operational, information and performance requirements.

Program Plans FY 2016 – Performance Output Goals
- Annual RTCA support.
- Develop and sustain cognitive / analytic models to support assessments of new air traffic control operational concepts.
- Coordinate concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.
- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Conduct operational concept development to include 2nd-level concepts, fast-time analyses and concept system design.
- Develop operational, information and performance requirements.

Program Plans FY 2017 – Performance Output Goals
- Annual RTCA support.
- Develop and sustain cognitive / analytic models to support assessments of new air traffic control operational concepts.
- Coordinate concept development, validation, and measurement methodologies to support Single European Sky ATM Research (SESAR) Joint Undertaking.

- Develop concepts of use to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities.
- Conduct operational concept development to include 2nd-level concepts, fast-time analyses and concept system design.
- Develop operational, information and performance requirements.

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

Program Description

This legacy program supports increased efficiency 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. This program also provides support for Optimization of Airspace and Procedures in the Metroplex (OAPM) implementation activities.

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.

The purpose of the NY/NJ/PHL airspace redesign project is to increase the efficiency and reliability of the airspace structure and air traffic system while maintaining safety within the New York metropolitan area.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Airspace Redesign will increase system efficiency 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 2013 – Performance Output Goals

- Implement Western Corridor Airspace Redesign phase IV.
- Implement NY/NJ/PHL Redesign, final phases III and IV.
- Support implementation activities associated with the addition of eight ultra-high sectors that overly Fort Worth ARTCC (ZFW) existing high sectors.

Program Plans FY 2014 – Performance Output Goals
- Implement NY/NJ/PHL Redesign, final phases III and IV.

Program Plans FY 2015 – Performance Output Goals
- Implement NY/NJ/PHL Redesign, final phases III and IV.

Program Plans FY 2016 – Performance Output Goals
- Implement NY/NJ/PHL Redesign, final phases III and IV.

Program Plans FY 2017 – Performance Output Goals
- Implement NY/NJ/PHL Redesign, final phase III and IV.

E, 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

In order to achieve this and other capacity metrics, 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. Previously, the FAA relied 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 were not capable of analyzing the new technologies and procedures of NextGen, the Next Generation Air Transportation System. New models will be used for 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 2013 – Performance Output Goals

These new models will be used to support a number of analytical activities throughout the FAA, including:

- Updated NextGen benefits estimates for the NextGen Implementation Plan,
- Updated benefits estimates for the NextGen Segment Implementation Plans,
- NextGen avionics equipage operational incentive trade studies,
- NextGen avionics financial incentive trade studies,
- Target setting for Destination 2025 "Delivering aviation access through innovation" performance metrics, and
- Operational Improvement/Capability Capture Team benefits estimates.

Specific software improvements to the system-wide NAS model in this time frame include:

- Update Graphical User Interface (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, and
- Complete implementation of new airport capacity representation.

Program Plans FY 2014-2017 – Performance Output Goals

- None.

F, DYNAMIC CAPITAL PLANNING, M47.01-01

Program Description

Dynamic Capital Planning supports FAA acquisition programs by: tracking of NAS Plan schedules for all Capital Programs; determining and validating quantitative and qualitative economic value and internal benefits for capital programs; racking financial performance compared to approved baselines for all major programs; tracking of field implementation status by site of all NAS programs; and capitalizing NAS Plan installed equipment and final disposal of retired assets.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation.*
- *FAA Outcome 4 – NextGen capabilities are fully implemented and utilized in how US aviation community system needs are met.*
- *FAA Performance Metric 1 – Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.*

Relationship to Performance Metric

Dynamic Capital Planning helps capital programs maintain baselines by providing program tracking and analysis which leads to better baseline investment decisions and early identification of programs that are not performing so corrective actions can be implemented

G, 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.

This program will assess and characterize the safety and operational performance of current TCAS II via data extracted from the TCAS Resolution Advisory (RA) Monitoring System (TRAMS) and the TCAS Operational Performance Assessment (TOPA) program. This data will be instrumental for informing future research and development efforts surrounding the next generation of TCAS.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Define safety and operational performance criteria for future collision avoidance systems stemming from data extracted from TRAMS and TOPA program – Operational requirements are captured within a future Airborne Collision Avoidance System (ACAS) CONOPS and specifics are outlined in a requirements document.
- Sustain TRAMS capability while coordinating system transition to a service unit (i.e., with the Surveillance Broadcast Service (SBS) Monitor System).

Program Plans FY 2014-2017 – Performance Output Goals

- None.

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

Program Description

The Operational Modeling Analysis and Data program provides a central database of both models and corresponding inputs, assumptions and results of Air Traffic Organization (ATO) modeling activities. The ATO uses a variety of models of both the entire NAS and its component parts such as airports, 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Complete requirements document for operational modeling database.
- Acquire hardware and software for operational modeling database as defined in the requirements document.
- Develop list of models and supporting material for models to be placed on operational modeling database.

Program Plans FY 2014-2017 – Performance Output Goals

- Future activities will depend upon approval of funding by FAA management.

I, UNIFIED CONTRACTING SYSTEM, M08.46-01

Program Description

The Unified Contracting System (UCS) Program will unify the FAA procurement processes under one system that improves efficiency, reduces costs, standardizes work products, and eliminates redundant and paper-based processes. UCS will be an electronic and secure internet-based purchase card system that includes a contract lifecycle management system that automates contract formulation and execution (planning, pre-award, award, administration/post-award, and close-out). UCS will use a sophisticated Graphical User Interface (GUI) based toolset, which will allow future acquisitions process changes to be implemented by the FAA, with minimal external support. This automated system will provide accurate and timely acquisition data, electronic storage and retrieval of contractual documents and data, and management information reports, such as workload distribution and visibility into each contracting action through its lifecycle. UCS will be utilized at all FAA offices and organizations involved in procurements and will support contracts for CIP Projects.

UCS will be implemented in an iterative and modular approach. The modules will encompass some or all aspects of the following functionality:

- Automate manual procurement processes;
- Interface with the FAA's financial system, Oracle 12i, and;
- Replace the functionality used in FAA's current procurement funds obligation and commitment system (PRISM).

All requirements / functionality will be evaluated and receive a priority ranking, determining when each of the UCS modules will be developed and implemented. This modular approach is predicated on industries best practices (i.e., agile development). Each module will be developed, tested and deployed as a separate deliverable under the UCS Program. Specific functionality implemented and incorporated into the UCS program will include:

- Purchase card purchasing system (PCPS) – an automated process for purchase card usage Agency-wide;
- Pre-award Phase process automation (limited scope) – support contract actions with pre-qualified small business vendors providing services, as part of the FAA's eFAST Program;
- Transition from paper/manual procurement document and content management to electronic management;
- Automate procurement processes (e.g., routing / approvals) for all contract types and all procurement phases (e.g., planning, pre-award, post-award /administration, and close-out);
- Manage contract funds obligation and commitment system – processes contract financial information and coordinate with the FAA's financial system;
- Federal Procurement Data System Next Generation (FPDS-NG) interface – send required procurement data to FPDS-NG, a congressional database established to collect historical and statistical information about the government's procurements to understand how and where tax dollars are spent;
- Statement of Work (SOW) creator / generator;
- Contract writing / contract clause generator; and
- Contractor labor rates engine / repository – database for all contractor labor rates, allowing for improved accuracy in Independent Government Cost Estimate (IGCE) creation and contract rates negation.

The FAA currently uses a Lotus Notes software application for the PCPS. In the near term, the UCS program will replace the current PCPS and deliver improved capabilities in two phases. Phase 1 (IOC FY 2012) will replace all functionality currently in the Lotus Notes based PCPS, on the UCS Business Process Management (BPM) platform and Phase 2 (IOC FY 2013) will implement new functionality into PCPS (called PCPS2). Examples of new functionality include:

- Internet Accessibility.
- Reconciliation within the system using actual bank data.
- Standardized management and internal controls for all FAA accounts.
- Increased transparency and reporting capabilities.

The Pre-Award Phase (limited scope) module will be developed and deployed as part of the initial scaled down implementation of the FAA's UCS. It supports the FAA's procurement processes by providing an integrated, AMS-based system that uses automated workflow processes, functions, and standards. The limited scope of this module has the following limitations:

- Pre-Award phase procurement activities only include activities up to the point of award.
- It follows the procurement process based on the Electronic FAA Accelerated and Simplified Tasks (eFAST) program.*

* eFAST (a procurement vehicle) streamlines new contract awards through competition or direct awards to pre-qualified Small Business 8(a)s, Service-Disabled Veteran-Owned Businesses and Alaskan Native Corporations. eFAST is the FAA's preferred acquisition vehicle for fulfilling Agency Small Business goals.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 target: 90 percent of targeted savings.*

Relationship to Performance Metric

UCS will implement cost effective initiatives by consolidating the FAA's procurement process under one system that will reduce the time of issuing, maintaining and closing out contract actions and eliminates paper-based processes. UCS will normalize and streamline the procurement process by providing an integrated system that uses automated workflow processes, functions and standards, and electronic document management. UCS will enable users and management access to reporting on status, allocation of effort, task durations, and other user and management measurements. The Agency has over 355 procurement officers/specialists who process over 45,000 actions per year (based on FY 2010 calculations). By implementing UCS, the cycle time from receipt of Procurement Request (PR) to award will be improved, thus contributing to a 10% reduction in time to award major system contracts. Other program performance goals include: Increased productivity through standardized and automated processes; improved quality and accessibility to data by eliminating paper based processes; and improved cycle time through automation and standardization. UCS will eventually replace the legacy (costly) FAA procurement funds obligation and commitment system (PRISM).

Program Plans FY 2013 – Performance Output Goals
- Complete implementation of Phase 2 of the Second Generation Purchase Card Processing System (PCPS2).
- Complete implementation of the Pre-Award Phase (limited scope) module.

Program Plans FY 2014 – Performance Output Goals
- Complete Critical Design Review (CDR) of UCS.

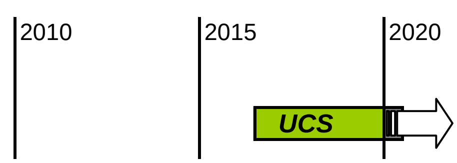
Program Plans FY 2015 – Performance Output Goals
- Complete Development Test & Evaluation (DT&E) for UCS.

Program Plans FY 2016 – Performance Output Goals
- Achieve UCS Initial Operational Capability (IOC) – to include the following functions:
  - Commitment and Obligation module (PRISM Replacement);
  - Automate procurement processes (e.g., routing / approvals) for all contract types and all procurement phases, and;
  - Federal Procurement Data System Next Generation (FPDS-NG) interface.

Program Plans FY 2017 – Performance Output Goals
- Complete Legacy Document Conversion (UCS becomes the official contract/file system).

System Implementation Schedule

Unified Contracting System (UCS)
First IOC: October 2016 -- Last IOC: September 2019



J, WORKFORCE SCHEDULE OPTIMIZATION TOOL, M29.01-01

Program Description

The Workforce Scheduling Tool is a commercial off-the-shelf workforce management information system product that has been configured to FAA specifications. It provides the FAA with a common application that effectively creates and maintains efficient schedules based on traffic, staffing, work rules, and qualifications. Additionally, the FAA will be better equipped to make more informed decisions regarding the hiring and scheduling of controllers, and allow for:

- Consistent practices in and across facilities
- Compliance with bargaining unit agreements (including local agreements)
- Enhanced decision-making and analysis
- Reduction of time spent on scheduling related tasks
- Quality, reliability and availability of scheduling information
- Flexibility and convenience (web-based)

A prototype was developed and tested at three key sites – a Tower, a TRACON, and an ARTCC. This enabled the prototype to be tested in different environments with varying staff levels, local requirements, and level / type of air traffic. Implementation at facilities is expected to continue through FY 2016 dependent on funding. Current funding will implement Workforce Scheduling Tool at 81 facilities.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The Workforce Scheduling Tool will allow for efficient use of staffing and overtime contributing to the performance metric to implement cost efficient initiatives.

Program Plans FY 2013 – Performance Output Goals

- Complete implementing Workforce Scheduling Tool at 81 selected facilities.

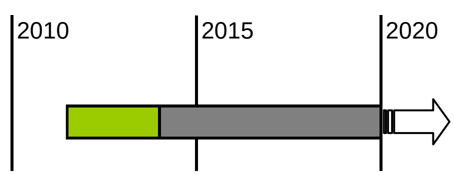
Program Plans FY 2014-2017 – Performance Output Goals

- None.

System Implementation Schedule

Workforce Scheduling Tool

First site Delivery: October 2011 -- Last site Delivery: 2013



K, SAFETY ANALYSIS SYSTEM, M08.32-03

Program Description

The Air Traffic Organization's (ATO) Safety Analysis System provides a prognostic approach in identifying NAS wide trends and managing emerging risks before they result in accidents or incidents. This initiative delivers a suite of analytical capabilities and user interfaces not currently available to achieve the next level of safety required to support the introduction of Next Generation Air Transportation System (NextGen) technologies, operational concepts, and procedures into the NAS.

In order to identify emerging risks, the ATO collects and analyzes safety data and then uses the results of these analyses to make data-driven decisions on how to best mitigate the identified hazards. At the core of the Safety Analysis System is a central platform for data distribution, fusion from multiple locations, and warehousing. Also, the Safety Analysis System: (1) Directly supports the ATO Safety core business functions by integrating all ATO domains to identify, create, standardize and disseminate safety data throughout ATO and external organizations; and (2) Integrates with operational NAS systems to ensure that the information required to successfully implement the Safety Management System (SMS) is readily available, not only for component-level safety assessments, but also for an integrated system of systems approach.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

Safety Analysis System will reduce air carrier fatalities by providing a forward-looking approach to analyze trends, data, and systems to manage risk before it leads to a future incident or accident. To achieve the next level of safety, the traditional methods of analyzing the causes of an accident or incident after the fact are not enough. The Safety Analysis System allows the FAA to anticipate potential sources of risk to identify and remove accident precursors and contributors, and strategically manage safety resources for maximum safety improvement in a cost effective manner.

Program Plans FY 2013 – Performance Output Goals
- Achieve a JRC Initial Investment Decision.

Program Plans FY 2014-2017 – Performance Output Goals
- None, pending JRC approval.

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

1A02 FY 2013 Request $1.0M
1A03 FY 2013 Request $11.5M

- 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.

<u>Laboratory Sustainment:</u>
The FAA's centralized set of laboratories located at the WJHTC provide the infrastructure for research, development, testing, and field support to FAA's Capital Investment Plan (CIP) programs. These laboratories provide around the clock operation support to En Route, Terminal, and other Air Traffic Control (ATC) facilities throughout the nation. It is necessary to sustain these laboratory systems in configurations and capabilities that match field sites that currently exist or are planned for the future. This activity provides for the ongoing sustainment of the WJHTC NAS and NextGen laboratories.

<u>Laboratory Modernization:</u>
The FAA's centralized set of laboratories located at the WJHTC provide the infrastructure for research, development, testing, and field support to FAA's Capital Investment Plan (CIP) programs. It is necessary to upgrade and improve the supporting laboratory infrastructure and equipment to provide a laboratory platform capable of supporting FAA programs. This activity provides for the modernization of the laboratory infrastructure. The Laboratory Master Plan identified more than 150 modernization items with a value of over $32M.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

Laboratory Sustainment:

- Provide Laboratory Support Services to support CIP programs.
- Conduct two independent external surveillance audits of the Laboratory Services Group's Quality Management procedures and processes.
- Conduct management review meetings to report on Level 2 performance status and review and update Quality Objectives.
- Successfully complete 90% of the quality objectives by the end of the fiscal year.
- Identify Opportunities for Improvement (OFI) and successfully address at least 80% of the OFIs.
- Update Laboratory Equipment to support CIP programs.
- Complete at least 70% of the laboratory improvement targets and milestones identified to achieve NextGen readiness for FY 2013.

Laboratory Modernization:

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2013 identified in the 20-Year Master Plan. In FY2013, modernization projects include upgrades to the fire protection system, initiation of parcel hoteling station, security upgrades in Bldg. 170, and ongoing laboratory air conditioning unit (CAC) replacement.

Program Plans FY 2014 – Performance Output Goals

Laboratory Sustainment:

- Provide Laboratory Support Services to support CIP programs – Continue to provide support services and equipment that develop the capability to test NextGen concepts and solutions and integrate them into the NAS.
- Provide enhanced services as needed to reach NextGen readiness for FY 2014.

Laboratory Modernization:

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2014 identified in the 20-Year Master Plan. In FY 2014, modernization projects include laboratory ceiling and lighting upgrades, electrical panelboard replacements and upgrades, and ongoing CAC unit replacements.

Program Plans FY 2015 – Performance Output Goals

Laboratory Sustainment:

- Provide Laboratory Support Services to support CIP programs – Continue to provide support services and equipment that develop the capability to test NextGen concepts and solutions and integrate them into the NAS.
- Provide enhanced services as needed to reach NextGen readiness for FY 2015.

Laboratory Modernization:

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2015 identified in the 20-Year Master Plan. In FY15, modernization projects including the ongoing CAC replacements, ongoing electrical panelboard replacements, and upgrades to the power monitoring system.

Program Plans FY 2016 – Performance Output Goals

Laboratory Sustainment:

- Provide Laboratory Support Services to support CIP programs – Continue to provide support services and equipment that develop the capability to test NextGen concepts and solutions and integrate them into the NAS.
- Provide enhanced services as needed to reach NextGen readiness for FY 2016.

Laboratory Modernization:

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2016 identified in the 20-Year Master Plan. In FY 2016, modernization projects including the ongoing CAC replacements, ongoing electrical panelboard replacements, and upgrades to the power monitoring system.

Program Plans FY 2017 – Performance Output Goals

Laboratory Sustainment:

- Provide Laboratory Support Services to support CIP programs – Continue to provide support services and equipment that develop the capability to test NextGen concepts and solutions and integrate them into the NAS.
- Provide enhanced services as needed to reach NextGen readiness for FY 2017.

Laboratory Modernization:

- Complete at least 75% of the Laboratory Infrastructure improvements targeted for FY 2017 identified in the 20-Year Master Plan. In FY 2017, modernization projects including the ongoing CAC replacements, ongoing electrical panelboard replacements, and upgrades to the power monitoring system.

1A04, WILLIAM J. HUGHES TECHNICAL CENTER INFRASTRUCTURE SUSTAINMENT

FY 2013 Request $8.0M

- 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 4.2 percent of the Center's FY 2003 value.

The WJHTC contracted with a private consultant to develop a twenty year facility master plan, which was completed in July of 2008. The master plan was developed based upon the consultant's consideration of life safety issues, code compliance issues, equipment age, life expectancy, replacement part availability, and general condition for each system. Replacement strategies and priorities were developed based upon Condition Codes and Importance Factors. The Condition Codes indicated the operability or need for replacement. The Importance Factors addressed the importance of each building and project to WJHTC's mission. Each of the FY 2013 projects (or Output Goals) had a Condition Code of Poor (most severe code) and an Importance Factor of Essential (most critical factor).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 thereby reducing costs for system implementation

Program Plans FY 2013 – Performance Output Goals
- Life Safety Improvements to Four Facilities.
- Building 303 Chiller Replacement (No. 1 of 3).
- Building 301 Mechanical Remediation.
- Mechanical & Electrical Improvements to Five Facilities.
- Electrical Upgrades to Building 300.
- Roof Replacement at Three Facilities.
- Primary Exterior Electric Cable/Duct Bank Replacement.

Program Plans FY 2014 – Performance Output Goals
- Building 287 Roof Replacement and Mechanical Upgrades.
- Building 301 Fire Detection/Suppression/Annunciation System Upgrades (Phase 1).
- Design Building 316 Chiller Replacement (No. 1 of 2).
- Building 301 Roof Replacement.
- Building 275 Structural Deficiency Remediation.

Program Plans FY 2015 – Performance Output Goals
- Center Facility System Improvements (Year 2 of 20 year plan).
- Building 316 Roof Replacement.
- Design Building 315 Electrical Substation Replacements.
- Main Electrical Substation Upgrades (Switchgear Enclosure).
- Buildings 300 & 301 Fire Detection/Suppression/Annunciation System Upgrades.
- Building 316 Chiller Replacement (No. 1 of 2).

Program Plans FY 2016 – Performance Output Goals
- Center Facility System Improvements (Year 4 of 20 year plan).
- Building 316 Electrical Substation Replacements.
- Center-wide Building automation system Expansion.
- Central Utilities Plant Chiller Replacement (No. 2 of 3).
- Design Primary Electrical Feeder Replacement to Buildings 315 and 316.
- Design Life Safety Improvements to Seven Facilities.

Program Plans FY 2017 – Performance Output Goals
- Center Facility System Improvements (Year 5 of 20 year plan).
- Buildings 211 and 303 Roof Replacements.
- Building 300 Mechanical Equipment Replacement.
- Creation of a Water Distribution Loop.
- Life Safety Improvements to Seven Facilities.

1A05, DATA COMMUNICATION IN SUPPORT OF NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN)
FY 2013 Request $142.6M

- Data Communications – Segment 1a/1b, G01C.01-01

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, Departure Clearances (DCL) including revisions transmitted to the aircraft on the airport surface, will enable full route clearances and revisions. DCL could provide potential for use as a NextGen Best Equipped Best Served test case. Data Communications (Data Comm) will increase capacity and enable more strategic management of en route airspace. The “Go Button” leverages Traffic Flow Management (TFM) program for more direct reroutes reducing flight time and distance. It enables quicker recovery from bad weather or other Traffic Management Advisory situations.

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 major 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 (Segment 1a (phase 1)) 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 (Segment 1b (phase2)) for Controller-Pilot Data Link Communication (CPDLC), which automates routine interactions between controllers and flight crews, including transfer of communications and initial check-in/out for aircraft flying into and out of sectors, direct-to-fix flight paths, altimeter settings, and flight crew reports as a supplement to voice communications. 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

Steps for the initial Data Comm implementation (Segment 1 Phase 1 (Segment 1a)) 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, direct connect from TDLS-to-ERAM-flight information, which performs the flight plan correlation function, protocol gateway and security boundary development.
- William J. Hughes Technical Center (WJHTC) integration and test planning and lab development.
- Contract award for Data Comm Integrated Services (DCIS) to include integration and engineering activities, data communications network, and airplane avionics equipage incentives
- Continue preparations for and conduct of Final Investment Decision for Segments 1a and b.
- Trials for revised Departure Clearance service.
- Deploy revised Departure Clearance service.

Steps for implementation of core En Route services for Data Comm (Segment 1 Phase 2 (Segment 1b)) are identified below:

- TDLS engineering and software enhancements to accommodate flight plan correlation changes.
- Software enhancements to allow for revisions to occur at the protocol gateway for aircraft log-on and flight plan correlation for En Route core services of initial check-in and transfer of communications with aircraft.
- ERAM software development for En Route Computer-Human Interface upgrades, lower level requirements completion and software development for design of En Route Controller Pilot Data Link Communications (CPDLC) applications.
- Integration and testing of core En Route services.
- Upgrade air/ground network for expanded En Route services.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 Core 30 (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 2013 – Performance Output Goals

- Achieve final Investment Decision for Segment 1a Data Communications Network Services.
- DCIS contract award to include Data Communications Network Service (DCNS) modification.
- Complete Critical Design Review for Revised Departure Clearance Services.
- Complete Revised Departure Clearance trials at first site.

- Complete vendor developmental testing of En Route Automation Modernization (ERAM) log-on capability for Revised Departure Clearance Service.
- Deliver initial data communications networking services capability to test environments.

Program Plans FY 2014 – Performance Output Goals
- Complete software enhancements to TDLS for Revised Departure Clearance service.
- Complete developmental testing of TDLS upgrades for Revised Departure Clearance service.
- Complete ERAM vendor developmental testing for log-on and protocol gateway functionality for Tower DCL service.
- Government acceptance of ERAM log-on and protocol gateway for DCL service.
- Complete final DCL trials.
- Complete DCNS service acceptance.
- Complete ERAM software acceptance.

Program Plans FY 2015 – Performance Output Goals
- Complete Revised Departure Clearance system level integration and test.
- Complete Data Comm system level Operational Test and Evaluation (OT&E) for revised departure clearance service.
- Complete technical operations and second level support training.
- Complete hardware deployment of protocol gateway and terminal information management system to national centers.
- Complete Initial Operational Capability at key site for DCL Tower Service (dependent upon ERAM release 4 deployment).
- Complete vendor developmental testing for En Route services.
- Initiate En Route services trials.

Program Plans FY 2016 – Performance Output Goals
- Deliver TDLS and ERAM software upgrades to Key Site.
- Complete Operational Test and Evaluation for DCL Tower Service.
- Complete software acceptance testing at WJH Technical Center for En Route services.

Program Plans FY 2017 – Performance Output Goals
- Complete Independent Operational Assessment (IOA) for DCL Service.
- Complete In-Service Decision (ISD) for DCL Service.
- Complete Operational Readiness Decision (ORD) for DCL Service.
- Complete system integration and testing for En Route services.
- Complete Operational Test and Evaluation for En Route services.
- Complete En Route services trials.
- Initiate Key Site testing for En Route services.

System Implementation Schedule

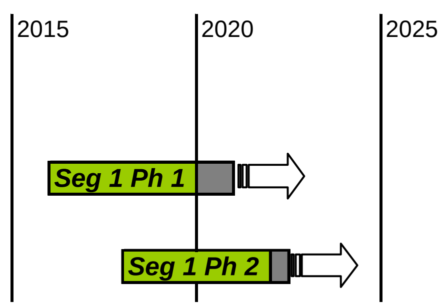
Data Communications in support of NextGen

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

First site IOC: 2016 -- Last site ORD: 2019

Segment 1 Phase 2 Service – En Route core Services for FANS 1/A+

First site IOC: 2018 -- Last site ORD: 2021



1A06, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – DEMONSTRATIONS AND INFRASTRUCTURE DEVELOPMENT

FY 2013 Request $24.6M

- Demonstrations & Infrastructure Development, G08M.01-01

Program Description

To support implementation of NextGen, analysis is required, to demonstrate and validate the benefits of system improvements and to determine which research and development (R&D) initiatives might be accelerated By examining proposed NextGen technologies, procedures, equipment and automation in integrated test bed environments with targeted demonstrations, the early benefits of NextGen Operational Improvements (OIs) can be determined and risk areas that require additional work can be identified. 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 and promote industry involvement. Rigorous demonstrations will help to ensure the integration and interoperability of systems. Demonstrations can reveal the need for rulemaking, policy changes, and 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 2013 to FY 2017 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:

<u>International Air Traffic Interoperability (IATI)</u> – 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 the Department of Defense (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).

<u>Airborne Access to SWIM</u> – 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 allows for the exchange of traffic management information and the ability to quickly communicate the information, improving 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. The link can also be used to transmit updates of weather data and other non-safety critical information.

Airborne Execution of Flow Strategies – This project seeks to show how a metering Decision Support Tool (DST), such as the Traffic Management Advisor (TMA), could be informed by a fleet prioritization element within the Flight Object, in order to aide flight operators in sequencing their "higher value" 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.

Global Harmonization of Flight Information and Exchange Strategies – The purpose of this demonstration is to continue to validate the Flight Object concept and the use of the Flight Information eXchange Model (FIXM) standard. The demonstration will show how ANSPs and flight operators, in both the Pacific and Atlantic regions, can leverage the FIXM standard as a means for sharing common flight information elements.

Future Planning – During the FY 2013 to FY 2017 time frame, demonstration, development, and validation results can lead to implementation of early improvements in the NAS while supporting long-term operational objectives. The initial segment initiatives provide integrated demonstration and end-to-end demonstration activities. Near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and/or emerging customers' NAS initiatives, and mid-term development will be designed 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

FY 2013-2017 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. International Air Traffic Interoperability, Airborne Access to SWIM, Airborne Execution of Flow Strategies, GBAS Demonstration, and Future Planning 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 2013 and beyond.

Program Plans FY 2013 – Performance Output Goals

International Air Traffic Interoperability Demonstrations:

- Work with SESAR and ICAO to define Aviation System Block Upgrades (ASBU), a framework for providing a set of modular targets for each state to work towards, and within specific timeframes; all in relation to AIRE (Atlantic Interoperability Initiative to Reduce Emissions) and SWIM activities.
- Define the FAA's role with SESAR over the next 6 months, in areas such as Advanced PBN for the Terminal Area.
- Demonstrate Strategic Flow Planning for Collaborative Decision Making in coordination with Asia-Pacific using SWIM.

Airborne Access to SWIM:

- Conduct demonstration and complete final report of demonstration results to show the capability for the FAA system and airborne aircraft to communicate non-safety critical information via an airborne network
- Airborne Execution of Flow Strategies
- Conduct demonstration and complete analysis and final report of the demonstration results to show how a metering DST can be informed by a fleet prioritization element within the Flight Object to aide flight operators in sequencing "higher value" flights.

Global Harmonization Demonstrations:

- Conduct demo planning and initiate implementation.
- Develop Concept of Operations and scope for Scenarios.
- Develop metrics and methodology.
- Develop evaluation strategies to harmonize Flight Objects.

Future Planning – Demonstrations:

- Develop a plan to integrate current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration sites.

Program Plans FY 2014 – Performance Output Goals

International Air Traffic Interoperability Demonstrations:

- Conduct demonstration activities of collaborative end-to-end domain systems.
- Develop standards and alternatives.
- Conduct demonstration activities of mid term end-to-end trajectory based operations.
- Conduct demonstration activities for enhanced avionics capabilities.
- Conduct demonstration activities for enhanced navigation capabilities.
- Conduct Post-Demonstration Analysis and Final Report.

Global Harmonization Demonstrations:

- Conduct demonstration and complete analysis and final report of the demonstration results to validate the Flight Object concept and the use of the FIXM standard.

Program Plans FY 2015-2017 – Performance Output Goals

- Perform demonstration activities for enhanced avionics capabilities.
- Perform demonstration activities for enhanced navigation capabilities.
- Perform demonstration of mid term end-to-end trajectory based operations.
- Perform standards and alternatives development.
- Support OMB 300 development for NextGen transformational technologies.

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

FY 2013 Request $61.0M

- 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, Facility System Development – Staffed NextGen Towers, G03M.04-01
- E, Environment & Energy G06M.02-01
- F, Wake Turbulence Re-Categorization, G06M.02-02
- G, Systems Safety Mgmt Transformation, G07M.02-01
- H, Safety, Security, Environment – System Development – Operational Assessments, G07M.02-02

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

Program Description

The planned outcome of this program is the development of a Human System Integration (HSI) Roadmap to complement the other roadmaps in the Enterprise Architecture and human factors functional requirements. The HSI Roadmap will show the roles and responsibilities of the participants in the NAS (air traffic controllers, pilots, dispatchers, traffic managers, etc.), their interactions with NextGen technologies, and the 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 the NextGen Controller and facilities maintenance personnel to ensure safe operations at increased capacity levels and the best allocation of functions between humans and automation. The success of new NextGen technologies are dependent on 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 designing the human interface with the decision support tools so they can be easily used. 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.

This program will be implemented using a variety of facilities including the Research and Development Human Factors Lab (RDHFL), the NextGen Integration and Evaluation Capability (NIEC), as well as facilities at NASA and Volpe. The output will be in the form of functional requirements and simulation results in terms of human performance when using NextGen improvements. A Strategic Training Needs Analysis is to be completed in coordination with the ATO Technical Training office.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

By 2016, improvements in human factors will result in 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.

Data showing the potential increase in controller efficiency is currently being generated for many of the operational improvements in the NextGen portfolio. For example, simulation data has shown the ability, when using Data Comm, to handle a 30% increase in traffic while maintaining the baseline workload level.

Program Plans FY 2013 – Performance Output Goals

- Complete the Human System Integration Roadmap.
- Conduct simulations and provide a technical report that investigates controller roles in a simulated strategic air traffic environment for en route and terminal domains.
- Complete a demonstration of controller procedures in use of workstation tools for mixed equipage.
- Conduct initial air ground integration simulations and provide technical report of findings to address future changes in roles between pilots and controllers.
- Complete the Unmanned Aircraft Systems (UAS) information requirements document.

Program Plans FY 2014 – Performance Output Goals

- Complete Human Factors information requirements document to improve controller efficiency in the en route and terminal domains.
- Conduct simulations of NextGen tower operations and provide report of findings and requirements to address human factors issues with the use of new efficiency tools on the airport surface.
- Provide technical report of human performance safety analyses in support of NextGen safety risk management.
- Conduct simulations and provide technical report assessing changes to the roles of controllers and traffic flow coordinators in the use of Collaborative Air Traffic Management.

Program Plans FY 2015 – Performance Output Goals

- Conduct simulations and provide technical report of findings and requirements to measure human performance when using tools for efficient operations in the terminal environment.
- Demonstrate and provide technical report of findings for advanced human machine interface for integrated air traffic workstations using the suite of NextGen operational improvements in the en route environment.

Program Plans FY 2016 – Performance Output Goals

- Demonstrate, through simulations, and provide technical report of findings for increased operational efficiencies that can be captured through the use of new human factors guidance in the development of new NextGen tools for the terminal domain.
- Perform human factors safety analyses and provide technical report of findings for fielded NextGen improvements to identify unforeseen issues related to implementation.

Program Plans FY 2017 – Performance Output Goals

- Demonstrate system capacity improvement models and provide technical report of findings for specific improvements in controller efficiency.
- Update controller NextGen Strategic Job Analysis document to review the need for new controller selection criteria.
- Update controller NextGen Strategic Training Needs Analysis document.

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:

- Weather Transition – Manage appropriate Concept Maturity Technology Development (CMTD) activities to include the creation, testing and evaluation of prototypes and operational demonstrations for the purpose of defining and refining an appropriate operational use concept. Ensure that any risk inherent in the introduction of a new weather product to the NAS is done so in accordance with ATO Safety Risk Management guidelines.

- 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 Required Navigation Performance (RNP) routes from beginning of the descent to the runway;

- Airborne SWIM – Identify information distribution requirements for non-command and control information transmitted by airborne System-Wide Information Management (SWIM).

- Trajectory Modeling – Analyze trajectory requirements to determine differences between different automation systems and decision support tools. Define what trajectory information and exchange methods are required, which trajectory prediction types are required and what is required to achieve trajectory interoperability across multiple domains.

- New Radar Requirements (Surveillance and Weather) – Determine technology and requirements for Weather Radar Replacement (WRR).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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

Program Plans FY 2013 – Performance Output Goals

Weather Transition:
- Complete concept of operations (ConOps) for Alaska current icing product/forecast icing product (CIP/FIP AK).
- Complete ConOps for Graphical Turbulence Guidance product version 3 (GTG3).
- Draft allocation of weather requirements to federal agencies and sub-agencies (e.g., NWS under NOAA).
- Conduct service analyses to address operational problems (e.g., Path Based Shear, Ground Deicing, Time of Wind Return, Terminal Haze) and complete a report.

TCAS:
- Develop the TCAS/ADS-B Compatibility / Future Requirements document.
- Define the Future Collision Avoidance System (CAS) Logic Development / Future Surveillance Requirements document.
- Complete the CAS Logic Assessment Report / Avionics Model.

Airborne SWIM:
- Provide acquisition planning to support requirements levied on NAS systems by uses of Airborne Access to SWIM (AAtS).

Trajectory Modeling:
- Complete development of NAS trajectory performance requirements.
- Complete development of NAS trajectory interoperability requirements.
- Complete development of NAS trajectory information requirements.
- Complete Trajectory Concepts Alternative Analysis.
- Define initial Trajectory information elements for the Flight Object.

New Radar Requirements (Surveillance and Weather):
- Deliver initial report on Full-Antenna Aperture Performance Model for Multifunction.
- Deliver report on industry solutions for multifunction radar backend architecture.

Program Plans FY 2014 – Performance Output Goals

Weather Transition:
- Complete safety management system (SMS) process and technical package review for CIP/FIP AK.
- Complete SMS process and technical package review for GTG3.
- Final allocation of weather requirements to federal agencies and sub-agencies (e.g., NWS under NOAA).
- Conduct service analyses to address operational problems (e.g., Path Based Shear, Ground Deicing, Time of Wind Return, Terminal Haze).

Airborne SWIM:
- Conduct industry day.
- Develop high level requirements.

<u>Trajectory Modeling:</u>
- Develop safety assessment of common trajectory.
- Develop common trajectory demonstration strategy.
- Develop Concept of Use for delivering RNAV/RNP approaches using DataComm.

Program Plans FY 2015-2017 – Performance Output Goals
<u>Weather Transition:</u>
- Complete ConOps for advanced in-flight icing (IFI) forecast.
- Complete ConOps for advanced turbulence forecast.
- Complete validation of weather requirements (analyze for technical merit, review with stakeholders for accuracy, develop working scenarios to demonstrate usefulness).
- Perform service analyses to address operational problems.

<u>Trajectory Modeling:</u>
- Develop high level requirements for RNAV/RNP approaches using DataComm.
- Develop common trajectory demonstration strategies.
- Conduct common trajectory demonstration.
- Complete update of 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 gate to gate (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. 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.

The research provides evaluation of 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Complete development of High Priority Mid-Term Concepts of Operations through 2018.
- Complete development of operational requirements for validated concepts.

- Complete risk analysis of NextGen Mid-Term Operational Concepts.
- Complete development of artifacts to support the subsequent Concept and Requirements and Investment Analysis activities for Next Gen Mid Term concepts.

Program Plans FY 2014 – Performance Output Goals
- Revise iteration of The NAS Concept of Operations document based on concept validation activities.
- Complete benefits validation associated with NextGen concepts to be implemented in the 2018-2020 timeframe.
- Conduct mission analysis activities to validate shortfalls and mission needs and to develop concept and requirements definition artifacts.
- Complete development of artifacts to support subsequent investment analysis activities for NextGen concepts to be implemented in the 2018-2020 timeframe.
- Modify and define operations concepts for the latter stages of the Mid Term (beyond 2018), based on new research and investment decisions.

Program Plans FY 2015 – Performance Output Goals
- Revise iteration of The NAS Concept of Operations document based on concept validation activities.
- Complete benefits validation associated with NextGen concepts to be implemented in the 2020-2022 timeframe.
- Conduct mission analysis activities to validate shortfalls and mission needs and to develop concept and requirements definition artifacts.
- Complete development of artifacts to support subsequent investment analysis activities for NextGen concepts to be implemented in the 2020-2022 timeframe.
- Modify and define operations concepts for the latter stages of the Mid Term (beyond 2020), based on new research and investment decisions.

Program Plans FY 2016 – Performance Output Goals
- Revise iteration of The NAS Concept of Operations document based on concept validation activities.
- Complete benefits validation associated with NextGen concepts to be implemented beyond 2022.
- Conduct mission analysis activities to validate shortfalls and mission needs and to develop concept and requirements definition artifacts.
- Complete development of artifacts to support subsequent investment analysis activities for NextGen concepts to be implemented beyond 2022.
- Modify and define operations concepts for the late Mid Term (beyond 2022). NextGen ConOps will be refined based on new research and investment decisions.

Program Plans FY 2017 – Performance Output Goals
- Revise iteration of The Concept of Operations document based on concept validation activities.
- Complete benefits validation associated with NextGen concepts to be implemented beyond 2022.
- Conduct mission analysis activities to validate shortfalls and mission needs and to develop concept and requirements definition artifacts.
- Complete development of artifacts to support subsequent investment analysis activities for NextGen concepts to be implemented beyond 2022.
- Modify and define operations concepts for the late Mid Term (beyond 2022). NextGen ConOps will be refined based on new research and investment decisions.

D, FACILITY SYSTEM DEVELOPMENT – 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 surface surveillance approved for operational use. 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 a surface surveillance system approved for operational use. 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 addition, solutions for non-towered airports may also be examined.

In future years, operationally approved surface surveillance may be leveraged to provide contingency operations in case ATC services at a staffed terminal facility are interrupted for a limited time.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Air Traffic Control Tower (ATCT) operations are projected to increase and SNT will provide surface surveillance approved for operational use, future technologies, 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 to be comparable with capacity in Visual Flight Rules (VFR), and SNTs will allow the FAA to cost effectively expand its service to meet capacity demand. SNT will also allow for delivering aviation services when a local air traffic control facility is experiencing a limited duration loss of service by allowing a contingency facility to provide those services. This will allow continued access to the airport instead of having to temporarily close the airport.

Program Plans FY 2013 – Performance Output Goals

- Complete program requirements update.
- Complete surface surveillance operational suitability (formerly ASDE-X Certification) documentation.
- Develop initial procedures for surface surveillance operational suitability.
- Complete system safety analysis for surface surveillance operational suitability.
- Complete initial draft of modifications to for remote tower operations.

Program Plans FY 2014 – Performance Output Goals

- Conduct analyses in support of operationally approved surface surveillance.
- Conduct procedure development in support of operationally approved surface surveillance.
- Conduct system safety analysis and develop documentation in support of operationally approved surface surveillance.
- Complete update of requirements for operationally approved surface surveillance.

Program Plans FY 2015 – Performance Output Goals

- Complete update to the analysis and documentation for operationally approved surface surveillance.
- Conduct simulation and analysis of SNT for small and medium airports (SMT-SMA).
- Conduct concept validation for contingency operations.
- Conduct analysis and 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 operationally approved surface surveillance.
- Develop initial concept of operations document for ANT and validation of ANT.

Program Plans FY 2017 – Performance Output Goals
- Develop initial requirements document for ANT.
- Complete update of concept of operations for ANT.

E, Environment & Energy, G06M.02-01

Program Description

Growth in aviation operations 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 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, aircraft technologies, alternative fuels, policies, environmental standards and market based options to allow the desired increase in capacity and efficiency. The environmental and energy development efforts under this program will lead to the assessment of solutions to reduce emissions, fuel burn, and noise associated with NextGen. This effort specifically focuses on research, simple demonstrations, and other 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 2018, this program will provide information necessary to develop, implement, and manage NextGen system alternatives to meet NextGen capacity growth demand. 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 provides a strategic framework to coordinate and optimize NextGen solutions (e.g. operational procedures, aircraft technology, alternative fuels, and policy) for noise, fuel burn, and emissions reduction as well as provide stakeholders with guidance and tools needed to manage their critical environmental issues and ultimately 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. The Environment and Energy – Environmental Management System program integrates acquired knowledge from the other environmental programs 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) aircraft and alternative fuel technologies program being pursued under the 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, Outcome, and Performance Metric

- *FAA Strategic Goal 4 – Sustaining our Future.*
- *FAA Outcome 1 – US aviation Sector is a model for sustainable growth.*
- *FAA Performance Metric 3 – Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.*

Relationship to Performance Metrics

This program supports the FAA Destination 2025 goal for Sustaining Our Future with an outcome of the US aviation sector being a model for sustainable growth. Progress and success of this program will be measured against the performance metric to improve NAS-wide energy efficiency by at least 2% per year. This program supports accelerated maturation of CLEEN aircraft technologies through testing, demonstration and assessment. In addition, it focuses on exploration of energy efficient and environmentally favorable operational procedures. Both of these advances lead to improved energy efficiency which will be managed and tracked via the Environmental Management System. This program accelerates securing qualification of commercial alternative fuels through testing and demonstration as well as analysis of aviation environmental standards on NAS-wide operational environmental performance.

Program Plans FY 2013 – Performance Output Goals
Environmental Management System (EMS):
- Develop guidance for addressing environmental issues during the implementation of NextGen improvements.
- Establish initial non-financial incentive program to encourage airports, airlines, manufacturers efforts to achieve the aviation environment and energy goals.
- Develop and deploy targeted communications materials (brochures, posters, etc.) to provide stakeholders with a clear understanding of the potential environmental benefits of NextGen implementation and the role they play in realizing these benefits.
- Conduct an environmental evaluation and create a summary report on FAA NextGen capabilities in the Alpha and Bravo timeframes so that it is possible to identify those capabilities that may have environmental benefits.
- Establish formal partnerships with FAA programs that are delivering NextGen capabilities that show potential for environmental benefits or National Environmental Policy Act (NEPA) implications.
- Provide a scoping report describing activities to develop a concept and requirements for a system to track NextGen environmental performance against aviation environment and energy goals.
- Prepare a summary report on an approach for integrating NEPA considerations into existing FAA AMS guidance.

Advanced Noise and Emission Reduction:
- Develop research report on the environmental impacts of CLEEN technologies including alternative fuels on the NAS.
- Prepare research report based on demonstrating environmental control algorithms for gate-to-gate operational procedures**.**
- Prepare report analyzing environmental impacts of NextGen operational procedures.
- Assess the impacts of environmental standards on NAS wide operations.
- Prepare assessment report on the impact of policy options and market based measures on NAS.

Program Plans FY 2014 – Performance Output Goals
Environmental Management System (EMS):
- Expand stakeholder involvement in the NextGen EMS Partnership Program increasing the number of organizations that have formally committed to support aviation environment and energy goals.
- Evaluate and refine EMS communication and outreach approaches.
- Develop a reference list of key environmental information sources on the EMS portal website leveraging information that is available through SWIM.
- Track results for an initial set of select environmental benefits and stakeholder activities so that progress toward aviation environmental goals can be evaluated and prepare a report describing initial environmental benefits.

- Evaluate and create summary report on new or updated capabilities in the Bravo timeframe to identify those that may have environmental benefits and identify potential NEPA implications.
- Draft initial approach to integrate NEPA considerations into existing FAA AMS guidance.
- Coordinate with internal FAA program offices that are implementing NextGen capabilities to ensure coordination and collaboration on components with the potential to effect the environment (+/-).

Advanced Noise and Emission Reduction:
- Promote integration and assessment of CLEEN technologies and alternative fuels.
- Explore and demonstrate environmentally efficient gate-to-gate operational procedures.
- Support preparation of an environmental analysis report for NextGen operational procedures.
- Investigate and assess the environmental impacts on NAS wide operations of standards for aircraft noise and emissions.
- Prepare assessment report of the potential contributions 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):
- Expand stakeholder involvement in the NextGen EMS Partnership Program and identify specific priority areas on which members/partners should focus.
- Develop guidance to support the continued roll out of NextGen capabilities deployed during the NSIP Alpha timeframe (based on lessons learned and data from early implementation).
- Deploy appropriate materials and maintain portal/website to focus communications on environmental benefits and success stories from implementation of NSIP Alpha programs.
- Expand tracking of environmental benefits of capabilities implemented during the NSIP Alpha timeframe and stakeholder activities.
- Evaluate and create a summary report on new or updated NextGen capabilities planned in the Bravo time frame.
- Complete integration of NEPA considerations into existing FAA AMS guidance into AMS.
- Coordinate and collaborate with internal FAA program offices that are implementing NextGen capabilities with the potential to effect the environment.

Advanced Noise and Emissions Reduction:
- Improve Phase II CLEEN aircraft technologies and alternative fuels through assessment, testing and demonstration.
- Prepare report with latest data on environmentally efficient gate-to-gate operational procedures.
- Support NextGen environmental analysis report on 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 contribution 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):
- Expand stakeholder involvement in the NextGen EMS Stakeholder Partnership Program and identify specific priority areas on which members/partners should focus.
- Develop guidance to support the continued role out of NextGen capabilities deployed during the NSIP Bravo timeframe.
- Deploy appropriate materials and maintain portal/website to focus communications on environmental benefits and success stories from NSIP Alpha implementation to support bravo implementation.
- Expand tracking of environmental benefits and stakeholder activities.
- Evaluate and create a summary report on new or updated NextGen capabilities planned in the Bravo time frame and Charlie timeframe or beyond.

- Provide targeted NEPA guidance to assist FAA program offices with planning and implementing NextGen capabilities.
- Coordinate and collaborate with internal FAA program offices that are implementing NextGen capabilities with the potential to effect the environment.

Advanced Noise and Emission Reduction:
- Upgrade Phase II CLEEN aircraft and fuel technologies.
- Assess Phase II CLEEN aircraft technologies and alternative fuels.
- Prepare research report on environmentally efficient gate-to-gate operational procedures.
- Prepare environmental analysis of NextGen 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 contribution 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 2017 – Performance Output Goals
Environmental Management System (EMS):
- Expand stakeholder involvement in the NextGen EMS Stakeholder Partnership Program and identify specific priority areas on which members/partners should focus.
- Develop guidance to support the continued roll out of NextGen capabilities deployed during the NSIP Bravo timeframe (based on lessons learned and data from early implementation).
- Deploy appropriate materials and maintain portal/website to focus communications on environmental benefits and success stories from NSIP Alpha and Bravo implementation.
- Expand tracking of environmental benefits and stakeholder activities (i.e., stakeholders that are partnering) and continue to evaluate environmental benefits of select NextGen capabilities which have been implemented.
- Evaluate and create a summary report on new or updated NextGen capabilities planned in the NSIP Bravo and Charlie timeframe or beyond.
- Analyze NEPA compliance within the EMS framework and Provide targeted NEPA guidance to assist FAA program offices with planning and implementing NextGen capabilities.
- Coordinate and collaborate with internal FAA program offices that are implementing NextGen capabilities with the potential to effect the environment.

Advanced Noise and Emission Reduction:
- Test and demonstrate improved Phase II CLEEN aircraft technologies and alternative fuels.
- Conduct NAS-wide benefit assessment of Phase II CLEEN aircraft and fuel technologies.
- Develop report on environmentally efficient gate-to-gate operational procedures.
- Support environmental analysis of NextGen operational procedures.
- Investigate and assess the impacts on NAS wide operations (including environmental performance).
- Investigate NAS-wide impacts of environmental standards for aircraft noise and emissions including market based options (such as Cap and Trade, carbon charges, etc.), and other policy measures.

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. Since the last full review of wake separation standards used by air traffic control air carrier operations and fleet mix have changed dramatically, airport runway complexes have changed and new aircraft designs (A-380, B787, B747-8, 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 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 is using a data driven relative risk safety analysis approach. That approach is complimented with enhanced analysis tools to link observed wake behavior to standards and provide additional confidence in the determined safety risk associated with potential new standards relative to existing standards. Use of the new standards is expected during 2013. 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 2015, it will develop sets of tailored leader aircraft and follower pair-wise static aircraft wake mitigation separation standards for all aircraft. The actual application of these static pair-wise separations may continue to use categories for simplification, but those categories may be optimized for the demand fleet mix operating at an airport. 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 pair-wise dynamic wake mitigation separations of aircraft.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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. The Wake Turbulence Re-Categorization program 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 2013 – Performance Output Goals

- Complete preliminary requirement documentation to incorporate leader/follower pair-wise static wake separation standards into the FAA ATC automation platforms.
- Finalize the implementation of 6 category wake separation standards into the FAA ATC automation platforms.

Program Plans FY 2014 – Performance Output Goals

- Complete enhancements to process, and procedure modeling tools to evaluate, proposed pair-wise dynamic aircraft wake hazard mitigation processes.
- Complete the implementation plan for the Leader/Follower pair-wise static tailored aircraft wake separation standards procedures and processes.

Program Plans FY 2015 - 2017 – Performance Output Goals

- Complete Development of the Leader/Follower pair-wise static tailored aircraft wake separation standards.
- Complete the implementation of the Leader/Follower pair-wise static tailored wake separation standards on the FAA ATC automation platforms.

- Initiate and complete development of detailed concept of use description for dynamically adjusted wake separation minima and coordinate with the aviation stakeholder community.
- Complete development of pair-wise dynamic process alternatives for real-time adjustment of the allowable minimum wake mitigation separations between aircraft, and initiate their evaluation for additional safe airport/airspace capacity benefit.
- Develop a simulation plan to validate the operational feasibility of the alternative that modeling showed to have the most benefit.

G, SYSTEMS SAFETY MANAGEMENT TRANSFORMATION, G07M.02-01

Program Description

This program researches comprehensive and proactive approaches to analyzing aviation safety related 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. Safety analysis allows 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 including operational and performance impacts 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 comprehensive and cooperative 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.

Guidance materials developed in 2012 are delivered to relevant program offices for integration into annual training activities including coordination conference held to produce an integrated SRM practice manual for all operational Line of Business (LOBs) (Air Traffic Organization (ATO), Aviation Safety, Office of Commercial Space Transportation and Office of the Associate Administrator for Airports) .

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

System Safety Assessment (SSA)
Demonstrate a National Level System Safety Assessment working prototype that will proactively identify emerging risk across the proposed NextGen.

Safety Management Systems (SMS)
Develop and implement 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. Develop a formal hazard tracking system database that captures a standardized dataset of the outputs of system safety assessment analyses. Create maintenance and validation methods for this database and provide the software and inputs to a database managed by the FAA SMS office. Produce a document describing best practices and recommendation on databases or systems to support safety information sharing. Results will be disseminated through the SMS program office.

Safety Risk Management (SRM)
Refine methods for system-wide risk analysis of the NAS that will lead to definition of system and user requirements to ensure that new systems are designed to eliminate forecasted risk.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 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 by the FAA and air transportation stakeholders at home and abroad. The results will be integrated using 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 2013 – Performance Output Goals

System Safety Assessment (SSA):

- Conduct annual aviation system wide safety risk baseline and impact assessments for all NextGen related improvements. Maintain the capability to conduct long-term forecasts of the change impacts due to system changes in NextGen, variations in implementation schedules, equipment upgrades, and crew and controller performance.
- Complete report and software documentation on risk analysis function for surface operations (all 35 major US airports)
- Complete report and software documentation on risk analysis function for terminal area operations (all 35 major US airports).
- Complete report on potential impacts of other domestic safety initiatives and SESAR implications using the Integrated Safety Assessment Model (ISAM) and U.S. and SESAR documentation.
- System baseline analysis data and software requirements based upon the results of the studies performed in this program under the joint System Safety Management Transformation (SSMT) program (2009-2012), are codified into a standard baseline software requirements document for surface safety risk identification and analysis. Output- procurement for surface safety risk identification and analysis.

Safety Management Systems (SMS):

- Implement a method for Design Approval Holder (DAH) capability (developed in 2010-2012) with hazard tracking oversight software and technology for notification of hazards to all participants in the SMS process.
- Develop methods for Information-sharing for SMS participants at Original Equipment Manufacturer.

Safety Risk Management (SRM):

- Conduct annual FAA-wide safety risk management training requirements, implementation and coordination workshop based upon the output of the Uniform Risk Assessment studies performed in FY 2009-2012 and the requirements of the SMS program.

Program Plans FY 2014 – Performance Output Goals

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 – Complete Risk Analysis function for terminal area operations (all CONUS TRACON facilities and FAA command center operations.
    - 2014 – Integrated system risk analysis program – Complete integration 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):

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

Program Plans FY 2015 – Performance Output Goals

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 – Complete Risk Analysis function for en route 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, en route 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):

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

Program Plans FY 2016 – Performance Output Goals

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 – Complete development of near real-time diagnostic function developed for integrated risk analysis for single terminal area prototype.
    - 2016 – Integrated system risk analysis program – Complete integration of NextGen and SESAR segments as relevant to domestic operations improved through metaware to support data exchange with analysis functions.

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):
- Conduct annual FAA-wide safety risk management training requirements, implementation and coordination workshop.

Program Plans FY 2017 – Performance Output Goals
System Safety Assessment (SSA):
- Develop an integrated system risk analysis function for terminal area operations providing near real-time advisory functions for system risk alerts.
  - Complete development and deliver 3 terminal areas with local process prototypes (JFK, MSP and MEM).

H, SAFETY, SECURITY, ENVIRONMENT – SYSTEM DEVELOPMENT – 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 conduct performance assessments, benefits modeling, cost/benefit data synthesis, NAS-wide environmental-specific assessments, system performance evaluations, and risk management activities. This research will include initial NAS-wide assessment of methods within Aviation Environment Design tool (AEDT) and Aviation Portfolio Management Tool (APMT) 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, Outcome, and Performance Metric

- *FAA Strategic Goal 4 – Sustaining our Future.*
- *FAA Outcome 1 – US aviation Sector is a model for sustainable growth*
- *FAA Performance Metric 3 – Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.*

Relationship to Performance Metric

The program supports the transition to NextGen by providing comprehensive assessment of its environmental performance in terms of NAS-wide fuel efficiency improvement. By 2018, this program element will enhance assessment capability that will enable quantitative assessment of NAS-wide operational fuel efficiency. This assessment will provide guidance for adaptations and improvements in mitigation options needed towards achieving any shortfall in the performance metric.

Program Plans FY 2013 – Performance Output Goals
- Develop report on enhancements in Aviation Environmental Design Tool (AEDT) to cover study fidelity for local airport to regional NAS-wide NextGen environmental analysis.
- Integrate AEDT environmental assessment capabilities with NextGen NAS simulation models.
- Develop report on Aviation Portfolio Management Tool (APMT)-Economics for domestic/ regional NAS-wide NextGen environmental analysis.

- Develop report on analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support.
- Conduct an operational evaluation of NextGen operational capabilities deployed in 2012.
- Update NextGen cost estimates, benefits estimates, and the overall NextGen business case.

Program Plans FY 2014 – Performance Output Goals

- Develop report on AEDT to cover study fidelity for local airport to regional NAS-wide NextGen environmental analyses.
- Develop report on APMT-Economics for domestic/ regional NAS-wide NextGen environmental analysis.
- Provide report refining 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 Operational Performance Model to support NextGen Operational Assessments.
- Update NextGen cost estimates, benefits estimates, and the overall NextGen business case.

Program Plans FY 2015-2017 – Performance Output Goals

- Develop report on AEDT to cover study fidelity for local airport to regional NAS-wide NextGen environmental analyses.
- Develop report on APMT-Economics for domestic/ regional NAS-wide NextGen environmental analysis.
- Report on 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 Operational Performance Model to support NextGen Operational Assessments.
- Update NextGen cost estimates, benefits estimates, and the overall NextGen business case.

1A08, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – TRAJECTORY BASED OPERATIONS (TBO)

FY 2013 Request $16.5M

- A, Separation Mgmt – Modern Procedures, G01A.01-01
- B, Trajectory Mgmt – Oceanic Tactical Trajectory Mgmt, G01A.02-02
- X, Trajectory Mgmt – Conflict Advisories, G01A.02-03

A, SEPARATION MGMT – MODERN PROCEDURES, 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 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. Develop and evaluate a prototype to modify these algorithms for use in 3-nmi separation areas. This will support the performance metric by allowing controllers to make fuller use of the airspace.
- Perform research and analysis on:
  - 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.

Program Plans FY 2014 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Enhancements to trajectory prediction and strategic conflict detection supporting more strategic maneuvering resulting in efficient and safe separation of aircraft to assist in increased traffic demands;
  - Extending trajectory prediction and automated conflict detection 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;

- 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;
- Automated controller-to-controller coordination to support conflict detection and 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:
  - Extending the automated conflict detection capabilities to support metering and other traffic management initiatives designed to make more complete use of available airspace; and
  - Conduct pre-implementation activities associated with capabilities identified for NextGen in the 2017-2022 timeframe.

Program Plans FY 2016 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Extending the trajectory prediction and automated conflict detection capabilities to support increased use of high altitude airspace; and
  - Extending the trajectory prediction and automated conflict detection 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.
- Conduct pre-implementation activities for NextGen capabilities identified for implementation after 2018.

Program Plans FY 2017 – Performance Output Goals

- Perform pre-implementation activities to validate requirements for:
  - Extending the trajectory prediction and automated conflict detection capabilities to support increased use of high altitude airspace
  - Extending the trajectory prediction and automated conflict detection and routing capabilities to utilize data communications
- Transition promising NextGen technologies for enhanced separation management currently in the research phase into pre-implementation

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

Program Description

The Oceanic Tactical Trajectory Management program addresses ATC enhancements that improve fuel efficiency and schedule reliability in the oceanic environment. Separation in oceanic airspace is handled by controllers using display screens that show aircraft locations based on data link or voice reporting by the pilot. Air Traffic Control (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 efforts will be expanded to cover other oceanic areas, perform additional operational trials, refine longer-term objectives, develop new initiatives to investigate separation assurance systems using Automatic Dependent Surveillance (ADS) technology, and begin development activities for changes to Oceanic Airspace Management.

This program is focused on three areas for development:

<u>Procedure Development</u>:
This activity will be developing oceanic procedures which will enable more efficient operations. The planned supporting activities are:

- ADS-C Climb Descent Procedures (CDP): Data collected and the results from Automatic Dependent Surveillance – Contract (ADS-C) Climb Descent Procedures (CDP) operational trials completed in FY 2010 will be used to identify automation requirements for Ocean 21, the upgraded oceanic automation system. Adjustments will be needed to support the transition of Oceanic Separation to less than 30/30 longitudinal/lateral separation and implementation of advanced procedures in other FAA-controlled airspace. International Civil Aviation Organization (ICAO) approval of ADS-C CDP adoption will be requested, and approval of expansion of this service to other ICAO states so that flights can take advantage of these procedures when they transition to others countries controlled airspace. This activity supports Operational improvement 102108 Oceanic In-Trail Climb and Descent and 102136 Reduced Oceanic Separation and Enhanced procedures.
- ADS-C Lateral procedures: This activity support Operational improvement 102136 Reduced Oceanic Separation and Enhanced procedures.

Collaborative Trajectory Planning:
This activity will develop web-enabled Collaborative Trajectory Planning (CTP) capabilities to share information with airlines so they can optimize planned oceanic routes for aircraft. The planned activity supporting this is:

- Pre-departure 4D-OTM: Operational trials will be initiated in FY 2012 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 Collaborative Trajectory Planning. Work will also continue to enhance profile de-confliction analysis and develop preferred profile data source requirements. This activity supports Operational improvement 104102 Flexible Entry Times for Oceanic Tracks.

Trajectory Management:
This activity will develop Oceanic Trajectory Management concepts and procedures. The planned activities supporting this:

- In-Flight 4D-OTM: Operational trials began in mid FY 2011 and will continue in FY 2012. Analysis work will include developing strategies and methodologies for data collection, baselining, modeling and simulation that support trajectory change requests for aircraft in flight. Data collection and analysis performed during the operational trials will be used to support business case development efforts in FY 2012 and 2013. This activity support Operational Improvement 102136 Reduced Oceanic Separation and Enhanced procedures.
- Domestic/Oceanic Transition: 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 to support transition from domestic to oceanic airspace. Engineering activities will include conducting Communication/Navigation/Surveillance (CNS) automation analysis and initiating prototype requirements.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Aircraft will be able to fly more efficient, user-preferred oceanic routes. Increased system precision and enhanced automation allow the more efficient use of flight levels so that aircraft can more closely fly routes that realize the airlines' goals for fuel efficiency and schedule reliability. Reduced separation standards for aircraft that rely on shared 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 2013 – Performance Output Goals

Procedure Development:

- Obtain Service Level Agreement on Climb Descent Procedures (CDP).
- Develop supporting materials for Funding Approval on Climb Descent Procedures (CDP).
- Develop Preliminary Operational Requirements for Lateral Procedures.
- Develop Initial Business Case for Lateral Procedures.

Collaborative Trajectory Planning (CTP):

- Finalize Core Algorithm for Pre-Departure Web-Enabled CTP.
- Initiate Operational Trial for Pre-Departure Web-Enabled CTP.

Trajectory Management:

- Complete Investment Analysis Plan (ConUse, Prelim. Requirements, Roles, Schedule) for Automation for In-Flight Trajectory Optimization (Vertical, speed, lateral).
- Develop Implementation Funding Request Package for In-Flight Trajectory Feedback (OCAT).
- Conduct Benefits Analysis for Flight-Specific Likelihood Feedback Capability.
- Conduct Lab Demonstration for Flight-Specific Likelihood Feedback Capability.
- Develop HITL scenarios & conduct simulations for Portfolio of Controller Enhancement.
- Conduct Ops Trial planning and execution with enhanced controller procedures Enhancement.
- Initiate Prototype Development for Operational Capabilities for Strategic Trajectory Coordination.
- Develop Initial Business Case for Operational Capabilities for Strategic Trajectory Coordination.

Program Plans FY 2014 – Performance Output Goals

Procedure Development:

- Develop Safety Risk Management Document (SRMD) for Lateral Procedures.
- Develop plan for Operational Trials for Lateral Procedures.

Web-Enabled Collaborative Trajectory Planning (CTP):

- Complete Operational Trial Data Collections & Analysis Report for Pre-Departure Web-Enabled CTP.
- Refine Requirements for Pre-Departure Web-Enabled CTP.
- Initiate Implementation Funding Request Package for Pre-Departure Web-Enabled CTP.
- Conduct Lab Demo for Integration with Web-Enabled CTP Capability #1.
- Conduct Ops Trial Planning for Integration with Web-Enabled CTP Capability #1.
- Conduct Lab Demo for Integration with Web-Enabled CTP Capability #2.
- Conduct Ops Trial Planning for Integration with Web-Enabled CTP Capability #2.

Oceanic Trajectory Management:

- Complete Investment Analysis (IA) Readiness documentation for Automation for In-Flight Trajectory Optimization (Vertical, speed, lateral).
- Develop Operational Trial Planning Document for Flight-Specific Likelihood Feedback Capability.
- Conduct Operational Trial for Flight-Specific Likelihood Feedback Capability.
- Conduct Operational trials with new controller procedures for Portfolio of Controller Enhancement #1.
- Conduct Ops Trial planning and execution with enhanced controller procedures for Enhancement #2.
- Develop Initial Business Case for Portfolio of Controller Enhancement #3.
- Develop Initial Business Case for Portfolio of Controller Enhancement #4.
- Conduct Lab Demonstration for Operational Capabilities for Strategic Trajectory Coordination Capability #1.
- Develop Final Requirements for Operational Capabilities for Strategic Trajectory Coordination Capability #1.
- Conduct Lab Demo for Operational Capabilities for Strategic Trajectory Coordination Capability #2.
- Develop Initial Business Case for Operational Capabilities for Strategic Trajectory Coordination Capability #3.

Program Plans FY 2015 – Performance Output Goals

Procedure Development:

- Develop Ops Trial Training Package/Procedures for Lateral Procedures.
- Conduct Ops Trial for Lateral Procedures.

Web-Enabled Collaborative Trajectory Planning (WE-CTP):
- Finalize Implementation Funding Request Package for Pre-Departure Web-Enabled CTP.
- Conduct Ops Trial for integration with Web-Enabled CTP Capability #1.
- Refine Requirements for Integration with Web-Enabled CTP Capability #1.
- Conduct Ops Trial for Integration with Web-Enabled CTP Capability #2.
- Conduct Lab Demo for Integration with Web-Enabled CTP Capability #3.

Oceanic Trajectory Management:
- Finalize Implementation Funding Request Package for Pre-Departure Optimization (Pre-Departure Planner).
- Refine Requirements for Flight-Specific Likelihood Feedback Capability.
- Conduct operational trials with new controller procedures for Portfolio of Controller Enhancement #2.
- Develop HITL scenarios and conduct simulations for Portfolio of Controller Enhancement #3.
- Conduct Ops Trial Planning and execution with enhanced controller procedures for Enhancement #3.
- Develop HITL scenarios & conduct simulations for Portfolio of Controller Enhancement #4.
- Develop Implementation Funding Request Package for Operational Capabilities for Strategic Trajectory Coordination Capability #1.
- Develop Final Requirements for Operational Capabilities for Strategic Trajectory Coordination Capability #2.
- Conduct Lab Demo for Operational Capabilities for Strategic Trajectory Coordination Capability #3.
- Develop Initial Business Case for Operational Capabilities for Strategic Trajectory Coordination Capability #4.

Program Plans FY 2016 – Performance Output Goals
Procedure Development:
- Initiate Data Collection & Analysis for Lateral Procedures.
- Develop Functional Requirements for Lateral Procedures.

Web-Enabled Collaborative Trajectory Planning (WE-CTP):
- Develop Implementation Funding Request Package for the integration with Web-Enabled CTP Capability #1.
- Refine Requirements for the integration with Web-Enabled CTP Capability #2.
- Conduct Ops Trial Planning for Integration with Web-Enabled CTP Capability #3.
- Conduct Lab Demo for Integration with Web-Enabled CTP Capability #4.

Oceanic Trajectory Management:
- Develop Implementation Funding Request Package for Flight-Specific Likelihood Feedback Capability.
- Develop Implementation Funding Request Package for Portfolio of Controller Enhancement #1.
- Develop Implementation Funding Request Package for Portfolio of Controller Enhancement #2.
- Conduct Ops Trial Planning and execution with enhanced controller procedures for Enhancement #4.
- Develop Implementation Funding Request Package for Operational Capabilities for Strategic Trajectory Coordination Capability #2.
- Develop Final Requirements for Operational Capabilities for Strategic Trajectory Coordination Capability #3.
- Conduct Lab Demo for Operational Capabilities for Strategic Trajectory Coordination Capability #4.
- Develop Initial Business Case for Operational Capabilities for Strategic Trajectory Coordination Capability #5.

Program Plans FY 2017 – Performance Output Goals
Procedure Development:
- Implement Funding Request Package for Lateral Procedures.
- Develop supporting materials for Funding Approval for Lateral Procedures.

Web-Enabled Collaborative Trajectory Planning (WE-CTP):
- Develop Implementation Funding Request Package for the integration with Web-Enabled CTP Capability #2.
- Conduct Ops Trial for the integration with Web-Enabled CTP Capability #3.
- Conduct Ops Trial Planning for the integration with Web-Enabled CTP Capability #4.
- Conduct Ops Trial for integration with Web-Enabled CTP Capability #4.
- Conduct Ops Trial Planning and execution with new controller procedures for Enhancement #3.

- Conduct Ops Trial Planning and execution with new controller procedures for Enhancement #4.
- Develop Implementation Funding Request Package for Operational Capabilities for Strategic Trajectory Coordination Capability #3.
- Develop Final Requirements for Operational Capabilities for Strategic Trajectory Coordination Capability #4.
- Conduct Lab Demo for Operational Capabilities for Strategic Trajectory Coordination Capability #5.

X, 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 implementing conflict resolutions between aircraft and airspace. It produces computer generated conflict resolution advisories (CRA), 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 two step lateral heading maneuvers and interim altitude step climbs) that can be transferred verbally by controllers and evaluate the impact these have on the Computer-Human Interface (CHI) design and system performance. This initial increment of capability, referred to as CRA Build 1, will provide an initial benefit in terms of more strategic resolutions for certain maneuver types but also enhance the existing capabilities by facilitating entry of clearances into the automation. As the research matures, more complex capabilities will be investigated for future implementation such as multiple horizontal segment maneuvers and additional maneuver constraints (e.g., metering, weather). 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. These later more complex capabilities shall be organized into additional incremental builds providing more and more benefits in terms of efficiency and safety.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013-2016 – Performance Output Goals

- None.

Program Plan FY 2017 – Performance Output Goals

- Complete benefits and safety assessments and begin technology transfer required for CRA Build 1 JRC decision.
- Develop operational concept for CRA Build 2 automation capability.
- Develop automation requirements document for CRA Build 2 capability.
- Develop the benefits case for CRA Build 2 capability.
- Develop safety assessment for CRA Build 2 capability.

1A09, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – REDUCE WEATHER IMPACT

FY 2013 Request $16.6M

- 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, supporting development of weather decision support tools, supporting integration of weather information into operations, supporting 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 weather radar and the Terminal Doppler Weather Radar (TDWR). 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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

Program Plans FY 2013 – Performance Output Goals

- Complete prototype demonstration of Flexible Terminal Sensor Network (FTSN) functionality, 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 weather observation requirements document.
- Deliver updated Observation Transition Plan.
- Deliver FTSN Design Document for 2013 Demonstration.
- Develop sensor blue prints for 10 Super Density Operations (SDO) Terminals.
- Coordinate and respond to EA roadmap and Idea to In-Service (I2I) initiatives and obligations.

Program Plans FY 2014 – Performance Output Goals

- Provide FTSN demonstration report.
- Update Performance Evaluation Unit Design Document.
- Initiate update to prototype FTSN retrofit and evaluation.
- Determine strategy and scope of FTSN Performance Evaluation Unit concept demonstrations.
- Begin development of GFI software package.
- Coordinate and respond to EA roadmap and I2I initiatives and obligations.

Program Plans FY 2015 – Performance Output Goals

- Initiate Screening Information Request for Performance Evaluation System.
- Continue development GFI software package.
- Initiate Wireless Field Evaluation.
- Complete update to prototype FTSN retrofit and evaluation.
- Test and evaluate updated prototype.
- Coordinate and respond to EA roadmap and I2I initiatives and obligations.

Program Plans FY 2016 – Performance Output Goals

- Complete Screening Information Request for Performance Evaluation System.
- Complete Wireless Field Evaluation.
- Qualify additional sources of production sensors.

- Begin Performance Evaluation Unit vendor selection.
- Complete development GFI software package.
- Test and evaluate updated prototype.
- Coordinate and respond to EA roadmap and I2I initiatives and obligations.

Program Plans FY 2017 – Performance Output Goals
- Complete Performance Evaluation Unit vendor selection.
- Complete Test and Evaluation of prototype.
- Prepare procurement for Performance Evaluation Units.
- Coordinate and respond to EA roadmap and I2I initiatives and obligations.

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, supporting development of weather decision support tools (DST), supporting integration of weather information into operations, supporting 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 that can be 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 to operational use, 3) developing and using metrics to evaluate the effectiveness of weather improvements and their usefulness 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, and 6) developing policies and guidance necessary for the allocation of roles and responsibilities in the provision and use of weather state information to meet FAA requirements and US commitments to ICAO. 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.

NWP establishes a common weather processing platform that will functionally replace the legacy FAA weather processor systems and host new capabilities. NWP will aid in reducing the rising operations and maintenance costs by consolidating weather product generation of weather processor systems such as: Weather and Radar Processor (WARP); Corridor Integrated Weather System (CIWS); and Integrated Terminal Weather System (ITWS). NWP will provide advanced aviation specific weather information through the assimilation of NWS forecast models with real time radar data extrapolation to produce a 0-8 hour convective weather forecast. NWP will perform Weather Translation which will enable the use of weather information by automated DSTs. NWP will also address consolidation solutions for weather displays. The implementation of these capabilities will be segmented in multiple work packages as the requirements become defined.

Standards and Recommended Practices (SARPS) will also be developed for the provision of Volcanic Ash and Space Weather information in graphics and performance metrics for enhanced forecasts and modeling. The global alignment of ICAO SARPS with US current and NextGen weather standards will also be conducted. Yearly policy analyses will be conducted and policy artifacts related to government and industry roles and responsibilities will be developed.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 aircraft routing 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 2013 – Performance Output Goals

- Obtain Final Investment Decision approval for NWP Work Package 1 (WP1).
- Award system development contract for NWP WP1.
- Deliver updates on maintaining 0-8hr convective weather forecast prototype (i.e., Consolidated Storm Prediction for Aviation (CoSPA)) operations at selected ATC facilities to support TFM.
- Deliver AIRman's METeorological Advisory (AIRMET) Quality Management System (QMS) documentation.
- Document opportunities for weather integration into emerging DSTs.
- Deliver report on technologies for translation of weather information into aviation weather constraints.

Program Plans FY 2014 – Performance Output Goals

- Conduct and monitor solution implementation activities for NWP WP1, through acquisition management and system engineering reports.
- Deliver updates on maintaining 0-8hr convective weather forecast prototype (i.e., CoSPA) operations at selected ATC facilities to support TFM.
- Complete Concepts and Requirements Definition Readiness (CRDR) activities for NWP WP2, to include improved convective forecast (priory need and preliminary shortfall).
- Deliver end-of-year QMS process management report.
- Document identifying opportunities for weather integration into emerging DSTs.
- Deliver report on developing technologies for translation of weather information into aviation weather constraints.
- In coordination with EUROCONTROL, deliver reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of global weather standards for NextGen and SESAR.

Program Plans FY 2015 – Performance Output Goals

- Continue to conduct and monitor solution implementation activities for NWP WP1, through acquisition management and system engineering reports.
- Achieve Initial Operational Capability (IOC) for NWP WP1 at Key Site.
- Deliver updates on maintaining 0-8hr convective weather forecast prototype (i.e., CoSPA) operations at selected ATC facilities to support TFM.
- Conduct Investment Analysis Readiness Decision (IARD) activities for NWP WP2, to include improved convective forecast (preliminary program requirements, Concept of Use, description of alternatives).
- Deliver end-of-year QMS process management report.
- Document identifying opportunities for weather integration into emerging DSTs.
- Deliver report on developing technologies for translation of weather information into aviation weather constraints.
- In coordination with EUROCONTROL, deliver reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of global weather standards for NextGen and SESAR.

Program Plans FY 2016 – Performance Output Goals

- Continue to conduct and monitor solution implementation activities for NWP WP1, through acquisition management and system engineering reports.
- Deliver updates on maintaining 0-8hr convective weather forecast prototype (i.e., CoSPA) operations at selected ATC facilities to support TFM.
- Complete IARD activities for NWP WP2, to include improved convective forecast (preliminary program requirements, Concept of Use, description of alternatives).
- Deliver end-of-year QMS process management report.
- Document identifying opportunities for weather integration into emerging DSTs.
- Deliver report on developing technologies for translation of weather information into aviation weather constraints.
- In coordination with EUROCONTROL, deliver reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of global weather standards for NextGen and SESAR.

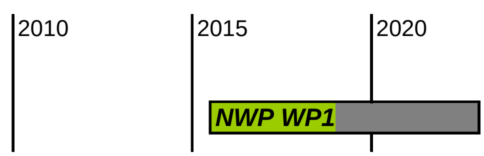
Program Plans FY 2017 – Performance Output Goals

- Continue to conduct and monitor solution implementation activities for NWP WP1, through acquisition management and system engineering reports.
- Initiate Initial Investment Analysis (IIA) activities NWP WP2, to include improved convective forecast (OMB-X300, Business Case Analysis Report, Market Survey).
- Deliver end-of-year QMS process management report.
- Document identifying opportunities for weather integration into emerging DSTs.
- Deliver report on developing technologies for translation of weather information into aviation weather constraints.
- In coordination with EUROCONTROL, deliver reports and presentations (e.g., position papers, guidance material) to ICAO to support the development of global weather standards for NextGen and SESAR.

System Implementation Schedule

NextGen Weather Processor (NWP) Work Package 1

WP 1 First site IOC: September 2015 -- Last site ORD: September 2018



1A10, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – ARRIVALS/ DEPARTURES AT HIGH DENSITY AIRPORTS

FY 2013 Request $11.0M

- A, Trajectory Mgmt – Surface Tactical Flow, G02A.01-01
- B, Trajectory Mgmt – Surface Conformance Monitor, G02A.01-02
- C, Trajectory Mgmt – Time Based Flow Management (TBFM) – Work Package 3, G02A.01-06

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

Program Description

The Trajectory Management - Surface Tactical Flow project is focused on improving the movement of traffic on the airport surface to reduce total travel time for each flight. It leverages ongoing FAA research using the Surface Decision Support System prototype platform and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This is required to safely improve the use of airport runways and taxiways.

The 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." It will require several improvements such as prepackaged and standardized taxi instructions and aircraft taxi monitoring to assure the pilot is following the assigned taxi route.

This project will demonstrate and document requirements for a series of capabilities that build to the NextGen vision for surface trajectory-based operations. Examples include local data exchange, leading to the sharing of flight readiness information and collaboration, which will integrate pre-planned runway schedules 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 reduced taxi time.

The project's concept and requirements development and acquisition process is designed to allow incremental steps toward complete implementation, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies. Testing and refining of requirements will be realized through several phases.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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. Street: Provide any available data on the potential increased capacity to be gained as a result of this capability.

Program Plans FY 2013 – Performance Output Goals
- Complete Surface Trajectory Based Operations (STBO) field evaluations at Memphis and Orlando and provide report detailing results of new capabilities.
- Complete field evaluations of Collaborative Departure Scheduling and provide report.
- Complete field evaluations of Time-Base Taxi Route Generation Tool and provide report.
- Complete Human in the Loop (HITL) Simulation of Collaborative Departure Scheduling.
- Complete HITL simulation of Time-Based Taxi Route Generation Tool.
- Complete HITL simulation of STBO Taxi Route Generation.
- Complete tech transfer of mature surface capabilities to TFDM system to include concept and requirements documentation.

Program Plans FY 2014 – Performance Output Goals
- Complete STBO field evaluations at Memphis and Orlando and provide report.
- Complete field evaluation of Collaborative Departure Scheduling and provide report.
- Complete field evaluation of Time-Based Taxi Route Generation Tool and provide report.
- Complete HITL of STBO Taxi Route Generation and provide report.
- Complete tech transfer of mature surface capabilities to TFDM system to include concept and requirements documentation.

Program Plans FY 2015 – Performance Output Goals
- Complete STBO field evaluations at Memphis and Orlando and provide report.
- Complete field evaluation of Collaborative Departure Scheduling and provide report.
- Complete field evaluation of Time-Based Taxi Route Generation Tool and provide report.
- Complete HITL of STBO Taxi Route Generation and provide report.
- Complete tech transfer of mature surface capabilities to TFDM system to include concept and requirements documentation.

Program Plans FY 2016 – Performance Output Goals
- Complete STBO field evaluations at Memphis and Orlando and provide report.
- Complete field evaluation of Collaborative Departure Scheduling and provide report.
- Complete field evaluation of Time-Based Taxi Route Generation Tool and provide report.
- Complete HITL of STBO Taxi Route Generation and provide report.
- Complete tech transfer of mature surface capabilities to TFDM system to include concept and requirements documentation.

Program Plans FY 2017 – Performance Output Goals
- Complete tech transfer of mature surface capabilities to TFDM system to include concept and requirements documentation.
- Conduct two field evaluations of Collaborative Departure Scheduling Tool and provide reports.
- Conduct field evaluation of initial full STBO capability and provide reports.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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. It can also reduce taxi times reducing surface delays at congested airports.

Program Plans FY 2013 – Performance Output Goals

- Conduct Human-in-the-Loop (HITL) simulation of Time-Based Surface Conformance Monitoring to support updating ConUse, Requirements, and Air Traffic Control (ATC) Procedures documents.
- Conduct field evaluation of Surface Conformance Monitoring (2D) at Orlando to support updating ConUse, Requirements, and ATC Procedures documents.

Program Plans FY 2014 – Performance Output Goals

- Conduct a HITL simulation of Time-Based Surface Trajectory Based Operation (STBO) Surface Conformance Monitoring evaluating the performance of pre-established taxi routes vs. controller-generated taxi routes in a TCM environment and controller workload. This HITL will support the updating of the Concept of Use, Requirements and ATC Procedures documents.
- Conduct a HITL simulation of Time-Based Surface Trajectory Based Operation (STBO) Surface Conformance Monitoring to evaluate the performance of the prototype taxi conformance algorithm. This HITL will support the updating of the Concept of Use, Requirements and ATC Procedures documents.
- Conduct initial field evaluation of Time-Based STBO Surface Conformance Monitoring to support the updating of the Concept of Use, Requirements and ATC Procedures documents.
- Conduct final field evaluation of 2D STBO Surface Conformance Monitoring. This field evaluation will support the development of the initial Concept of Use, Requirements, ATC Procedures documents along with the completion of a tech transfer of these documents to the TFDM program.

Program Plans FY 2015-2017 – Performance Output Goals

- None.

C, 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. Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. TMA is an automation system currently available that enables the use of time-based metering to optimize the flow of aircraft as they approach and depart congested airspace and airports. TMA has been field-tested over the past 10 years and is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM will improve upon TMA and directly address Solution Sets within the NextGen Implementation Plan.

TBFM Work Package 3 will prepare for a follow-on phase to the initial development of TBFM, which focuses upon further leveraging time-based metering capabilities to implement NextGen concepts, such as terminal metering, expanding Tower scheduling of departures to additional locations, integrating surface data into TBFM calculations to improve departure scheduling, enabling the opportunity for optimized descents during metering operations, and making TBFM more flexible to accommodate dynamic reroute operations in response to changing weather conditions.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Measure

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Target

The TBFM Work Package 3 will begin to 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 in organizing the arrival stream for maximum use of that airport capacity.

Program Plans FY 2013– Performance Output Goals
- Develop documentation to support TBFM WP3 acquisition management system requirements towards achieving an Investment Analysis Readiness Decision (IARD) in 2013. This documentation will include, concept of use, preliminary requirements, initial benefits information, initial cost data, and architecture artifacts.
- Continue to refine concepts and investment artifacts for TBFM WP3.

Program Plans FY 2014 – Performance Output Goals
- Achieve Final Investment Decision for TBFM Work Package 3, funded in prior year.

Program Plans FY 2015 – Performance Output Goals
- Award Work Package 3 enhancements/work to approved vendor.

Program Plans FY 2016-2017 – Performance Output Goals
- Implement enhancements per Final Investment Decision for TBFM Work Package 3.

1A11, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – COLLABORATIVE AIR TRAFFIC MANAGEMENT (CATM)

FY 2013 Request $24.2M

- 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, Collaborative Information Management (CIM), G05M.02-01
- H, 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 program is providing CONOPS, requirements and IRD document for the TMI information exchange to be implemented in ERAM.

This activity will also fund the requirements definition, and risk mitigation for increments of Flow Strategy integration, which addresses Airborne Re-route Execution, in the Post-release 3 timeframe.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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

Program Plans FY 2013 – Performance Output Goals

- Conduct studies, analysis, high fidelity prototype and operational evaluations to define requirements and risk mitigation for implementation in ERAM.
- Complete a risk assessment and initial requirements for the implementation into ERAM.

Program Plans FY 2014 – Performance Output Goals
- Complete requirement and risk mitigation documents for implementation in ERAM.

Program Plans FY 2015 – Performance Output Goals
- Initial deployment of Strategic Flow Management-Integration for airborne flights into ERAM.

Program Plans FY 2016 – Performance Output Goals
- Initiate analysis on the use of data communication for trajectory negotiation and airborne re-route and develop a report.

Program Plans FY 2017 – Performance Output Goals
- Develop a report for the engineering analysis on data communication for trajectory negotiation and airborne re-route.

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. The modeling results will be shared with the aviation community when evaluating these initiatives. Automated and enhanced post analysis capabilities will have the potential to feed the results back to the TMU originating the initiative. This project provides 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 (WP4) will be the vehicle for deploying NextGen mid-term CATM capabilities. These enhancements may 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Deliverables to support artifact development start in FY 2013 to support Investment Analysis Readiness Decision (IARD) in FY 2015:
  - 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 Initial Investment Decision (IID):
  - Updated program requirements document;
  - Draft initial Business Case;
  - Draft initial Implementation Strategy and Planning Document (ISPD); and
  - Plan for Final Investment Analysis (FID).

Program Plans FY 2017 – Performance Output Goals

- Finalize artifacts required for IID.
- Conduct IID.
- Initiate Final Investment Analysis activities.

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 achieving NextGen goals of "Shared Situational Awareness" and "Trajectory Based Operations". 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. Key elements 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Demonstrate prototype Special Activity Airspace (SAA) Editor.
- Develop artifacts to support Final Investment Decision (FID) approval for AIM Modernization Segment 2.
- Develop concept of operations for the collection and dissemination of standard operating procedure/letters of agreement (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.
- Demonstrate Airport Data management.

Program Plans FY 2014 – Performance Output Goals

- Document expansion of SOP/LOA capabilities to a wider range of stakeholders and SOP/LOA scenarios to support the final investment decision for AIM Modernization future segment.
- Perform safety assessments.
- Develop artifacts to support FID for AIM Modernization future segment.

Program Plans FY 2015 – Performance Output Goals

- Develop cross-domain requirements document for consumer (automation systems and decision support tools) of aeronautical information via the Aeronautical Common Services.

Program Plans FY 2016 – Performance Output Goals
- Develop interface requirements document with decision support tools and other automation using AIM information, for example, ERAM or TFDM. Specifically this effort will support acquisition engineering for those programs within the On-Demand NAS Information Portfolio in the Bravo timeframe (FY2015-FY2018).

Program Plans FY 2017 – Performance Output Goals
- None.

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

Program Description

The project objective is to enhance Traffic Flow Management (TFM) capabilities by integrating NAS data (e.g., weather, aeronautical, etc) and improving flight planning. This activity is structured into two parts – Unified Flight Planning and Filing (UFPF) and NAS Common Reference (NCR).

<u>Unified Flight Planning and Filing:</u>
The UFPF concept will define the standards for flight planning and flight plan filing which would enhance the demand modeling and prediction capabilities for the traffic flow management system. It will also improve the flight planning and monitoring processes for the airline flight operations centers by providing ATC and users with a common understanding of the NAS constraints.

<u>NAS Common Reference:</u>
The NAS Common Reference (NCR) will use standardized formats and mapping systems to ensure that user and the FAA have a common geographic reference when determining how to meet the future demand and capacity needs of the NAS. The NCR is a virtual, multidimensional, conceptual model that facilitates the storage, management, retrieval, and filtering of the various types of 3-D and 4-D geospatial and temporal information. The NCR will be used for exchanging geo-referenced information among and between all the interconnected NAS systems. It provides the basis for near real-time and strategic airspace and air traffic planning as well as for airspace analysis.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 by providing the NAS Users and ATM with a common understanding of the NAS Constraints.

Program Plans FY 2013 – Performance Output Goals
<u>Unified Flight Planning Filing:</u>
- Complete initial report on Shortfall Analysis.
- Complete initial report on UFPF Benefit Justification.
- Complete development of Concept and Requirement Definition Readiness (CRDR) Briefing Package.

<u>NAS Common Reference:</u>
- Conduct Demo 3 – NCR and UFPF Interoperation in SWIM Environment.
- Develop Long-term Demo Framework Analysis for Demos 4, 5, & 6.
- Conduct Demo 4 – NCR with Live Data Feed (Special Activity Airspace (SAA) and NOTAMS).

- Develop Concept Validation Plan and Post Demonstration Analysis for NCR and UFPF Interoperation in SWIM Environment Demonstration.
- Develop Concept Validation Plan and Post Demonstration Analysis for NCR with Live Data Feed (NOTAM, SAA) Demonstration.
- Complete the Concept and Requirements Definition (CRD) Documentations.
- Develop NCR ConOps.

Program Plans FY 2014 – Performance Output Goals
Unified Flight Planning Filing:
- Complete Functional Analysis report.
- Complete Preliminary Requirements report.
- Develop initial report on Range of Alternatives.
- Complete initial report for Estimated Costs and Benefits Analysis.

NAS Common Reference:
- Conduct Demo 5 – Governance of Access Control.
- Conduct Demo 6 – Assess Equipment type and its trajectory against weather constraint.
- Develop Concept Validation Plan for NCR Demo 5 – Governance of Access Control Demonstration.
- Develop Concept Validation Plan for NCR NCR Demo 6 – Assess Equipment type and its trajectory against weather constraint.
- Develop Post Demonstration Analysis for NCR Governance of Access Control Demonstration.
- Develop Long-term Demo Framework for Demo 7 and 8.
- Develop the Investment Analysis Readiness Decision (IARD) Documentation.

Program Plans FY 2015 – Performance Output Goals
Unified Flight Planning Filing:
- Complete Investment Analysis Plan.
- Complete final report on Range of Alternatives.
- Complete final report for Estimated Costs and Benefits analysis.
- Achieve IARD Milestone.

NAS Common Reference:
- Develop Post Demonstration Analysis for Demo 6.
- Conduct Demo 7 – TMI referencing capability.
- Conduct Demo 8 – Master Integrated Demo.
- Develop Concept Validation Plan and Post Demonstration Analysis for NCR Demo 7 – TMI Referencing Capability.
- Develop Concept Validation Plan and Post Demonstration Analysis for NCR Demo 8 – Master Integrated Demonstration.
- Develop the Investment Analysis Readiness Decision (IARD) Documentation.

Program Plans FY 2016 – Performance Output Goals
Unified Flight Planning Filing:
- Develop Initial Investment Analysis (IIA) documentation.

NAS Common Reference:
- Conduct Analysis to establish the ACAT determination request, complete the form and submit the form for approval.
- Prepare IARD Package and Briefing for Presentation to Acquisition Executive Board (AEB).

Program Plans FY 2017 – Performance Output Goals
Unified Flight Planning Filing:
- Develop Final Investment Analysis (FIA) documentation.

NAS Common Reference:

- Develop Initial Investment Analysis (IIA) documentation including Analysis of Alternatives, Business Case Analysis, and Program Requirements Update.

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

Program Description

NAS systems currently operate as separate entities servicing different flight domains. Similarly, International Air Navigation Service Providers (ANSPs) also operate as separate entities servicing their own airspaces. Whereas a flight may "exist" across the NAS and be found in NAS systems, a unified, complete, accurate, up-to-date, and easily-accessible picture of any and all flights does not exist today. The goal of the Flight Object program is to develop an International data standard, "FIXM" (Flight Information Exchange Model). This data standard will support the exchange of flight information between systems across multiple domains (including both NAS and International). The use of standardized flight data will increase data quality and availability between stakeholders, enabling operational benefits such as increased coordination, common situational awareness, and collaborative decision-making across all phases of flight, thereby improving planning, decision making, and NAS capacity. Additionally, as new technologies emerge and drive solution development, the use of FIXM will improve system-to-system interoperability and can alleviate integration challenges between legacy and future systems, reducing engineering and deployment costs.

The Flight Object is intended to be the standard medium for capturing and sharing the most up-to-date information on any flight, and will serve as the single common reference for all system information about that flight. A Flight Object will be created for each proposed flight, and the Flight Object information will be updated throughout the entire lifecycle as the flight progresses from gate to gate. The Flight Object will collect, manage and provide flight-specific data, such as aircraft identification, aircraft parameters, current flight plan information, operator preferences, flight capabilities, and security information The Flight Object will not include environment or weather information, since these are system-wide elements that affect multiple flights. The total information contained in the Flight Object will be much richer than today's flight data construct.

To support development of the FIXM standard, additional work efforts of the Flight Object program will include engineering for creation of the following artifacts: Flight Object Data Dictionary, data models and XML schema, engineering analysis reports, requirements documents, and AMS (Acquisition Management System) documents. Demonstrations will also be conducted to permit engineering evaluations of Flight Object in a laboratory environment. To facilitate these work efforts, continuous collaboration will occur with FAA stakeholders, International partners, and industry, via multiple forums including the Flight Object Working Group (FOWG), International FIXM Forum, and FIXM conferences.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Both the users and the ATM service providers can benefit from the increased efficiency of well-coordinated capabilities that share common flight information elements. Greater visibility of all aircraft in the NAS will improve strategic planning and improve capacity by having a more complete picture of system demand.

Program Plans FY 2013 – Performance Output Goals

- Conduct International Flight Object demonstration.
- Develop Flight Object Data Dictionary to support Flight Information Exchange Model (FIXM) v2.0 and v2.1. This update is based upon the Flight Object Data Dictionary completed in FY 2012 in support of FIXM v1.1.
- Develop FIXM v1.1 and v2.0 in collaboration with NAS and International partners.
- Develop the draft preliminary Flight Object Requirements Document.
- Complete documentation supporting the AMS (Acquisition Management System) process for IARD (Investment Analysis Readiness Decision) and the effort to transition Flight Object to JRC and implementation.
- Complete the Flight Object Exchange System (FOXS) Requirements Document.

Program Plans FY 2014 – Performance Output Goals

- Update the Flight Object Data Dictionary to support FIXM v3.0. This update is based upon the Flight Object Data Dictionary completed in FY 2013 in support of FIXM v2.0.
- Continue the development of FIXM, including data modeling and XML schema, and deliver FIXM v2.1 and v3.0.
- Conduct the International Flight Object demo for Mini-Global, based upon the plan developed in FY 2013.
- Prepare the plan for the next International Flight Object demo to demonstrate Flight Object usage outside of the laboratory environment.
- Complete Preliminary Flight Object Requirements document, based upon the draft Flight Object Requirements completed in FY 2013.
- Develop an engineering report on results of engineering evaluations conducted in a laboratory environment for identification and analysis of Flight Object engineering issues.
- Prepare documentation supporting the AMS process for IID (Initial Investment Decision) and the effort to transition Flight Object to JRC and implementation.

Program Plans FY 2015 – Performance Output Goals

- Update the Flight Object Data Dictionary to support FIXM v4.0 and v5.0. This update is based upon the Flight Object Data Dictionary completed in FY 2014 in support of FIXM v3.0.
- Continue the development of FIXM, including data modeling and XML schema, and deliver FIXM v4.0.
- Conduct International Flight Object demo to demonstrate Flight Object usage outside of the laboratory environment, based upon the plan developed in FY 2014.
- Develop an engineering report on results of engineering evaluations conducted in a laboratory environment for identification and analysis of Flight Object engineering issues. Focus includes evaluation of various SWIM interfaces.
- Complete documentation supporting the AMS process for FID (Final Investment Decision) and the effort to transition Flight Object to JRC and implementation.

Program Plans FY 2016 – Performance Output Goals

- Update the Flight Object Data Dictionary to support FIXM v6.0. This update is based upon the Flight Object Data Dictionary completed in FY 2015 in support of FIXM v5.0.
- Continue the development of FIXM (Flight Information Exchange Model), including data modeling and XML schema, and deliver FIXM v5.0.
- Prepare the plan for the next International Flight Object demo to demonstrate Flight Object usage outside of the laboratory environment.
- Develop an engineering report on results of next phase of engineering evaluations conducted in a laboratory environment for identification and analysis of Flight Object engineering issues.
- Prepare additional documentation supporting the AMS process and the effort to transition Flight Object to JRC and implementation.

Program Plans FY 2017 – Performance Output Goals

- Continue the development of FIXM, including data modeling and XML schema, and deliver FIXM v6.0.
- Conduct International Flight Object demo to demonstrate Flight Object usage outside of the laboratory environment, based upon the plan developed in FY 2016.

- Develop an engineering report on results of next phase of engineering evaluations conducted in a laboratory environment for identification and analysis of Flight Object engineering issues.
- Complete documentation for conclusion of the AMS process and JRC approval for the implementation process.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

This program will contribute to the average daily airport capacity metric by providing the modeling and analysis needed to modify airspace and procedures. This will result in more efficient use of airspace thereby increasing capacity.

Program Plans FY 2013 – Performance Output Goals

- Best Equipped Best Served Greenfield Analysis:
  - Complete evaluation of new airspace and procedure design.
  - Complete transition plan for possible implementation.
  - Conduct Operational Trial for selection applications and capabilities.
  - Identify sites for Operational Trials to validate the design and modeling results of the airspace and procedures as well as gain operational experience in the Best Equipped Best Served operational environment.
- Greener Skies Research and Development:
  - Complete transition of research to Greener Skies Design and Implementation team for implementation at the key site.

Program Plans FY 2014 – Performance Output Goals

- Greener Skies Research and Development:
  - Conduct operational trial of advance RNAV/RNP capabilities for use with ILS and RNP.
  - Complete analysis of training requirements for use of advance RNAV / RNP capability for ILS and RNP procedures.

- Develop criteria for use of advance RNAV / RNP capabilities for use in procedures.
- Complete analysis of automation requirements needed to support advance RNAV / RNP capabilities for ILS and RNP procedures.

Program Plans FY 2015-2017 – Performance Output Goals
- None

G, Collaborative Information Management (CIM), G05M.02-01

Program Description

Collaborative Information Management (CIM) is an information sharing capability that promotes inter-agency communication and collaboration through the use of modern network enabled tools, technologies, and operational procedures for terminal or en-route; envisioned to provide the stakeholders with the connectivity and interoperability necessary to rapidly and dynamically share information**.**

Currently, flight data for Unmanned Aircraft Systems (UAS) during both normal and abnormal flight conditions is not readily available for Air Traffic Control (ATC). CIM aims to improve information flows to Air Traffic Control and assess the improvement provided to the controller. Utilizing enhanced flight data such as aircraft intent and trajectories, as well as advanced airspace coordination concepts, CIM will analyze controller workload and ease of coordination in both normal and abnormal UAS flight conditions.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

With collaborative situational awareness tools available to the FAA, DoD and DHS, 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 2013 – Performance Output Goals
- Conduct a test of SWIM publish/subscribe capability with one partner government agency (DoD, DHS).
- Conduct initial gap analysis of partner agency cyber security system against FAA security protocols for development of SWIM interface.
- Deliver draft implementation plan of test architecture for SWIM connection and publish/subscribe capability to partner agency.

Program Plans FY 2014-2017 – Performance Output Goals
- None.

H, System Development – Information Management, G05M.03-01

Program Description

The Information Management Program addresses issues 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
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Relationship to Performance Metric

The goal is to ensure that in the transformation to NextGen, the necessary and required information sharing to improve situational awareness are provided with guaranteed performance. Implementation of Information Management will allow Information to be shared at a level of service that will enable the NAS to more efficiently manage NAS resources to optimize capacity in the system.

Program Plans FY 2013 – Performance Output Goals
- Complete information sharing requirements document.
- Complete an initial shortfall document – with respect to information management based on this analysis.
- Develop initial draft of the Information Management Functional Description Document.

Program Plans FY 2014 – Performance Output Goals
- Complete Concept of Use Document for Information Management and governance.
- Complete Information Management Functional Description document.
- Develop responsibility matrix for information publishing.
- Complete initial Information Management Governance document.
- Complete report on performance monitoring methods to ensure delivery of agreed service performance.

Program Plans FY 2015 – Performance Output Goals
- Complete responsibility document for information publishing.
- Develop final Information Management Governance document.

Program Plans FY 2016 – Performance Output Goals
- Develop information performance monitoring guidance document.

Program Plans FY 2017 – Performance Output Goals
- Complete common information protocols and standards documentation.

1A12, Next Generation Air Transportation System (NextGen) – Flexible Terminal Environment

FY 2013 Request $30.5M

- 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, 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 – Alternative Positioning Navigation and Timing (APNT), G06N.01-06
- I, Trajectory Mgmt – Arrivals, G06N.02-01
- J, Trajectory Mgmt – Enhancing Terminals and Airports – Reduced RVR Minima, G06N.02-02

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 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, in determining when favorable crosswinds exist in relation to an airport’s Closely Spaced Parallel Runways (CSPR). WTMD alerts ATCTs when these favorable meteorological conditions would allow reduced departure spacing. The ATCT personnel 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 and fleet mix dependent, 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 to implement WTMD at the remaining seven candidate airports.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 aircraft spend (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 2013 – Performance Output Goals
- Complete benefit and safety assessment documentation.
- Complete evaluation report and documentation for investing in seven additional WTMD airports.
- Develop simulation environments for the next 4 WTMD candidate airports – with controller familiarizations.
- Regional installation and checkout for WTMD at 3 ATCTs.
- Develop WTMD controller and technician training package for 4 WTMD airports & conduct training.
- Setup T1 lines for four additional airports.

Program Plans FY 2014 – Performance Output Goals
- Complete documentation of WTMD Operational demonstration evaluations at installed airports.
- Complete regional service center engineering and installation of WTMD Phase 2 hardware and associated data links in 5 of the 6 remaining airports – WTMD becomes operational at these 5 airports.
- Complete regional service center engineering and installation of WTMD Phase 2 hardware and associated data links at the 10th airport ATCT – WTMD becomes operational at this last airport.

Program Plans FY 2015-2017 – Performance Output Goals
- None

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

Program Description

This program will evaluate air traffic control wake separation minima 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 (CSPR) (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 2013 will initiate an evaluation at a selected airport of an ATC decision support tool that will aid controllers in providing safe and efficient wake mitigation aircraft separations during use of WTMA procedures in instrument landings on an airport's CSPR. WTMA-Procedural (WTMA-P) allows reduced wake separations to be applied during airport instrument landing operations at airports that meet certain runway layout criteria. WTMA-System (WTMA-S) utilizes predicted crosswinds on the approach to enable controllers to use reduced wake separations during airport instrument CSPR landing operations. It can be used at a wide range of CSPR airports – but only during favorable crosswind conditions at the airports. It will use the WTMA-P Decision Support Tool (DST) to display the reduced separations when crosswinds are sufficient to enable their safe use. WTMA-S will provide information to traffic management for predicted times when the airport will have a higher CSPR arrival rate, due to WTMA-S enabled reduced required wake separations.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 diagonal dependent wake separations during instrument approach operations to an airport's closely spaced parallel runways in all wind conditions at some airports and at many other airports when the decision support tool is enhanced to factor in favorable crosswinds. – resulting in 8 to 10 more CSPR landings (depending on fleet mix) 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 2013 – Performance Output Goals

- Complete Engineering development of WTMA information displays, NAS interfaces and associated Interface Requirements Documents (IRDs).
- Complete documentation of weather data analysis and wind forecast algorithm needs to support WTMA.
- Finalize WTMA-Procedural (WTMA-P) Automatic Terminal Proximity Alert (ATPA) software, procedures, and Noise Compatibility Program (NCP) for candidate airport.
- Begin operational use of WTMA-P at candidate airport.

Program Plans FY 2014-2016 – Performance Output Goals

- None – work will resume on this project in 2017.

Program Plans FY 2017 – Performance Output Goals

- Initiate enhancement of the WTMA decision support tool design to incorporate crosswind information [along the airport approach corridor in its determination of minimum safe diagonal dependent spacing between aircraft during WTMA approach operations].

C, SURFACE/TOWER/TERMINAL SYSTEMS ENGINEERING, G06A.02-01

Program Description

The Surface/Tower/Terminal Systems Engineering program is an early stage developmental program to refine and validate Terminal NextGen concepts for improving the efficiency of traffic flow in the terminal area. This program will reduce the risks inherent with introducing new technology and operational procedures using Systems Engineering analysis that examines the integrated use of techniques and equipment necessary to achieve these efficiencies. System engineering will consider the impact on the National Airspace System (NAS) architecture and the needed changes throughout the product development lifecycle for terminal systems. This program will create specific products for use by the Terminal Services organization as they develop the final system configuration.

The Surface/Tower/Terminal Systems Engineering program will primarily address Terminal Flight Data Manager (TFDM) capabilities. The program will aid in the development and concept demonstration of a prototype TFDM system at one or more operational field facilities, in order to reduce risk and validate requirements and benefits for the proposed TFDM acquisition. TFDM will provide an integrated surveillance and flight data automation system which will improve tower controllers' common situational awareness in order to support the NextGen Concept of Operations. Concept engineering activities include analysis, evaluation, and assessments to develop and mature concepts for changes to Air Traffic Control Tower (ATCT) automation. The program reduces technical risks by conducting demonstrations and evaluations of a TFDM prototype. The program reduces operational risks by:

- Developing a comprehensive and mature TFDM Concept of Operations,
- Operating pre-production Decision Support Tools (DSTs) at operational sites,
- Analyzing the near-term benefits available from DSTs, and
- Conducting Human-In-The-Loop (HITL) tests to understand human factors issues.

TFDM provides several enhancements for tower personnel and provides an automation system that:

- Integrates flight data with terminal area and surface surveillance data, where available, including associated alerts and alarms indicating potentially unsafe conditions on the surface or between arriving and departing aircraft.
- Electronically processes and distributes flight data to different control positions in the tower.
- Provides a suite of DSTs that assist air traffic controllers in providing efficient and safe airport operations.
- Consolidates disparate legacy tower systems into an open, scalable architecture. Consolidation and replacement of legacy platforms, input devices, and displays will allow better use of limited tower cab space and reduce equipment end-of-life issues.
- Provides a platform for flight data exchange for the terminal, en route and traffic management domains and enhances collaborative tactical decision making for airport surface operations.
- Publishes data to internal and external NAS stakeholders.
- Receives data from internal and external NAS stakeholders.

Use of common data will make TFDM a highly integrated tower automation system. The electronic processing and distribution of flight data will enhance data exchange between the en route, terminal, and Traffic Flow Management (TFM) domains; Airline Operations Centers (AOCs); and Airport Operators. The DSTs will provide tower controllers with the first major automated decision support tools beyond Airport Surface Detection Equipment-Model X (ASDE-X). TFDM will provide an integrated tower automation environment supporting:

- Flight Data,
- Surveillance Data ,
- Tower Management,
- Aeronautical and Weather Data,
- Decision Support Tools, and
- Tower platform consolidation.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 improve control of air traffic in the terminal airport arena. This project will ensure smoother transition into and out of the NAS terminal 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 2013 – Performance Output Goals

- Conduct prototype development and demonstration of the Tower Flight Data Manager (TFDM) system. Perform evaluation of TFDM prototype at Dulles Airport:
  - Demonstrate TFDM enhancements derived from DFW demonstrations,
  - Demonstrate adaptability of TFDM to a second site,
  - Demonstrate ASDE-X Surface Surveillance data, enhanced displays and alerts integrated with flight data,
  - Demonstrate 2-Way Flight Data exchange between TFDM and En Route automation, and
  - Demonstrate TFDM in an operational Air Traffic environment with live data.
- Perform Technology Transfer of initial Surface Trajectory-based Ops Decisions Support Tools (DSTs) into TFDM prototype and acquisition.
- Conduct demo of the Airline Operations Center Interface.
- Develop TRACON automation Concept Engineering Plan.
- Develop artifacts to support Final Investment Decision (FID) for the core TFDM system.
- Complete validation plans, procedures, and results for TFDM Core functions and near term DSTs.
- Complete validation and documentation of detailed TFDM algorithm and performance requirements for transfer to the production contractor.

Program Plans FY 2014 – Performance Output Goals

- Conduct demos/evaluations to assess interface requirements in the field of TFDM DST integration with TFMS and TBFM systems.
- Complete risk mitigation analysis report for TFDM Work Package 1 via prototype development and demonstration.
- Develop high level architecture and requirements for TFDM Work Package 2. Work packages will be determined after IID/FID of core package.
- Conduct risk mitigation of TFDM Work Package 2 via prototype development and demonstration.
- Develop Concept of Operations for TAMR NextGen Segment Bravo (2015-2018).
- Develop TRACON Research Transition Plan for NextGen Terminal.
- Develop Terminal-Level Systems Engineering Products:
  - Tower and TRACON-level enhancement Roadmaps.
  - Future “To-Be” architecture for Terminal.

Program Plans FY 2015 – Performance Output Goals
- Complete risk mitigation analysis report for TAMR NextGen Segment Bravo via prototype development and demonstration.
- Update TRACON Research Transition Plan for NextGen Terminal.
- Update TRACON automation Concept Engineering Plan.

Program Plans FY 2016 – Performance Output Goals
- Develop demonstration reports.
- Update artifacts for investments.

Program Plans FY 2017 – Performance Output Goals
- Complete concept engineering and requirements definition of TFDM Work Package 2.
- Finalization and tech transfer of TFDM Work Package 1.

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

Program Description

The current voice-oriented air/ground communications capabilities, and the safety critical air/ground data communications capabilities of Segments 1 and 2 of the Data Communications Program will not provide access foe the larger NextGen data needs of users in the airport surface environment. These larger NextGen data needs can be met by globally harmonized standards based communications of the Aeronautical Mobile Airport Communications System (AeroMACS). AeroMACS will support future increases in capacity by allowing faster, larger volume and more reliable communication with aircraft and ground vehicles on the airport surface.

NextGen solution set 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 AeroMACS system. This project will address both fixed and mobile communications dealing with Safety and Regularity of Flight applications which are data intensive and will not be supported by the Data Comm system including Digital Operational Terminal Information Services (D-OTIS), Data Link Taxi Instructions (D-Taxi: Graphical), and Weather in the Cockpit. This program work will specifically support the development and validation activities taking place in RTCA and EUROCAE to develop a Profile Standards document and a Minimum Operational Standards (MOPS) document which can be used for the procurement of a globally harmonized wideband communications system on the airport surface.

<u>C-Band Communications Standard</u>
- Determine IEEE (Institute of Electrical and Electronic Engineers) 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 to enable the procurement and implementation of a globally harmonized wideband communications system on the airport surface.
- 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:

<u>C-Band Communications</u>
- 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Improving the speed and reliability of ground communications would increase airport's capacity for ground operations which would improve overall system capacity and reduce aircraft delays.

Program Plans FY 2013 – Performance Output Goals

- Develop Investment Analysis Documentation.
- Complete Validation of the Minimum Operational Performance (MOPS) document.
- Complete investigation of Flexible Airborne Architecture.

Program Plans FY 2014-2017 – Performance Output Goals

- None.

E, SEPARATION MGMT – APPROACHES, GROUND BASED AUGMENTATION SYSTEM, G06N.01-01

Program Description

The Ground Based Augmentation System (GBAS) augments the current Global Positioning System (GPS) service for terminal non-precision, and precision approaches in the NAS. GBAS is a 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). GBAS will eliminate the need to install ILS localizers, however approach lighting systems are required. The GBAS determines a correction to the GPS signal and that correction is transmitted for use by aircraft instrumentation to ensure the accuracy necessary for guidance to a runway end during limited visibility conditions.

GBAS is a component of the FAA plan to transition from a ground-based navigation and landing system to a satellite-based navigation system. The strategy to achieve this capability is to initially develop and approve a single-frequency GBAS to provide Category I service and improve this architecture to provide Category II/III service. The FAA will not deploy Category I GBAS based on cost-benefit analysis as well as duplication of capabilities provided by WAAS but plans to deploy Category II/III GBAS at qualifying locations. The development efforts for GBAS to provide guidance for Category III approach and landing operations will be known as GBAS Approach Service Type D (GAST-D). Honeywell International proceeded with a non-federal GBAS development following the FAA decision, and submitted its Category I SLS-4000 GBAS station to the FAA for System Design Approval (SDA). The system was granted FAA approval in September 2009 and may be implemented by airport authorities based on their customer requests.

The Port Authority of New York and New Jersey (PANYNJ) purchased the first SLS-4000 unit for use in the United States. Service approval and initial operations of the GBAS station, installed at Newark (EWR), continues to be delayed due to excessive Radio Frequency Interference (RFI) in the GPS band at this location. The FAA is working cooperatively with the PANYNJ to address this issue. The FAA is also working cooperatively on a second SLS-4000 installation is planned for Houston (HOU) to support Continental/United Airlines efforts for Newark-Houston city pair operations. Boeing installed an additional SLS-4000 at Moses Lake Airport (MWH) in Washington for its flight validation efforts.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
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Relationship to Performance Metric

GBAS will allow for increased flexibility in the Terminal Area by eliminating the capacity constraint due to ILS critical area limitations and thus reducing arrival and taxi delays. 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 2013 – Performance Output Goals

- Complete testing of commercially developed RFI-Robust GBAS Category III Prototype Ground System.
- Complete requirements development for RFI-Robust GBAS Category III prototype avionics.
- Complete review of System Design Approval (SDA) artifacts by the GBAS technical team, leading toward Non-Federal GBAS Category III approval in FY 2016.

Program Plans FY 2014 – Performance Output Goals

- Complete prototype and requirements development of GBAS Approach Service Type D (GAST-D).
- Complete Standards and Recommended Practices (SARPs) validation activities for GAST-D design modification to address impact of local GPS RFI.
- Conduct assessments and flight test support of CAT I non-Federal GBAS systems, to gain operational experience for Cat III GBAS.

Program Plans FY 2015 – Performance Output Goals

- Complete initial documentation for GBAS SDA for GAST-D.
- Complete data collection and analysis of CAT I non Federal GBAS systems for proof of concept of Cat III GBAS.

Program Plans FY 2016 – Performance Output Goals
- Complete GBAS SDA activities for GAST-D.
- Conduct studies for Cat III multi-constellation GNSS interoperability and requirements formulation.

Program Plans FY 2017 – Performance Output Goals
- Conduct studies for Cat III multi-constellation GNSS interoperability and requirements formulation.

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 Instrument Meteorological Conditions (IMC). CSPO will develop the performance requirements that enable the implementation of innovative procedures, tools and/or controller/pilot aids that increase capacity at airports utilizing multiple independent and dependent operations. 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. Furthermore, CSPO will identify potential alternatives for meeting functional requirements such as the application of existing and new technologies to current standards, reevaluation of the applicability of the blunder model assumptions and the use of the model on risk assessments, the application of emerging NextGen technologies to current standards, and the development of new standards to facilitate NextGen applications.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Deliver RNAV/RNP (GPS) interim report.
- Deliver WAAS/LAAS interim report.
- Deliver SAT/NAV/ILS w/ High Update Radar (HUR) interim report.
- Update modeling & simulation toolset.
- Deliver Triple/Quad Approach interim report.
- Complete the Simplified Aircraft-Based Paired Approaches (SAPA) algorithm feasibility report..
- Deliver SAPA interim report.

Program Plans FY 2014 – Performance Output Goals
- Develop paired departure concept.
- Conduct dual RNAV/RNP human-in-the-loop simulation (HITL).
- Conduct field data collection effort in support of HITL.

- Develop SAPA feasibility report.
- Finalize SAPA design.
- Conduct implementation of CSPO at applicable airports.
- Complete enhancements to the CSPO blunder simulation model.

Program Plans FY 2015 – Performance Output Goals
- Achieve SAPA concept IOC.
- Conduct Triple Approaches HITL #7.
- Conduct field data collection effort in support of HITLs.
- Conduct Triple Approaches HITL #8.
- Conduct implementation of CSPO at applicable airports.
- Complete enhancements to the CSPO blunder model.

Program Plans FY 2016 – Performance Output Goals
- Complete enhancements to the CSPO blunder model.
- Conduct human-in-the-loop simulations to bring paired departure and SAPA concepts to IOC.
- Conduct implementation of CSPO at applicable airports.

Program Plans FY 2017 – Performance Output Goals
- Conduct implementation of CSPO at applicable airports.
- Finalize Paired Departure Concept.
- Finalize SAPA concept.
- Achieve SAPA IOC.
- Achieve Paired Departure IOC.

G, SEPARATION MGMT – APPROACHES, NEXTGEN NAVIGATION INITIATIVES, G06N.01-03

Program Description

This program supports NextGen goals related to increasing capacity during Instrument Meteorological Conditions (IMC). It is laying the foundation to increase and improve use of area Navigation (RNAV) using Distance Measuring Equipment (DME) in the terminal domain, and improving situational awareness on the airport surface, especially during low visibility. The two main program elements address each of these areas.

<u>Terminal RNAV DME-DME:</u>
This program supports terminal RNAV through use of DME-DME (use of 2 or more distance measuring navigational aids) down to 2000 feet above ground level (AGL) and potentially to the Final Approach Fix (FAF), with and 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 expansion of NextGen RNAV benefits to 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, as well as associated FAA Orders. Implementing DME-DME RNAV requires the spectrum office to perform case-by-case analysis on each runway to determine if Expanded Service Volumes (ESVs) are feasible and plan how to implement them. The results of this work could allow each DME to have an ESV larger than the existing service volume, greatly enhancing the NAS capability and flexibility. Research and testing is focused on determining the technical issues that are required to allow for DME-DME RNAV without IRU.

<u>Surface Navigation:</u>
This program is focused on developing a concept of operations (CONOPS) to provide the pilot in the cockpit 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, Head-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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

This program supports the increased capacity goal by enabling an:

- Increased number of arrivals and/or departures at high density airports;
- Decreased number of flight delays, cancellations, and/or diversions under IMC;
- Increased capacity and fuel savings for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan);
- Increased 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;
- Greater number of users to utilize Performance Based Navigation; and
- Greater throughput through increased surface navigation capability and situational awareness.

Program Plans FY 2013 – Performance Output Goals

<u>Terminal RNAV DME-DME:</u>

- Complete the Business Case Analysis.
- Complete an Alternatives Analysis.
- Complete DME Testing Analysis.
- Perform Operational Site Testing & Demonstrations.
- Complete an update of the National Standards based on testing results.
- Develop Acquisition Management System (AMS) artifacts as defined within the NAS Enterprise Architecture for Navigation Services.

<u>Surface Navigation:</u>

- Complete Business Case Analysis.
- Complete DME Testing Analysis.
- Complete performance requirements and finalization of historical data review.

Program Plans FY 2014 – Performance Output Goals

<u>Terminal RNAV DME-DME:</u>

- Finalize and coordinate changes to National Standard (1982).
- Complete implementation and training plan for NAS operations.

<u>Surface Navigation:</u>

- Conduct demonstrations of advanced navigational technologies and cockpit interactions.
- Complete the Concept of Operations (CONOPS) document.

Program Plans FY 2015 – Performance Output Goals

<u>Surface Navigation:</u>

- Complete an Alternatives Analysis.

Program Plans FY 2016 – Performance Output Goals
Surface Navigation:
- Conduct coordination of operational implementation at a key site.

Program Plans FY 2017 – Performance Output Goals
Surface Navigation:
- Continue coordination of operational implementation at key sites.

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

Program Description

The Separation Management – Alternative Positioning, Navigation, and Timing (APNT) project will investigate three alternatives for providing a back up for Global Positioning System (GPS)-based position, navigation, and timing (PNT) services. It will investigate Enhanced Distance Measuring Equipment (DME), Wide Area Multi-lateration, and Pseudolites. Many of the NextGen Operational Improvements depend on position, navigation, and timing (PNT) services to enable area navigation (RNAV) and required navigation performance (RNP). This means there is a significantly greater dependence on GPS-based PNT. National Policy (HSPD-7/NSPD-39) requires the FAA to provide a backup in the event of a GPS interference event or outage to maintain safety and security and preclude significant economic impact. NextGen APNT will provide a means to continue RNAV and RNP operations to a safe landing during periods when Global Navigation Satellite Systems (GNSS) services are unavailable.

GNSS PNT services utilizing the global positioning system (GPS) along with satellite-based augmentation systems (SBAS) are expected to be the primary enablers of performance-based navigation (PBN) and automatic 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 aging legacy systems for GNSS alternative navigation. Existing systems, consisting of VOR, DME and TACAN, do not fully support RNAV and RNP or Trajectory Based Operation. The NextGen APNT will explore the full range of alternatives to provide the NAS with a GPS independent backup to support performance based navigation and as a secondary benefit provide PBN to aircraft not equipped with GNSS services.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

This program supports maintaining operational availability of the NAS by ensuring PNT services remain available during GNSS outages and for aircraft not equipped to use GNSS.

Program Plans FY 2013 – Performance Output Goals
- Complete operational assumptions document for PNT needs in the NextGen future environment.
- Develop alternatives definition document to include Enhanced DME, Wide Area Multilateration (WAM), and Pseudolite.
- Develop an analysis document for each alternative with updated coverage predictions, identified shortfalls, assessment of potential accuracy, integrity, availability, continuity, and costs.

- Develop document assessing security technology, common time reference future RFI environment.
- Award contract(s) to develop prototypes for all three alternatives.
- Prepare documents for Shortfall Analysis, functional analysis, TBO scenarios, preliminary performance requirements and operational concept scenarios.
- Prepare an Operational Safety Assessment (OSA).

Program Plans FY 2014 – Performance Output Goals

- Prepare the following documents to support an Investment Analysis Readiness Decision:
  - Investment Analysis Plan
  - Safety risk management plan and documentation
  - Cost and benefits estimate

Program Plans FY 2015 – Performance Output Goals

- Prepare the following document to support an initial investment decision:
  - Initial program requirements
  - Initial business case
  - Initial implementation strategy and planning document
  - Final investment analysis plan
- Prepare document analyzing potential candidate solutions.
- Achieve Initial Investment Decision.

Program Plans FY 2016 – Performance Output Goals

- Prepare the following documents to support final investment decision by the fourth quarter of FY 2016:
  - Business case with stakeholder involvement
  - Finalized detailed program requirements
  - Validated range of alternatives
  - Risk Assessment and potential mitigations
  - Program budget profile
  - Acquisition program baseline
- Achieve Final investment Decision 4th quarter.

Program Plans FY 2017 – Performance Output Goals

- Award Contract for implementation of approved solution.
- Complete key site implementation planning for initial operating capability.

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 (this capability is 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, including selected Flight Management Systems (FMS), that are capable of executing Required Time of Arrival (RTA) instructions. The RTA capability provides an internal time-based control mechanism that supports the trajectory-based operations concept. 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Complete evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival.
- 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.
- Complete evaluating DataComm for aircraft messaging for Required Time of Arrival (RTA), reroutes, and waypoint verification data integrity.
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements in a report).
- Complete human factors analysis report on the shifting to control by time of arrival through controller-in-the-loop simulations and field trials.
- Complete analysis report on human factors and flight deck automation requirements to minimize errors and provide integrity assurance.
- Seek certification approval of initial TBO procedures / scenarios through the submission of a certification request.
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed).

Program Plans FY 2014-2017 – Performance Output Goals

- None.

J, Trajectory Mgmt – Enhancing Terminals and Airports – Reduced RVR Minima, G06N.02-02

Program Description

When visibility at an airport is reduced properly equipped aircraft can use instrument procedures to conduct approach and landing operations. In these reduced visibility conditions, Air Traffic will change from Visual Flight Rules to Instrument Flight Rules (IFR). Under IFR, only those aircraft properly equipped and with appropriately trained crews, can land or takeoff. The Runway Visual Range (RVR) system measures the visual distance at specific points along the runway. RVR minima for each runway is reflected on the approach plates and pilots are not allowed to attempt a landing on runways where RVR measured visibility is below those minima,

This program allows: 1) reducing RVR minima for Standard Category I (CAT I) landing operations, from 2400 feet (ft) or 2400 RVR to 1800 RVR for aircraft with Autopilot, Flight Director *or* Head Up Display (HUD); 2) Special Authorization (SA) CAT II operations at the same minima as Standard CAT II which is 1200 RVR, but with a significantly lower investment in lighting than Standard CAT II operations for aircraft with Autoland *or* HUD would require; and, SA CAT I operations that have lower than standard minima at 1400RVR (vice 2400 RVR) for aircraft equipped with HUD. This program is also evaluating reducing the minima from 2400 RVR to 1800 RVR for the Wide Area Augmentation System (WAAS) vertical guidance (LPV) approaches.

Analysis of the NAS identified a limited number of “Single Thread” airports that have only one CAT II/CAT III capable runway. System reliability issues can cause the airport service level for that runway to be downgraded to CAT I, until those issues are fixed. If no other runways have CAT II capability, the airport cannot handle its normal traffic and flights will be delayed or diverted during CAT II conditions. Implementing SA CAT II capability on an additional runway end can mitigate the impact of such events.

These reduced visibility criteria are implemented by publishing RVR 1800, SA CAT I, and SA CAT II procedures. This program also allows lower take off minima, which can be as low as 500 ft. The reduced criteria increase the potential number of takeoffs and landings, during IFR, thereby increasing airport capacity and NAS traffic flow. Benefit-cost analyses to support implementation of reduced criteria within the NAS are based on the access benefit modeling that takes into account such factors as the number of operations, current equipage of aircraft using a specific airport, existing ground infrastructure and lighting, weather, passenger value of time, and others. If criteria in FAA Order 8400.13, “Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations” are met, the procedure is coordinated and developed. If infrastructure investment is required, and that airport runway end is supported by need, benefit, and cost, then the infrastructure is augmented to meet FAA 8400.13 requirements.

Examples of operational benefits realized from reduced criteria;

- Portland International Airport (PDX), Avoided diversion of 58 arrivals with ~3,700 passengers on Christmas Eve, 2009 using SA CAT I;
- Operations continued at Boston Logan International after the primary runway was out of service due to Continuity of Service (CoS) issues by implementing SA CAT II on the cross wind runway, allowing access to the airport, avoiding delays or diverts. This resulted in an estimated $5.7M in avoided costs and an incremental benefit of $530,000 recurring benefit per year with both the primary and cross wind runway operational and capable of CAT II operations
- An estimated 17% increase in throughput could be achieved through implementation of lower take off minima at certain locations such as San Francisco. In some cases, additional RVR systems must be added but SFO did not require additional RVR.

Implementation at additional airports will increase the total operational benefits and also result in a lower carbon footprint and fuel savings.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Enhanced low visibility operations support the increased capacity metric by enabling an:

- Increased number of arrivals and/or departures at high density towered airports during IMC conditions;
- Increased access to the airport during IFR.
- 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;

- The number of operations at some focus airports support the need for CAT II level of service. This need can be met through SA CAT II vice Standard CAT II more cost effectively, be more rapidly deployed, and avoid the higher initial investment and life-cycle costs of Standard CAT II. Also, these additional CAT II capable airports will aide in traffic flow, especially in congested areas such as the NY/NJ airspace, and will also help in decreasing fuel costs for airlines with qualifying alternates closer to the primary destination.

Program Plans FY 2013 – Performance Output Goals
- Complete a reduced RVR minimum analyses of all qualifying runways in NAS.
- Complete an analysis addressing Single-Thread airports with only one Cat II/Cat III capable runway that upon loss can only handle Cat I traffic.
- Develop procedures for implementing SA CAT II, SA CAT I, and RVR 1800 runway operations at qualifying airports.

Program Plans FY 2014-2017 – Performance Output Goals
- None, Future activities will depend upon approval of funding by FAA management.

1A13, Next Generation Air Transportation System (NextGen) – System Networked Facilities
FY 2013 Request $11.0M

- 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 industry laboratory capability to support high fidelity simulations.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The integration, development, and operational analysis capability provides the support services, and software and hardware required to enhance and sustain the NextGen Integration and Evaluation Capability (NIEC) to conduct early proof of concept studies, rapid prototyping, validate and mature concepts, reduce risks, and improve operational performance across all NextGen solution sets.

Program Plans FY 2013 – Performance Output Goals

- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations.
- Purchase and install, develop, and maintain video data collection and streaming system to provide live video during a simulation in remote locations.

Program Plans FY 2014 – Performance Output Goals

- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations.
- Install a mini-Traffic Flow Management Production Center (TPC) and integrate TFM Auxiliary Platform into the NIEC. Include the ability to manipulate on the Traffic Situation Displays (TSDs).
- Integrate TMA/TBFM with Distributed Environment for Simulation, Rapid Engineering, and Experimentation (DESIREE) and Target Generation Facility (TGF)

Program Plans FY 2015–2017 – Performance Output Goals

- Identify and install upgrades and enhancements to NIEC required to support NextGen research and development human-in-the-loop simulations, and proof of concept demonstrations.
- Integration of the ERAM Evaluation System (EES) into the NIEC and the ability to use the EES for NIEC projects.
- Enhance SWIM Segment 1 services to support emulated SWIM Implementation Programs in the NIEC.
- Continual improvement of real time scenario fidelity of weather data, and the synchronization of that data with the TGF, TMU and ATM suite.
- Add capability to utilize other TMU applications in the NIEC. Functionality may include prototyping the capability in DESIREE or interfacing to more TMU applications such as Route Availability Planning Tool (RAPT).
- Augment the Terminal capability in the NIEC with an Automated Safety Alerting Tool (ATPA).

B, TEST BED DEMONSTRATION, G03M.03-01

Program Description

The Florida NextGen Test Bed (FTB) is a cooperative FAA and industry initiative that provides a robust platform where early-stage NextGen concepts can be integrated, demonstrated, and evaluated. Partnerships with industry are key to the mission of the FTB, where industry and academia have the opportunity to work in collaboration with the FAA to help advance NextGen technologies. The site provides an agile environment for the rapid integration of new and emerging technologies, prototypes and applications into existing or planned NAS systems.

The Test Bed has established strong relationships with a number of aviation industry members to form a unique environment that allows open access for industry users and vendors such that new capabilities can be more rapidly harnessed and partnerships can be fostered with industry and academia. This unique approach promotes innovation from industry, encourages in-kind contributions and R&D investment, and leverages industry's capabilities to provide cost savings to the FAA and help accelerate NextGen development.

The FTB provides an environment for industry and academia to easily bring in new capabilities and has sufficient working space to allow them to integrate these innovations into other ATC systems. The FTB core infrastructure is architected and configured to enable remote connection with other FAA test sites and industry partner sites to allow for the multi-site demonstration capabilities. Through appropriate governance and oversight, these approaches enable flexibility for industry to continue participation in the Test Bed, to provide upgrades and to maintain their own contributed systems.

Its unique location on the Daytona Beach International Airport (DAB) allows for easy physical access between the FTB and aircraft via the attached jet bridge as well as wireless communication between the FTB systems and aircraft and other vehicles on the airfield. Through the strong relationship with Embry Riddle Aeronautical University (ERAU), the FTB can leverage the local ERAU fleet of ADS-B equipped aircraft. Together, these capabilities facilitate the demonstration and evaluation of various aspects of ADS-B and other NextGen concepts in an operational environment.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The NextGen Test Bed provides a platform for new NextGen demonstrations to be quickly and efficiently conducted at an early stage without affecting NAS operations. This reduces risk and overall costs by enabling the FAA to evaluate the viability of these new technologies and concepts before making further investments and decisions on potential implementation in operations. In addition, the NextGen Test Bed approach of establishing partnerships with industry promotes contributions and R&D investment from industry, and leverages industry's capabilities, which provides cost avoidance to the FAA and helps to accelerate NextGen development.

Program Plans FY 2013 – Performance Output Goals

- Provide network capabilities for FTB Participants to remotely connect to systems within the FTB by leveraging existing FAA R&D Domain infrastructure for administration, monitoring, testing, and integration activities.
- Leveraging the existing FTB infrastructure, initiate the implementation of FTB Evolution Plan developed in FY 2012 to provide for data archiving and playback, and core supporting services to align with future demonstration needs.
- Coordinate with FTB industry participants to align capabilities in the Integration area and Demonstration area of the FTB based on Capability Gap Analysis developed in FY 2012.
- Coordinate with FAA and NASA Test Bed sites to reach consensus on Multi-Test Bed Architecture to support real time inter-test bed simulation and demonstration.
- Coordinate with R&D Domain and FAA Information Security to reach consensus on FTB network security requirements.
- Define methodologies and establish appropriate protocols/procedures for projects to request NAS data or connectivity to the FTB.
- Provide for existing FTB facility lease, utilities, maintenance, and systems support and maintenance.
- Conduct outreach (FTB website/outreach materials), coordination with FAA and industry stakeholders (FTB strategy meetings) and support governance activities (update Governance and Partnership Agreement documents) to promote industry participation.

Program Plans FY 2014 – Performance Output Goals

- Initiate the implementation of information sharing architecture to support real time simulation and demonstration among the three NextGen Test Bed sites based on Multi-Test Bed Architecture document developed in FY 2011/2012.
- Initiate the implementation of additional network security policies/procedures and hardware and software suites based on the FTB network security requirements developed in FY 2013.
- Provide capability to integrate and leverage resources such as cockpit simulator, high-fidelity human factors environments, etc. from remote FAA, NASA, and Industry sites.
- Provide additional core supporting services, including data archiving and playback, to support future demonstration needs.
- Enhance FTB facility to provide an Air Traffic Control (ATC) like environment to support 4D-Trajectory Based Operations (4D-TBO) concept and Human-In-The-Loop (HITL) activities.
- Provide for existing FTB facility lease, utilities, maintenance, and systems support and maintenance.
- Conduct outreach (FTB website/outreach materials), coordination with FAA and industry stakeholders (FTB strategy meetings) and support governance activities (update Governance and Partnership Agreement documents) to promote industry participation.

Program Plans FY 2015 – Performance Output Goals

- Develop architecture and plan to incorporate in-air communication capability for the exchange of information between ground systems and en route aircraft to facilitate demonstration concepts.
- Include Airline Operation Center (AOC) as a FTB participant to augment aircraft operations capabilities.
- Establish connectivity to Department of Defense (DoD) Defense Research and Engineering Network (DREN) to support inter-agency research activities such as UAS.
- Develop plan for FY 2016 FTB tech refresh.
- Provide for existing FTB facility lease, utilities, maintenance, and systems support and maintenance.
- Conduct outreach (FTB website/outreach materials), coordination with FAA and industry stakeholders (FTB strategy meetings) and support governance activities (update Governance and Partnership Agreement documents) to promote industry participation.

Program Plans FY 2016 – Performance Output Goals

- Perform tech refresh of FTB systems and network equipment to support upcoming NextGen concepts and maintain reliability, improve performance, and ensure compatibility with current-day Commercial Of The Shelf (COTS) systems.
- Provide additional demonstration scenario development, validation, and analysis tools to facilitate NextGen Test Bed demonstration.
- Provide in-air communication capability for the exchange of information between ground systems and en route aircraft to facilitate demonstration concepts.
- Provide for existing FTB facility lease, utilities, maintenance, and systems support and maintenance.
- Conduct outreach (FTB website/outreach materials), coordination with FAA and industry stakeholders (FTB strategy meetings) and support governance activities (update Governance and Partnership Agreement documents) to promote industry participation.

Program Plans FY 2017 – Performance Output Goals

- Expand telecommunication infrastructure with increased bandwidth and data services to support additional live data streams to the FTB.
- Establish connection to DAB airport tower to provide communication with FTB systems and support shadow operations.
- Expand virtual tower environment to enable Staffed NextGen Tower operational concepts and demonstration activities.
- Provide for existing FTB facility lease, utilities, maintenance, and systems support and maintenance.
- Conduct outreach (FTB website/outreach materials), coordination with FAA and industry stakeholders (FTB strategy meetings) and support governance activities (update Governance and Partnership Agreement documents) to promote industry participation.

1A14, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – FUTURE FACILITIES

FY 2013 Request $95.0M

- Future Facilities Investment Planning, G03F.01-01

Program Description

The Next Generation Air Transportation System (NextGen) program delivers redesigned air traffic control systems that are flexible, scalable, and easily maintained. FAA's infrastructure, automation, equipage, procedures, and regulations must evolve from a geographical focus to support the seamless operational and broader air traffic management. Air traffic control facilities are a critical component of the NextGen and must be redesigned to accommodate new technologies and facilitate new operational approaches.

The Future Facilities program office is chartered with planning, developing, and designing air traffic control facilities of the future. Since its launch in September 2010, the program has defined a long-term strategy and approach to facilities transformation. The program is focused on defining criteria, soliciting requirements, and developing and implementing plans for transforming the FAA's air traffic facilities. These facilities will optimally deploy NextGen technologies to capitalize on benefits and new operational concepts.

The program will deliver integrated, fit-for-purpose air traffic control facilities. These new and upgraded facilities will feature a full range of required air traffic management services, provide enhanced amenities and improved infrastructure for air traffic operations, and enable the FAA to better meet current and future operational needs. By combining Terminal and En Route operations in the same facilities, FAA will integrate formerly separate lines of business and facilitate cultural and workforce integration. Thanks to the net-centric capabilities and geo-independence afforded by NextGen technologies, facilities will not require proximity to the air traffic being managed. Facilities will be sited and staffed to address employee, fiscal, operational, safety, and security requirements.

The Future Facilities Program will address the highest priority areas first, and will manage the air traffic control facilities transformation in segments. A segment is defined as a geographic area with its associated airspace and air traffic facilities. Several projects (new facilities) are planned within each segment. A project is defined as the construction of a fit-for-purpose facility that will house the technologies and personnel required to manage a specific area of the NAS. Currently, the Future Facilities Program has identified six segments in the NAS. Segment delineation is an iterative, data-driven process shaped by operational demands, evolving FAA and industry requirements, and budget availability. By approaching the transformation in segments, the FAA will mitigate operational, budgetary, technical, political, and economic risks, as lessons learned from implementation of earlier segments will be applied to later segments.

The Future Facilities Program has a comprehensive process for planning, designing and implementing facility transformation. The projects within each segment will go through an individual final investment analysis decision. The multi-year transformation of FAA air traffic control facilities runs between 2012 (now) through 2025 and beyond.

The Future Facilities Program received approval from the JRC (IARD) to move to initial investment analysis for Segment 1 on September 15, 2010. Segment 1 Initial Investment Decision (IID) was received on November 16, 2011. The program is currently developing a business case for its first project, also known as Liberty Integrated Control Facility (ICF), and Final Investment Decision (FID) is expected in Q1 FY 2013. Liberty ICF will focus on the NY/NJ/PHL airspace and will address up to nine existing facilities by collocating operations in a single location. This new facility will deliver benefits that cannot be achieved within the FAA's current infrastructure. Liberty ICF will afford delay reductions in this critical congested metropolitan area while enabling reductions in aviation fuel consumption and noise, and capitalizing on operational efficiencies. FAA employees working in this facility will benefit from an improved work environment.

The Future Facilities Program will continue to develop its Portfolio Level Agreements (PfLAs) with FAA's inter-dependent programs, such as En Route Automation (ERAM), ATOP, terminal automation (TAMR), NAS Voice

System, Power Systems, and other efforts to ensure that critical equipment is available for installation and testing at the new Liberty ICF. The program will develop a detailed transition plan to transfer surveillance and communication inputs/equipment to the new facility. Transition risk management will be a paramount concern in the development of this approach.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

The Future Facilities Program focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. The program 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 will be assigned to facilities on both a long-term and daily basis with service continuity a foremost requirement. Business continuity will be built into the system to provide for a more resilient infrastructure, better contingency operations, and a higher degree of service. With these new infrastructure capabilities, the ability to efficiently handle current and future demand will be improved resulting in increased system capacity.

Program Plans FY 2013 – Performance Output Goals
- Complete Liberty ICF Site Selection.
- Complete Liberty ICF 100% Engineering Design.
- Obtain Liberty ICF Final Investment Decision.

Program Plans FY 2014 – Performance Output Goals
- Develop Pre-Qualified Bidders List for Liberty ICF.
- Update Segment 1 analysis.
- Complete Strategy Decision for follow-on project.

Program Plans FY 2015 – Performance Output Goals
- Develop and evaluate Liberty ICF Request for Proposal (RFP).
- Finalize Prime Mission Equipment (PME) agreements for Liberty ICF with portfolio partners.
- Award Liberty ICF Construction Contract.
- Initiate Final Investment Analysis for follow-on project.

Program Plans FY 2016 – Performance Output Goals
- Complete Site Selection for the follow-on project.
- Complete 100% Engineering Design for the follow-on project.
- Obtain Final Investment Decision (FID) for the follow on project.

Program Plans FY 2017 – Performance Output Goals
- Order remaining equipment for Liberty ICF.
- Develop and evaluate Request for Proposal (RFP) for the follow-on project.
- Award Construction Contract for the follow-on project.

1A15, NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) – PERFORMANCE BASED NAVIGATION (PBN) – METROPLEX AREA NAVIGATION (RNAV)/ REQUIRED NAVIGATION PERFORMANCE (RNP)

FY 2013 Request $36.2M

- Collaborative ATM (CATM) – NextGen Performance Based Navigation – Metroplex RNAV/Required Navigation Performance (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 by criteria established by FAA with input from RTCA, through the use of quantitative and qualitative metrics. The current plan will address 13 metroplex efforts (study team through implementation) either as unique metroplex locations (e.g. North Texas with Dallas/Fort Worth (DFW), Dallas Love Field Airport (DAL), and other regional airports) or as consolidated metroplex locations (e.g. Central and Southern Florida Metroplexes (Orlando (MCO), Miami (MIA), Tampa (TPA), Palm Beach (PBI), Fort Lauderdale (FLL) and other regional airports) combined into a single effort to take advantage of overlapping areas of concern. This approach will address these metroplex locations beginning in FY 2010 and will complete implementation by FY 2017, with each location being completed in 2-3 years from the start date. Results from 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.

The Navigation Procedures Implementation Plan (NAV Lean) was published in June, 2011, in response to the Navigation (NAV) Procedures Project Final Report, September 2010, containing 21 recommendations to streamline the Instrument Flight Procedures (IFP) development process. Funding will facilitate implementation of the recommendations to include a streamlined version of the current core process (request, design and development, approval, implementation, and maintenance). It will also explain the intersection of auxiliary processes, such as Safety Management System (SMS), environmental, and operational approval. The process will be better managed by having all IFP requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking, and managing the IFP development life cycle.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 1 – Optimize airspace and Performance Based navigation (PBN) procedures to improve efficiency an average of 10 percent across core airports by 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM):
- Completion of Study Team Reports with notional airspace and procedure redesign recommendations for 2 Metroplex locations.
- Completion of Design and Procedure proposals for 3 Metroplex locations.

NextGen Safety:
- Provide safety risk analysis and studies, flight simulation and data collection.

NAVLean:
- Initiate NAVLean database consolidation to support standardization and access of data.
- Develop web-based portal for processing, tracking, and managing the instrument flight procedure development life cycle.

Program Plans FY 2014 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM):
- Completion of Study Team Reports with notional airspace and procedure redesign recommendations for 2 Metroplex locations.
- Completion of Design and Procedure proposals for 3 Metroplex locations.

Program Plans FY 2015 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM):
- Completion of Design and Procedure proposals for 3 Metroplex locations.

Program Plans FY 2016 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM):
- Completion of Design and Procedure proposals for 3 Metroplex locations.

Program Plans FY 2017 – Performance Output Goals
Optimization of Airspace and Procedures for Metroplexes (OAPM):
- Completion of Design and Procedure proposals for 3 Metroplex locations.

ACTIVITY 2. AIR TRAFFIC CONTROL FACILITIES AND EQUIPMENT

A. EN ROUTE PROGRAMS

2A01, EN ROUTE AUTOMATION MODERNIZATION (ERAM)
FY 2013 Request $144.0M

- En Route Automation Modernization (ERAM), A01.10-01
- ERAM – Second Level Engineering, A01.10-05

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 replaced 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, as originally planned, was intended to contain 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. ERAM Release 2 also allowed the program office to incorporate a substantial amount of core functionality improvements, as articulated in the OMB improvement plan and reflected as part of the JRC re-baselining in 2011. 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) and address ICAO 2012 requirements.

Releases 1-3 were originally 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 are not needed once ERAM is fully operational. Also, additional familiarization time was needed because ERAM does some processing differently than HOST so system behaviors are different than what the field operators have been used to and were expecting. These challenges 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 and the Seattle (ZSE) site since Dec 28, 2010. Independent Operational Assessment (IOA) was conducted at both the Salt Lake City and Seattle key sites and an In-Service Decision was approved on March 29, 2011 with an Action Plan to address hazards documented through the IOA process. The core functionality improvements necessary to mitigate the identified hazards were implemented in 3 build phases as part of Release 2 completion. The IOA re-assessment against the identified hazards was completed in December 2011 and confirmed that the high hazards had been successfully mitigated to sufficient levels to continue with the waterfall deployment. Three sites (Denver, Albuquerque, and Minneapolis) successfully achieved initial operating capability (IOC) by the end of December 2011. An additional three sites (Chicago, Los Angeles, and Oakland) have successfully achieved IOC in the second quarter of FY 2012. FY 2012 funding will complete software updates required for deployment to these sites with additional funding required to complete the waterfall deployment to the remaining sites in FY 2013. ERAM Release 3 is planned to achieve key site IOC with ADS-B at the Houston ARTCC in 2nd quarter of FY 2012. Release 3 is then planned to be used as the waterfall release for the remainder of the sites during the completion of the waterfall through FY 2013.

All sites are planned to achieve IOC by the end of FY 2013 and last site operational readiness date (ORD) is planned to be achieved prior to the end of FY 2014. The ERAM program was re-baselined to incorporate the additional cost ($330M) and schedule (from December 2010 to the end of August 2014) in June 2011.

ERAM – Second Level Engineering (A01.10-05): ERAM achieved IOC in 2009 and has been in continuous operations at the two key sites Salt Lake City and Seattle since October 2010 and December 2010 respectively for 24 hours a day seven days a week. There are program costs (e.g. system analysis, system maintenance, and software field support) directly attributed to operational activities in support of these two key sites.

In FY 2012 the FAA achieved IOC at an additional 7 sites and continues to further these sites towards 24 x 7 operations. In addition the FAA is required to maintain the current HOST system while the transition of ERAM to operations at the 20 ARTCCs is completed.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

ERAM contributes to the FAA's strategic goal Delivering Aviation Access through Innovation and the Performance Metric for achieving average daily airport capacity by increasing the number of flight plans that can be stored to 65,536 (versus the current 2,600); providing flexibility in airspace configuration; and extending 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 2013 – Performance Output Goals

- Achieve IOC at (site locations subject to revision for operational needs) remaining sites – Indianapolis, New York, Kansas City, Miami, Washington, Boston, Cleveland, Memphis, Atlanta, Jacksonville, and Fort Worth. (Note that the first four sites in the list are scheduled for IOC by the end of the 1st quarter of FY 2013 and the deployment of the remaining sites by quarter will be determined after coordination with the affected facilities during FY 2012.)

Program Plans FY 2014 – Performance Output Goals

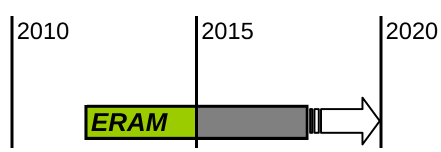
- Complete ERAM deployment achieving last site ORD.

Program Plans FY 2015-2017 – Performance Output Goals

- None.

System Implementation Schedule

En Route Automation Modernization (ERAM)
First site ORD: March 2012 -- Last site ORD: 2014



2A02, En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements

FY 2013 Request $10.0M

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

Program Description

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 will be replacing hardware and associated software to increase display size and increase processing capacity of the controller Radar Associate 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 may fund their requirements for enhanced ERAM capabilities during the ERAM D-Position Upgrade and System Enhancements development timeline. Costs for those efforts are not included in this program. Planning for each of this program's software releases allows for software development allocation to accommodate externally funded requirements without duplication of any efforts budgeted and documented in other programs' CIPs.

The ERAM D-Position Upgrade and System Enhancements effort began in 2011 with the drafting of investment analysis activities and documentation along with initial contract development. A final investment decision is planned for FY 2013. Prime contractor system engineering, software development, and implementation activity is planned to begin in 2014 and complete 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, 2013.

The planned upgrades would improve the suite of software tools so the D-position controller who assists the radar controller would have the same software support tools as the radar controller.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Complete Software Requirements Specifications for the D-Position Upgrade.
- Complete Hardware Engineering Analysis, Trade Study and Selection for the D-Position display and processor and R-Position processor upgrades.

Program Plans FY 2014 – Performance Output Goals
- Software Design Review of ERAM D-Position Upgrade and start software development.
- Test and Implementation of ERAM Technical Refresh Operating System Upgrades.
- Procure and install hardware for the D-Position and tech refresh upgrades in En Route labs.

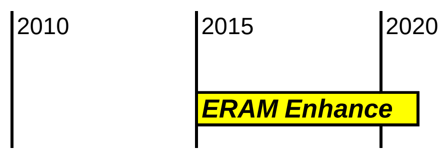
Program Plans FY 2015 – Performance Output Goals
- Complete Software Development of ERAM D-Position Upgrade.
- Complete integration and test of the ERAM D-Position Upgrades.
- Procure and start deployment of D-Position and tech refresh upgrades.
- Complete Software Requirements Specification for the ERAM enhancements for non-surveillance airspace – Electronic Flight Strips.
- Complete Software Design Review for the ERAM enhancements for non-surveillance airspace – Electronic Flight Strips.

Program Plans FY 2016 – Performance Output Goals
- Complete deployment of the D-Position hardware and tech refresh upgrades to three sites.
- Complete Software Requirements Specification of ERAM System Enhancements.
- Complete Software Design Review of ERAM System Enhancements.

Program Plans FY 2017 – Performance Output Goals
- Complete Deployment of the D-Position and R-Position hardware upgrades.
- Complete software development of ERAM System Enhancements.
- Complete Requirements Document for the next increment of ERAM D-Position and System Enhancements Program.
- Continue Investment Analysis activity to baseline the next increment of the ERAM D-Position and System Enhancements Program.

System Implementation Schedule

ERAM D-Position Upgrade and System Enhancements
Start Deployment 2015 -- Complete Deployment 2020



2A03, EN ROUTE COMMUNICATIONS GATEWAY (ECG)
FY 2013 Request $3.1M

- En Route Communications Gateway (ECG) – 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 Automatic Dependence Surveillance Broadcast (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 deployed to the ARTCC's to address EOL and EOS status; ECG Workstations (Maintenance Workstation – MWS and Support Workstation – SWS), Monitors, and Printers.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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. Upgrades can be required due to various product factors that may include cost of maintaining the existing system, system failures, licenses, spare quantities, and repair turn-around time. This investment will reduce supportability limitations and increase the ECG systems availability and reliability. Quarterly ECG Operational Analysis Reports indicate an operational availability of 100% from first site Operational Readiness Demonstration (ORD) in 2004 through June 30, 2011.

Program Plans FY 2013 – Performance Output Goals

- Complete procurement of 200 500W Power Distribution Units (PDU's), 125 Interface Processors, and 225 Magma Chassis.
- Complete deployment of 200 ECG Workstations (MWS & SWS), 200 Monitors, and 125 Printers.
- Complete deployment of the Operational LAN Switch (OLS) at all ARTCCs.

Program Plans FY 2014 – Performance Output Goals

- Complete engineering analysis for the ECG Random Access Planned Position Indicator (RAPPI).
- Begin procurement of the ECG Router Firewall (RFW) for all ARTCCs.
- Complete deployment of the Interface Processor, Magma Chassis, Printer, Workstation, Monitor, and DVD-RW at all ARTCCs.

Program Plans FY 2015 – Performance Output Goals

- Complete procurement of 100 ECG RAPPI.
- Complete deployment of 100 ECG RAPPI.
- Deploy software changes in support of ERAM and other emerging programs at all ARTCCs.

Program Plans FY 2016 – Performance Output Goals

- Complete procurement of the ECG RFW.
- Complete deployment of the ECG RFW.

Program Plans FY 2017 – Performance Output Goals

- None.

2A04, NEXT GENERATION WEATHER RADAR (NEXRAD)
FY 2013 Request $3.3M

- NEXRAD – Legacy, Icing & Hail Algorithms, W02.02-01
- X, NEXRAD – Service Life Extension Program (SLEP), W02.02-02

Program Description

NEXRAD is a long-range weather radar which detects, analyzes, and transmits weather information for use by ATC System Command Center, en route, terminal and flight service facilities. This weather information helps determine the location, time of arrival, and severity of weather conditions to determine the best routing for aircraft. The NWS collects and redistributes NEXRAD weather data nationwide and creates forecasts that are used in all phases of flight. NEXRAD products and services are processed by FAA's Weather and Radar Processor, Integrated Terminal Weather System, and the Corridor Integrated Weather System.

Currently there are 160 NEXRAD systems operated jointly by the Tri-Agency partners – the National Weather Service (NWS), the Federal Aviation Administration, and the Department of Defense. NWS is the lead agency for the NEXRAD program. FAA independently owns 12 of these systems located in Alaska (7), Hawaii (4) and Puerto Rico (1).

NEXRAD Legacy, Icing, and Hail Algorithm (NLIHA) Program (CIP Program W02.02-01)
NWS awarded a $43M contract in 2007 to acquire a dual polarization capability for the full complement of NEXRADs. 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). The ability to detect in-flight icing will significantly reduce icing-induced accidents and fatalities.

This program has two main purposes:
1. To continue providing support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). Each year, the FAA pays its pro-rata share of Dual Polarization acquisition costs, along with allocated Tech Refresh costs.
2. To acquire dual polarization technology for FAA's NEXRAD platforms and to continue 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.

FY 2013 represents the last year for CIP Program W02.02-01, and a Business Case is under development to cover the next seven (7) year window (CIP Program W02.02-02, NEXRAD SLEP).

NEXRAD SLEP (CIP Project W02.02-02)
This program will begin in FY 2014, and will address the next 7 years of service. NEXRAD was designed with a projected 20-year service life. The radars were deployed from 1992-1997 and NEXRAD will be reaching its 20-year end-of-life state beginning in 2015. NWS plans to keep NEXRAD in full operation through 2030, and beyond. A Final Investment Decision for NEXRAD SLEP is planned for September 2012, and a new cost and schedule baseline will be established at that time. This program will have four main purposes:
1. Extend the life of the NEXRAD to 2030, and beyond. There are four (4) NEXRAD subsystems that have been identified as needing replacement/refurbishment:
   a. Signal Processor/Pedestal Control
   b. Pedestal
   c. Transmitter
   d. NEXRAD Shelter/facilities
2. Provide continued support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). Each year, the FAA pays its pro-rata share of NEXRAD Product Improvement (NPI) Science Evolution costs.
3. Install 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 require a technical refresh beginning in CY 2014.

4. Develop FAA-specific algorithms that will be used to discern and display in real time, incidences of in-flight icing and hail. A prime objective is to develop operationally suitable displays to be used by pilots, controllers, Flight Service specialists, and dispatchers for use as a decision making tool for avoiding and/or mitigating airborne threats due to the presence of airborne icing and hail.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The NEXRAD program contributes to the Delivering Aviation Access through Innovation goal 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 Core airports and most other air traffic control facilities in the continental United States. The system has met or exceeded the 96% operational availability requirement (98% for FAA systems) to reliably observe weather and detect severe storms.

Program Plans FY 2013 – Performance Output Goals
NLIHA Program:
- 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
NEXRAD SLEP:
- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (1 yr).

Program Plans FY 2015 – Performance Output Goals
NEXRAD SLEP:
- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (yearly).

Program Plans FY 2016 – Performance Output Goals
NEXRAD SLEP:
- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (yearly).

Program Plans FY 2017 – Performance Output Goals
NEXRAD SLEP:
- Provide funding to DOC/NWS (Lead Agency) for NEXRAD Science Evolution (yearly).

System implementation schedule

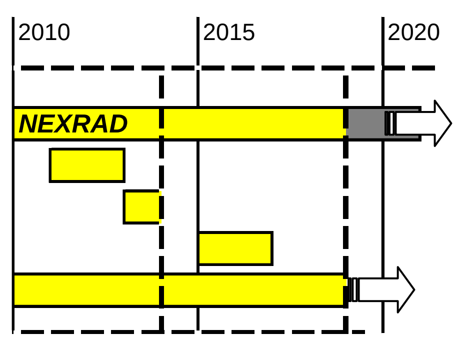
Next Generation Weather Radar (NEXRAD)

Dual Pol Upgrade : 2011--2012

Legacy, Icing & Hail Algorithms (NLIHA) : 2013

In-Flight Icing Dissemination: 2015--2016

Tech Refresh/NPI Science Evolution : 2010--2018



2A05, ARTCC BUILDING IMPROVEMENTS/PLANT IMPROVEMENTS
FY 2013 Request $46.0M

- 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. 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The ARTCC Modernization/Expansion program contributes to the FAA's performance metric of maintaining operational availability of the NAS by ensuring that buildings that house en route air traffic control equipment are sustained and modernized to meet operational requirements. The improvements to ARTCC facility infrastructure will extend the service life of facilities and minimize outages that would delay air traffic. Associated risks to operations include potential equipment damage, mold and operations interruptions from incidents such as roof leaks and pipe ruptures. In FY 2006 there were 8 ruptures of aged pipes, one of which required draping plastic sheets over controller consoles to maintain operations. In addition, the chiller plants are currently approaching and/or past their life expectancies. Replacement of these plants are underway but will not be complete until approximately 2019. A catastrophic failure of a chiller plant could ultimately result in the loss of Air Traffic capability for an ARTCC.

Program Plans FY 2013 – Performance Output Goals

- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Chicago and Albuquerque ARTCCs.
- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for project at Boston ARTCC.
- Fund and Award Contract for Auto Wing Rehab Phase II project at Albuquerque.
- Fund and Award Contract for Administration Mod Design Cost at Anchorage.
- Fund and Award Contract for Seismic Upgrade at Oakland ARTCC.
- 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 and Award Contract for Control Wing Basement/Major Mechanical projects at the Boston and Houston ARTCCs.
- Fund and Award Contract for Control System projects at the Chicago, Ft. Worth, Memphis and New York ARTCCs
- Fund and Award Contract for M-1 Room reconfiguration at the Los Angeles ARTCC.

- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for project at the Indianapolis ARTCC.
- Fund and Award Contract for Control Wing Basement/Major Mechanical project at the Indianapolis ARTCC.
- 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 and Award Contract for Control System projects at the Houston, Boston, and Albuquerque ARTCCs.
- Fund and Award Contract for Control Wing Basement/Major Mechanical Design Cost for projects at the, Cleveland, Kansas City, and Oakland ARTCCs.
- Fund and Award Contract for M-1 Room Build Out Phase II for Miami ARTCC.
- Fund and Award Contract for Administration Wing Mod at Anchorage ARTCC.
- 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 and Award Contract for Control Wing Basement/Major Mechanical projects at the Oakland, Cleveland, Kansas City ARTCCs.
- Fund and Award Contract for Control System projects at the Indianapolis and Anchorage ARTCCs.
- Fund and Award Contract for Control Wing Basement/ Major Mechanical Design Cost for projects at the Washington, Los Angeles, Atlanta, Salt Lake City and Seattle 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 2017 – Performance Output Goals
- Fund and Award Contract for Control Wing Basement/Major Mechanical projects at the Los Angeles, Washington, and Atlanta ARTCCs.
- Fund and Award Contract for Control System projects at the Cleveland, Kansas City and Oakland 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.

2A06, AIR TRAFFIC MANAGEMENT (ATM)
FY 2013 Request $21.7M

- TFM Infrastructure – Tech Refresh, A05.01-12

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 benefits all segments of aviation including airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, and partner countries.

The first useful and pre-Next Generation (NextGen) segment of this investment is composed of Traffic Flow Management-Modernization (TFM-M) and CATMT Work Package 1 (WP1), which were baselined as a single useful segment by the FAA's Joint Resources Council (JRC) on August 1, 2005. Completed in FY 2011, TFM-M modernized the operating hardware and software, and CATMT WP1 added new software capabilities.

A new segment, TFM Infrastructure – Technical Refresh (FY 2011-2015), was approved by the FAA JRC on March 29, 2011. This new segment provides a replace-in-kind technology refresh of the hardware providing the central data processing capability for the TFM system (TFMS). The program replaces the hardware of the TFM Processing Center (TPC) (also called TFMS Core), the TFM application National Traffic Management Log (NTML), located at the William J. Hughes Technology Center (WJHTC), the TFMS backup system located at the Disaster Recovery Center (DRC), and the prime contractor site. Last replaced in 2006, the hardware is no longer produced, will be unable to support future processing needs. The hardware must be replaced to avoid obsolescence, system performance degradation and impact to other programs.

The baselined TFMS Technical Refresh segment has three elements:

1) Spares: Procurement of Spares for the TFM TPC is a primary risk mitigation effort so that the TFMS will be fully functional until the technical refresh is completed in 2015. The current TFMS hardware is no longer produced. This mitigation effort will minimize outages due to equipment failure and will minimize the impact to development of CATMT capabilities in Work Package 2 and Work Package 3.
2) Phase 1: The technical refresh of NTML. The activities include engineering analysis, procurement, test and installation of the NTML replacement hardware. The current NTML equipment is no longer produced and no longer supported. The NTML is a TFM application that logs actions the Traffic Managers take to mitigate congestion and demand and shares this information with other FAA Traffic Management facilities for better situation awareness, collaboration and decision support.
3) Phase 2: Perform tech refresh of TFM Production Center, also called TFMS Core. The activities include: engineering analysis, procurement, test and installation of replacement hardware.

There is a future segment which requires an investment analysis and FAA approval, called TFM Field Site Tech Refresh, to replace TFMS equipment at field sites (remote sites). Purchased in 2008-2009 the field equipment will no longer be produced in 2014 and will require another replace-in kind hardware tech refresh.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

When the NAS is impacted by severe weather, congestion and/or outages, TFM predicts chokepoints and facilitates the collaboration and execution of mitigation initiatives with stakeholders, using common information displays and tools to minimize NAS delays.

The TFM Infrastructure program will support the FAA's Aviation Access through Innovation 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. Keeping the TFMS fully mission capable also serves as an enabling function for the NextGen CATMT WP 2 & 3 effort, as they both reside and operate on TFMS.

Program Plans FY 2013 – Performance Output Goals

- Complete the first phase of the TFMS Technical Refresh activities with the completion of NTML hardware installation so that NTML will be operational on the replacement equipment.
- Complete Engineering Analysis for TFMS Core – System Design Review (SDR).
- Initiate the second phase of Core Technical Refresh with the procurement of TFMS hardware and perform initial tests.

Program Plans FY 2014 – Performance Output Goals

- Perform second phase of TFMS Tech Refresh with system test, installation and initial deployments of TFM Production Center (also called TFMS Core) replacement hardware of the operational, test, development and back-up strings located at WJHTC, Disaster Recovery Center and prime contractor site.

Program Plans FY 2015 – Performance Output Goals

- Complete TFMS Technical Refresh Phase 2 with TFMS Core operational on replacement hardware.
- Complete TFMS Technical Refresh segment and conduct close out and transition.

Program Plans FY 2016-17- Performance Output Goals

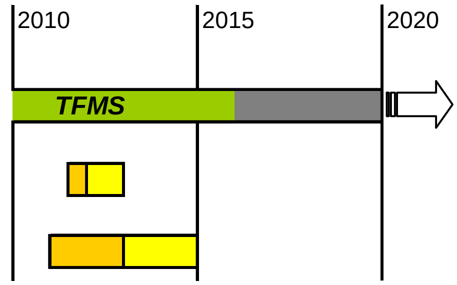
- None, future activities will depend upon approval of funding by FAA management.

System Implementation Schedule

Traffic Flow Management System (TFMS) - Tech Refresh

Phase 1 - Begin Engineering Analysis: September 2011
Phase 1 - NTML Operational: December 2012

Phase 2 - Begin Engineering Analysis: March 2012
Phase 2 - TFM Production Center (TFMS Core) Operational: Dec 2014



2A07, AIR/GROUND COMMUNICATIONS INFRASTRUCTURE

FY 2013 Request $4.0M

- 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 of the radios in the air traffic facility. The program also renovates buildings that house this equipment 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

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

CFE projects 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 2013 – Performance Output Goals
- Establish/Replace/Upgrade four (4) CFE sites and two (2) Remote Communications Self Sustaining Outlets.

Program Plans FY 2014 – Performance Output Goals
- Establish/Replace/Upgrade four (4) CFE sites.

Program Plans FY 2015 – Performance Output Goals
- Establish/Replace/Upgrade four (4) CFE sites.

Program Plans FY 2016 – Performance Output Goals
- Establish/Replace/Upgrade four (4) CFE sites.

Program Plans FY 2017 – Performance Output Goals
- Establish/Replace/Upgrade four (4) CFE sites.

2A08, AIR TRAFFIC CONTROL EN ROUTE RADAR FACILITIES IMPROVEMENTS
FY 2013 Request $5.9M

- Long Range Radar 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 beacon radars (Mode Select and Air Traffic Control Beacon Interrogator (ATCBI); 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 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 engine generators, uninterruptible power supply (UPS), lightning protection, grounding, bonding, and shielding (LPGBS) systems, and structural upgrades to support LRR Service Life Extension Program (SLEP) and ATCBI-6 deployments.

Phase II – Renovation of the Facility Infrastructure. Projects in this phase include critical infrastructure systems for both En Route secondary beacon and primary radar:
- 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The LRR program supports the FAA's Strategic Goal 3, Delivering Aviation Access Through Innovation 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. While the LRR Improvements program has made strides in recent years, almost 11 percent of Air Route Surveillance Radar (ARSR) outages experienced from August 2010 to August 2011 can still be directly linked to infrastructure failures and deficiencies.

Program Plans FY 2013 – Performance Output Goals
- Upgrade Critical Infrastructure Systems at 23 ARSRs including LPGBS, UPS, and HVAC systems (actuals may vary based upon validation and priority for the year).
- Sustain Existing Facility Infrastructures at 15 ARSR, Fixed Position Surveillance (FPS), and ATCBI-6 facilities including; roof replacements, tower foundation repairs, power panel retrofits, road repairs, alarm system replacements, and security gate replacements (actuals may vary based upon validation and priority for the year).

Program Plans FY 2014 – Performance Output Goals
- Upgrade Critical Infrastructure Systems at 7 ARSRs including UPS and HVAC systems (actuals may vary based upon validation and priority for the year).
- Sustain Existing Facility Infrastructures at 20 ARSR, Fixed Position Surveillance (FPS), and ATCBI-6 facilities including; roof replacements, tower foundation repairs, power panel retrofits, road repairs, alarm system replacements, and security gate replacements (actuals may vary based upon validation and priority for the year).

Program Plans FY 2015 – Performance Output Goals
- Upgrade Critical Infrastructure Systems at 7 ARSRs including UPS and HVAC systems (actuals may vary based upon validation and priority for the year).
- Sustain Existing Facility Infrastructures at 20 ARSR, Fixed Position Surveillance (FPS), and ATCBI-6 facilities including; roof replacements, tower foundation repairs, power panel retrofits, road repairs, alarm system replacements, and security gate replacements (actuals may vary based upon validation and priority for the year).

Program Plans FY 2016-2017 – Performance Output Goals
- None.

2A09, VOICE SWITCHING AND CONTROL SYSTEM (VSCS)
FY 2013 Request $15.0M

- 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 allow 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 quickly 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 70 to 210 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 VSCS internal control systems, updated some obsolete software technologies, and replaced the VSCS Timing and Traffic Simulation Unit at the FAA WJHTC. This WJHTC 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), Power Supply upgrades, VSCS Training and backup Switch (VTABS) Test Controller Replacement (VTCR), as well as some Programming Language for Microcomputers (PLM) to C software code conversion.

VSCS Tech Refresh Phase 3 will be dependent upon Investment Analysis which will include Ground-to-Ground (G/G) node reduction efforts, fiber optic tie trunk (FOTT) power supply retrofits, LAN Transceiver upgrades, enhanced diagnostics, PLM to C software conversion for the Air-to-Ground (A/G) switch, VSCS Control Subsystem refresh, VSCS Electronics Module (VEM) Test Set retrofit and a VSCS Training and Backup System (VTABS) subsystem refresh. A Final Investment Decision for VTABS is planned for FY 2013.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The VSCS Technology Refresh program supports the Performance Metric to maintain operational availability of the National Airspace System 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.

Program Plans FY 2013 – Performance Output Goals

- Exact dates are subject to change as they will be finalized after VSCS Tech Refresh Phase 3 Investment Analysis:
  - Achieve FID for VTABS Refresh.
  - Complete remaining 50% of VSCS Tech Refresh Phase 3 Requirements Analysis (extend life to 2027).
  - Begin VTABS Refresh: HW/SW integration Vendor facility 50% complete.

Program Plans FY 2014 – Performance Output Goals

- Exact dates are subject to change as they will be finalized after VSCS Tech Refresh Phase 3 Investment Analysis:
  - VTABS Refresh: HW/SW integration Vendor facility 100% complete.
  - G/G node reduction: Excess nodes removed from 3 ARTCCs.

Program Plans FY 2015 – Performance Output Goals

- Exact dates are subject to change as they will be finalized after VSCS Tech Refresh Phase 3 Investment Analysis:
  - VTABS Refresh: System Test complete.
  - G/G node reduction: Excess nodes removed from 7 additional ARTCCs (10 total).

Program Plans FY 2016 – Performance Output Goals

- Exact dates are subject to change as they will be finalized after VSCS Tech Refresh Phase 3 Investment Analysis:
    - VTABS Refresh: Deployment to 5 ARTCCs.
    - G/G node reduction: Excess nodes removed from 8 additional ARTCCs (18 total).
    - FOTT Power Supply Retrofits 50% complete.

Program Plans FY 2017 – Performance Output Goals

- Exact dates are subject to change as they will be finalized after VSCS Tech Refresh Phase 3 Investment Analysis:
    - VTABS Refresh: Deployment to 15 total ARTCCs.
    - G/G node reduction: Excess nodes removed from 3 additional ARTCCs (21 total).
    - FOTT Power Supply Retrofits 100% complete.

2A10, Oceanic Automation System

FY 2013 Request $4.0M

- Advanced Technologies and Oceanic Procedures (ATOP), A10.03-00

Program Description

The ATOP program replaced oceanic air traffic control systems and updated procedures, and it modernized the Oakland, New York, and Anchorage ARTCCs, which house these oceanic automation systems. A support system was installed at the William J. Hughes Technical Center. 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 safety and efficiency enhancements through FY 2015 for evolutionary improvements to the ATOP 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Complete the ATOP Development and Support procurement in August 2013.
- Transition to ICAO 2012 flight plan processing in November 2012.
- Provide delivery of safety and efficiency enhancements in operational releases to all three Oceanic sites in March 2013 and August 2013.

Program Plans FY 2014 – Performance Output Goals
- Provide delivery of safety and efficiency enhancements in the operational release to all three Oceanic sites in January 2014 – Possible candidates being considered for this target activity could include software updates for ADS-B data processing or the ADS-C Climb and Decent Procedure. The specific modifications for the build will be determined by June 2012.
- Provide delivery of safety and efficiency enhancements in the operational release to all three Oceanic sites in June 2014 – Possible candidates being considered for this target activity could include software updates for ADS-B data processing or the ADS-C Climb and Decent Procedure. The specific modifications for the build will be determined by November 2012.

Program Plans FY 2015– Performance Output Goals
- Provide delivery of safety and efficiency enhancements in operational releases to all three Oceanic sites in November 2014 and April 2015, funded with prior years appropriations.

Program Plans FY 2016-2017 – Performance Output Goals
- None.

System Implementation Schedule

Advanced Technologies and Oceanic Procedures (ATOP)

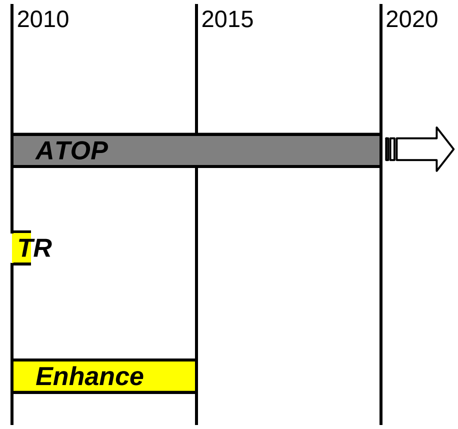
First site IOC: June 2004 -- Last site IOC: March 2006

ATOP Tech Refresh (TR)

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

ATOP Enhancements

First Release: February 2006
Last Release: 2015



2A11 NEXT GENERATION VERY HIGH FREQUENCY AIR-TO-GROUND COMMUNICATIONS SYSTEM (NEXCOM)

FY 2013 Request $33.7M

- Next-Generation VHF A/G Communications System (NEXCOM) – Segment 1a, C21.01-01 and Next-Generation VHF A/G Communications System (NEXCOM) – Segment 2 Phase 1 of 2, C21.02-01

Program Description

The NEXCOM program replaces and modernizes the aging and obsolete NAS air-to-ground (A/G) analog radios that allow direct voice communication with pilots. Replacing the radios is part of a larger program to address the limitations on 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. Segment 2 will address terminal and flight service operations. Segment 2 received Final Investment Decision September, 2011.

Segment 1a will have replaced all en route radios with Multimode Digital Radios (MDRs) by the end of FY 2013. The first installation was in 2003. There are 1035 sites with service available as of September 30, 2011.

NEXCOM Segment 2 will replace radios in the Terminal and the Flight Service environments during FY 2009 to FY 2027 and is separated into two phases. Phase One has JRC approval from 2011 to 2018. The NEXCOM procurement for Segment 2 Phase One will have one contract to deliver Very High Frequency (VHF) radios for civil aviation and Ultra high Frequency (UHF) radios for military aviation. The new VHF radios (MDRs) will be able to emulate the existing 25 kHz voice mode protocol or operate in the more efficient 8.33 kHz voice mode currently used 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., Datacomm program). To support the NexGen NAS Voice Systems (NVS) program, Voice over Internet Protocol (VoIP) will be integrated into Segment 2 Phase One radios.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

NEXCOM will reduce the number of unplanned outages by replacing existing communications equipment with modern A/G equipment. An added performance benefit will be the ability to increase capacity by expanding the number of communications channels within the spectrum assigned to the FAA. The Mean Time Between Failure performance metric, which is closely related to availability, will be increased from 11,000 hours to 50,000 hours at the completion of NEXCOM Segment 2, Phase 1.

Program Plans FY 2013 – Performance Output Goals

- Segment 1a and Segment 2: Deploy 2500 radios for the En Route and Terminal sites.

Program Plans FY 2014 – Performance Output Goals

- Segment 2:
  - Achieve In-Service Decision milestone.
  - Achieve first site Initial Operational Capability (new procurement).
  - Deploy 2000 new Terminal Air Traffic Control Radios.

Program Plans FY 2015 – Performance Output Goals

- Segment 2: Deploy 2500 new Terminal Air Traffic Control Radios.

Program Plans FY 2016 – Performance Output Goals

- Segment 2: Deploy 3000 new Terminal Air Traffic Control Radios.

Program Plans FY 2017 – Performance Output Goals

- Segment 2: Deploy 3500 new Terminal Air Traffic Control Radios.

System Implementation Schedule

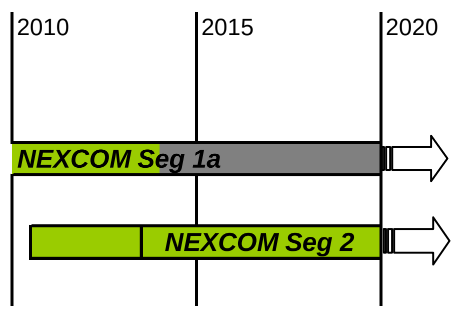
Next-Generation VHF A/G Communications System (NEXCOM) – Segment 1a & 2

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 -- Existing Radios

First site IOC: October 2013 -- Last site IOC: August 2027



2A12, SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM)

FY 2013 Request $57.2M

- A, System Wide Information Management (SWIM) – Segment 1, G05C.01-01
- X, System Wide Information Management (SWIM) – Segment 2, G05C.01-04
- B, System Wide Information Management (SWIM) – Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW), G05C.01-06

Program Description

The System Wide Information Management (SWIM) Program is an Information Technology (IT) infrastructure program that operates in the background to provide data to authorized users to facilitate collaboration across NAS domains. SWIM will provide the Service Oriented Architecture (SOA) Governance and Enterprise Infrastructure needed to meet NextGen's information management and data sharing needs. The program provides the policies and standards to support data management, secure its integrity, and control its access and use; these benefits improve the provision of data and services to support better real-time planning, streamline communications, and connect more FAA systems to more customers.

System Wide Information Management (SWIM) – Segment 1
SWIM is being developed incrementally in segments. In SWIM Segment 1, seven SWIM Implementing Programs (SIPs) are implementing nine SWIM capabilities in the NAS with SWIM-provided governance, standards, and software to support development of reusable SOA services. SWIM provides requirements, schedule, and funding to the SIPs. Segment 1 results in SOA services deployed to all Air Route Traffic Control Centers (ARTCCs), 39 Terminal Radar Approach Controls (TRACONs), the Air Traffic Control System Command Center, the William J. Hughes Technical Center (WJHTC), and NAS Enterprise Management Centers (NEMCs). The Segment 1 capabilities are as follows:

- Aeronautical Information Management (AIM) Special Use Airspace (SUA) Automated Data Exchange,
- Integrated Terminal Weather System (ITWS) Data Publication,
- Corridor Integrated Weather System (CIWS) Data Publication,
- Weather Message Switching Center Replacement (WMSCR) Pilot Report (PIREP) Data Publication,
- Reroute Data Exchange,
- Terminal Data Distribution System (TDDS),
- Traffic Flow Management (TFM) Flow Data Publication,
- Runway Visual Range (RVR) Data Publication, and
- Flight Data Publication Service (FDPS).

In FY 2011, ITWS and CIWS capabilities have become operational and AIM SUA Data Exchange achieved an Initial Operating Capability (IOC).

System Wide Information Management (SWIM) – Segment 2
SWIM Segment 2 continues the provision of governance, standards, and software to additional NAS programs, implements additional Enterprise Infrastructure for programs beginning to work with SWIM, and facilitates transition to this Enterprise Infrastructure by Segment 1 SIPs. Segment 2 Enterprise Infrastructure includes Domain Name Service (DNS), Network Time Protocol and Precision Time Protocol (NTP/PTP), and the NAS Enterprise Messaging Service (NEMS).

System Wide Information Management (SWIM) – Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW)
Under SWIM Segment 2, NextGen Network Enabled Weather (NNEW) will be the first instance in the first phase of a NAS Common Support Services capability to disseminate aviation weather and aeronautical information in a network enabled and global environment. NNEW is a key contributor to an interagency NextGen effort to provide quick, easy, and cost-effective access to weather information for all users of the NAS. NNEW will enable universal access to weather information for input to collaborative and dynamic NAS decision making. Establishing and utilizing open standards and developing the software necessary to support universal access to this information will provide an enhanced method of making aviation weather information available to NextGen stakeholders. It will utilize SOA architecture to enable common, universal access to aviation weather data. It will develop the standards, procedures, and field the system capabilities necessary to support these functions.

Future segments will include additional capabilities that move the FAA further toward the data sharing required for NextGen. SWIM will return to the Joint Resource Council (JRC) in FY 2012 for a Segment 1 Baseline Change Decision (BCD) and Segment 2 Final Investment Decision (FID).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

SWIM will reduce the number and types of unique interfaces, reduce redundancy of information, better facilitate information-sharing, improve predictability and operational decision-making, and reduce the 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 outside the FAA.

Program Plans FY 2013 – Performance Output Goals
SWIM Segment 1:
- Begin operating on SUA Automated Data Exchange capability.
- Begin operating on the Terminal Data Distribution System (TDDS) Capability.
- Begin operating on Flow Information Publication capability.
- Continue to provide governance of the Segment 1 SWIM Implementing Programs (SIPs).

SWIM Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW):
- Deliver FAA Joint Resources Council artifact documentation in support of Final Investment Decision (FID) for NNEW Phase 1.
- Complete FID for NNEW Phase 1.
- Contract Award for NNEW Phase 1.
- Complete Preliminary Design Review for NNEW Phase 1.

Program Plans FY 2014 – Performance Output Goals
SWIM Segment 1:
- Begin operating on Runway Visual Range (RVR) Publication Service (TFM).
- Begin operating Domain Name Service (DNS) enterprise service prototype.
- Begin operating Flight Data Publication Service.

SWIM Segment 2:
- Future activities will be based on approved program.

SWIM Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW):
- Conduct Critical Design Review for NNEW Phase 1.
- Complete development of Operational Test and Evaluation (OT&E) Plan for NNEW Phase 1.

Program Plans FY 2015 – Performance Output Goals
SWIM Segment 1:
- Begin operating on PIREP Data Publication capability.
- Complete Implementation – SWIM Tool Kits (Core Services).

SWIM Segment 2:
- Future activities will be based on approved program.

SWIM Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW):
- Complete installation at the FAA's William J. Hughes Technical Center for NNEW Phase 1.
- Conduct OT&E for NNEW Phase 1.
- Achieve Initial Operating Capability for NNEW Phase 1.

Program Plans FY 2016 – Performance Output Goals

SWIM Segment 2:

- Future activities will be based on approved program.

SWIM Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW):

- Operational Readiness Demonstration (ORD) 25% Complete for NNEW Phase 1.
- ORD 50% complete for NNEW Phase 1.

Program Plans FY 2017 – Performance Output Goals

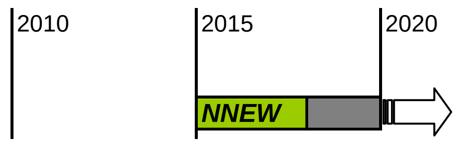
SWIM Segment 2, Common Support Services, Phase 1, Network Enabled Weather (NNEW):

- ORD 75% Complete for NNEW Segment 1.
- Last site ORD completed for NNEW Segment 1.

System Implementation Schedule

NextGen Network Enabled Weather (NNEW)

First site IOC: September 2015 -- Last site IOC: 2017



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

FY 2013 Request $271.6M

- ADS-B National Implementation – Segments 1 and 2, G02S.01-01
- X, ADS-B National Implementation – Future Segment, G02S.01-02

Program Description

The Surveillance and Broadcast Services (SBS) program office is implementing Automatic Dependant Surveillance – Broadcast (ADS-B), Automatic 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 broadcast communication links. Aircraft position (longitude, latitude, altitude, and time) is determined using the Global Navigation Satellite System (GNSS), and/or 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 use the aircraft's multi-function display to enhance their awareness of the location of nearby aircraft. 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), normally used in commercial transport aircraft. The ADS-R service provides a rebroadcast of the ADS-B received information on 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" of aircraft in their vicinity 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 multiple 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).

Concurrent to the deployment and implementation of ADS-B, the agency has signed agreements with several airlines (JetBlue, United and US Airways). These agreements are set up to demonstrate the benefits of advanced ADS-B applications and procedures during revenue service. The operational evaluations will give the agency detailed cost and benefit data, and encourage airlines to equip early to capitalize on ADS-B benefits.

The FAA has also tasked the Aviation Rulemaking Committee (ARC) to provide recommendations for moving forward with the implementation of high value ADS-B applications that would require a cockpit display installed in the aircraft. The ARC made its final report to the FAA by September 30, 2011 and detail recommended next steps by June 2012.

ADS-B National Implementation – Segments 1 and 2:

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 Pilot Advisory Services TIS-B/FIS-B. The second, on September 26, 2010, provided the authority to proceed with NAS-Wide deployment of Air Traffic Control (ATC) Separation and Advisory 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 focused on were: 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 began in FY 2011, and the schedule for deployment of services for the remainder of the NAS has been developed jointly by the FAA and the service provider ITT Corp, based on a roadmap that will provide for maximum operational benefit and the potential for early equipage along with select pocket of users that will optimize the user and government benefits. The planned completion date for deployment of ADS-B services, including TIS-B and FIS-B, is December 2013. This segment covers performance based service fees to pay for ADS-B infrastructure owned and operated by the prime contractor.

Segment 2 for FY2013 and FY2014 will continue NAS-Wide deployment of ADS-B with subscription services operational for surveillance and air traffic services at ERAM, CARTS, STARS & ASDE-X. Further development of ATC Spacing Services i.e.; Ground Based Interval Management-Spacing (GIM-S) (En Route only), and future applications i.e.; spacing flight trials for Flight Deck Based Interval Management-Spacing (FIM-S), In-Trail Procedure (ITP) operational evaluation, and Traffic Situational Awareness with Alerts (TSAA) flight tests are planned. ADS-B software development will occur for the ATOP automation platform.

<u>ADS-B NAS-Wide Implementation – Future Segment:</u>
The 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. An investment decision is planned for 2012 for this segment based on the recommendations of the ARC.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
<u>ADS-B National Implementation – Segments 1 and 2:</u>
- Deliver software for Automation Upgrades for the ATOP automation platform.
- Achieve IOC for ATC Surface Advisory Services at 12 sites.
- Complete Integration Testing of Ground Based Interval Management (GIM).
- Achieve IOC for En Route ATC Separation Services at 15 sites.
- Achieve IOC for Terminal ATC Separation Services at 45 sites.
- Complete validation of Minimum Operational Performance Standards (MOPS) for In Trail Procedures.
- Complete validation of MOPS for Flight Deck Based Interval Management (FIM-S).
- Complete validation of MOPS for Traffic Situational Awareness with Alerts (TSAA).
- Complete ATC Separation Services Implementation Service Acceptance Testing (ISAT) at 89 Service Volumes.
- Complete Gulf Avionics Upgrades. – Complete enhancement of avionics installed under previous partnership agreements to be compliant with the ADS-B Final Rule.
- Fund performance based subscription charges.

Program Plans FY 2014 – Performance Output Goals
<u>ADS-B National Implementation – Segment 1 and 2:</u>
- Complete ATC Separation Services Implementation Service Acceptance Testing (ISAT) at 49 Service Volumes
  - The deployment of 49 service volumes in FY2014 completes the APB Milestone for deployment of all 306 Service Volumes (Services encompass ADS-B Out, ADS-B In, TIS-B and FIS-B).
- Achieve IOC for Ground-Based Interval Management (GIM).
- Achieve IOC of Automation Upgrades for ATOP automation platform.
- Install ATC Surface Advisory Services at 3 sites.
- Complete IOC Surface Advisory Services at all 35 ASDE-X Sites.
- Achieve IOC for Terminal ATC Separation Services at 51 sites (124 cumulative).
- Fund performance based subscription charges.

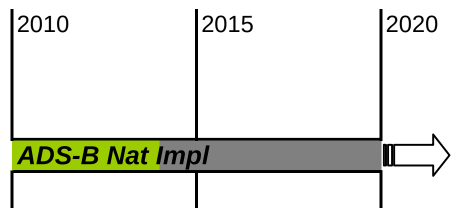
Program Plans FY 2015 – Performance Output Goals
<u>ADS-B National Implementation – Future Segment:</u>
- Although this segment has not yet been baselined, it is anticipated that the program's funding will be used for future application development and surveillance expansion.
- Fund performance based subscription charges.

Program Plans FY 2016 – Performance Output Goals
<u>ADS-B National Implementation – Future Segment:</u>
- Although this segment has not yet been baselined it is anticipated that the program's funding will be used for future application development and surveillance expansion.
- Fund performance based subscription charges.

Program Plans FY 2017 – Performance Output Goals
<u>ADS-B National Implementation – Future Segment:</u>
- Although this segment has not yet been baselined it is anticipated that the program's funding will again be used for future application development and surveillance expansion.
- Fund performance based subscription charges.

System Implementation Schedule

Automatic Dependent Surveillance-Broadcast (ADS-B) National Airspace System (NAS) Wide Implementation
First site IOC: August 28, 2008 -- Last site IOC: December 2013
Expected operational life: 27 years



2A14, WEATHER AND RADAR PROCESSOR (WARP)
FY 2013 Request $0.5M

- Weather and Radar Processor (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 allows 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 controller's 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) and NextGen Network Enabled Weather (NNEW) WP1. 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 altitude 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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 Specification Document, FAA-E-2898G. Actual availability since the incremental tech refresh in 2009 is recorded as 0.99993.

Program Plans FY 2013 – Performance Output Goals

- Complete WARP design and build phases and begin the test phases of two Engineering Change Proposals (ECP). ECP01 will be providing mosaics that have improved resolution and update rate and the foundation for selectable layer. ECP02 will provide the data format adaption along with hardware refresh for two subsystems whose end of life was 2002.

Program Plans FY 2014 – Performance Output Goals

- Complete WARP test, implementation, deployment, and disposal phases of the two ECPs.

Program Plans FY 2015-17 – Performance Output Goals
- None

2A15, COLLABORATIVE AIR TRAFFIC MANAGEMENT TECHNOLOGIES (CATMT)
FY 2013 Request $34.4M

- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, G05A.05-01
- Collaborative Air Traffic Management Technologies (CATMT) – Work Package 3, G05A.05-02
- X, Collaborative Air Traffic Management Technologies (CATMT) – Work Package 4, G05A.05-03

Program Description

The Traffic Flow Management (TFM) system is the primary automation system used by the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units that assist the ATCSCC in management of air traffic flow and throughput and planning for future air traffic demand. 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 users to develop and implement airspace management programs that reduce delays and ensure smooth and efficient traffic flow which result in significant benefits to passengers and airlines. TFM benefits the airlines, general aviation, U.S. Department of Defense (DoD), U.S. Department of Homeland Security, industry, and partner countries.

CATMT Work Package 2 (WP2) will provide new enhancements to the TFM decision support tool suite from FY 2010 through FY 2014. The FAA baseline for WP2 includes 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 – Integrates high confidence 2 hour weather predictions onto the primary display used by Traffic Managers and into TFMS for use as constraint information in decision support tools (called Corridor Integrated Weather System (CIWS)). Also locates departure opportunities through impending weather gaps and determines if a flight will encounter weather problems on its projected departure route (called the Route Availability Planning Tool (RAPT) enhancement);
- Collaborative Airspace Constraint Resolution (CACR) – Automated decision support tool that identifies constrained airspace and provides potential solutions for avoiding those constraints. CACR responds to the RTCA Task Force 5 recommendation for automation to negotiate user-preferred routes and alternative trajectories; and
- Airborne Reroute Execution (ABRR) – Provides the ability to electronically send TFM generated airborne reroutes to En Route control facility automation for ATC execution.

CATMT Work Package 3 (WP3) G05A.05-02, provides enhancements to the TFM from FY 2011 to CY 2015. The FAA baseline for WP 3 includes the following capability enhancements:
- TFM Remote Site Re-engineering (TRS-R) – Modernizes the software (SW) infrastructure, backbone of the TFM decision support tool suite (TFM Remote Site) used by Traffic Managers in the field:
  - Phase 1 – Consolidates three software base codes into one. Allows the airlines to see the same information as the FAA for better situational awareness, collaboration and decision support.
  - Phase 2 – Consolidates software communications, control and data management to one modernized suite. This is the first and fundamental step for future mid-term CATMT capabilities as well as the TFM integrated tool suite and integrated displays planned for future CATMT work packages.

- Collaborative Information Exchange (CIX) – Manages information exchange between the TFM system and external systems through software interfaces:
    - Integrates Special Use Airspace (SUA) status information made available through SWIM Segment 1 for use in decision support tools and on the Traffic Situation Display.

CATMT Work Package 4 (WP4) G05A.05-03, a future segment, that when approved by the FAA Joint Resource Council (JRC) will provide NextGen Midterm TFM/ CATM capabilities between FY 2015 though FY 2020.

- Concept exploration analyses are on-going as one part of the NextGen Collaborative Air Traffic Management (CATM) Solution Set, and will eventually lead to the identification of the possible CATMT Work Package 4 capabilities. These will be thoroughly analyzed and brought to the FAA JRC for a formal Investment Decision, when the analysis justifies it.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

The ATM program will support the Delivering Aviation Access through Innovation 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. CATMT will support the Performance Metric for On Time Arrival by providing more accurate forecasting of system capacity and user demand; improving modeling, evaluation and optimization of traffic management initiatives; improving information dissemination, coordination and execution of traffic flow strategies with NAS users; minimizing and equitably distributing delays across airports and users; collecting and processing additional performance data to define metrics and identify trends; and providing greater ease of use to the traffic management users.

Program Plans FY 2013 – Performance Output Goals
CATMT WP2:

- Complete development, test and deployment of RAPT (at Chicago).
- Continue development and test of the next increment of the CACR capability.
- Initiate design of Airborne Reroute Execution (ABRR).

CATMT WP3:

- Complete deployment TRS-R Phase 1.
- Design, develop and test the 1st increment of TRS-R Phase 2.
- Initiate design and development of CIX.

Program Plans FY 2014 – Performance Output Goals
CATMT WP2:

- Complete development, test and deployment of CACR.
- Complete development, test and deployment of ABRR.

CATMT WP3:

- Complete test and deployment of CIX.
- Deploy the 1st increment of TRS-R Phase 2.
- Begin design, develop and test the 2nd increment of TRS-R Phase 2.

Program Plans FY 2015 – Performance Output Goals

CATMT WP3:

- Deploy the 2nd increment of TRS-R Phase 2.
- Begin design, develop and test the final increment of TRS-R Phase 2.

Program Plans FY 2016 – Performance Output Goals

CATMT WP3:

- Deploy the final increment of TRS-R Phase 2, by end of CY 2015.
- Complete CATMT WP3 transition and close-out activities.

CATMT WP4:

- Pending JRC Final Investment Decision and contract award, begin development of CATMT Work Package 4.

Program Plans FY 2017 – Performance Output Goals

CATMT WP4:

- Pending JRC Final Investment Decision and contract award, continue development of CATMT Work Package 4.

System Implementation Schedule

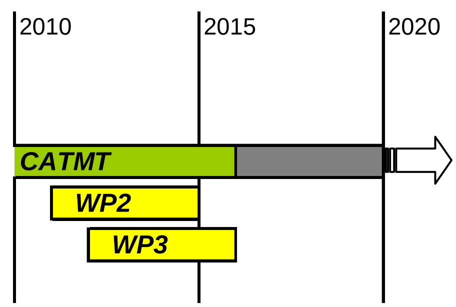
Collaborative Air Traffic Management Technologies (CATMT) – Work Package 2, 3 and 4

First Operational Capability (OC): June 2008 -- Last OC: 2019

WP2 First Software Enhancement: 2011 -- Last: 2014

WP3 First Software Enhancement: 2012 -- Last: 2015

WP4 - Pending final investment decision



2A16, COLORADO ADS-B WIDE AREA MULTILATERATION (WAM) COST SHARE

FY 2013 Request $1.4M

- 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). Operating under IMC 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, airlines and local communities. 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: Durango, Gunnison, Montrose and Telluride CO.

Colorado Wide Area Multilateration (WAM), G08M.03-01:
The project will develop an ADS-B/Multilateration surveillance service capability. Electronic instrumentation that will be placed at multiple locations on the surface will determine the location of an aircraft by integrating data from several ground sites. The increased accuracy of this surveillance technique will safely expand the capacity of these airports to allow additional aircraft operations during instrument landing conditions. The multilateration component will provide 1090/UAT transponder equipped 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. 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 system will be managed by a System Integrator that will be responsible for design, development, deployment, operation and maintenance of the surveillance system and will own the equipment. The System Integrator 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.

Colorado WAM – MLAT Services, G08M.03-02:
This project covers the annual service fees starting in FY 2015 for the surveillance services covering the four Colorado airports.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

ADS-B and Wide Area Multilateration (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. Once the services are fully implemented, the financial benefits projected from the increase in capacity is approximately $2.4 million per year.

Program Plans FY 2013 – Performance Output Goals
- Complete Initial Operating Capability (IOC) for 2 airports (Gunnison and Durango).
- Declare Operational Readiness Decision (ORD).
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.

Program Plans FY 2014 – Performance Output Goals
- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the three Colorado airports.
- Complete Initial Operating Capability (IOC) for Telluride airport.

Program Plans FY 2015 – Performance Output Goals

- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the four Colorado airports.

Program Plans FY 2016 – Performance Output Goals

- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the four Colorado airports.

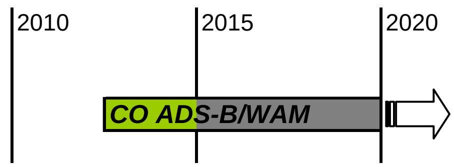
Program Plans FY 2017 – Performance Output Goals

- Provide WAM surveillance services of 99.996% availability supporting air traffic operations for the four Colorado airports.

System Implementation Schedule

Colorado ADS-B/WAM Cost Share

First site IOC: September 2012 -- Last site IOC: August 2014
Expected operational life: 23 years



2A17, TACTICAL FLOW TIME BASED FLOW MANAGEMENT (TBFM)

FY 2013 Request $12.9M

- Trajectory Mgmt – Time Based Flow Management (TBFM) – Work Package 2, G02A.01-03
- X, Trajectory Mgmt – TBFM – Tech Refresh, G02A.01-07

Program Description

Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. Currently, TMA is in daily use throughout the NAS. TMA is the only decision support tool that can support time-based metering. TMA has been field-tested over the past 10 plus years and is installed in the 20 Air Route Traffic Control Centers (ARTCC) with supporting equipment in most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. TBFM uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM determines specific time of arrival for waypoints in an aircraft's route and allows more precision in aircraft separation. TBFM will improve upon TMA and address Solution Sets within the NextGen Implementation Plan.

TBFM Work Package 2 (G02A.01-03) will improve the management of traffic flow throughout the cruise phase of flight through point-in-space metering or extended metering, resolve the issue of TMA hardware obsolescence, increase airspace capacity utilization through flexible scheduling, share metering data with other tools/stakeholders, enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes, enable more efficient departure operations with the integrated departure and arrival concept (IDAC), and increase traffic manager awareness of severe weather within their area of responsibility. The design, development and deployment of these concepts will be occurring during the 2010-2014 timeframe. These enhancements support the current NextGen Operational Initiatives. Initiatives include:

- Current Tactical Management of Flow in the En Route domain for Arrivals/Departures (NextGen Operational Improvement 104115) – TMA displays are used for organizing traffic flows for tactical flow management of transition from en route to terminal airspace,
- Integrated Arrival/Departure Airspace Management (NextGen Operational Improvement 104122) – Integrating and automating the departure capability with the TMA system (IDAC),
- Point-in-Space Metering (NextGen Operational Improvement 104120) – Extended Metering – Adding additional meter points for more efficient Time Based Metering, and

- Time-Based Metering Using Area Navigation (RNAV)/Required Navigation Performance (RNP) Route Assignments (NextGen Operational Improvement 104123) – Automating the use of RNAV procedures in the Terminal environment for a more efficient modeling of an aircraft's trajectory.

TBFM WP2 will develop and deliver programs for other operational needs such as flexible scheduling that will take advantage of the partial slots that currently causes a loss of efficiency in capacity constrained areas. Also the system will be re-architected to reduce the space requirements of the TMA system. The system currently consists of two monitors, two keyboards and two mice requiring a significant amount of space which may not be available at all needed airports. The reduction will help to continue the expansion of the TMA system to other airports and the expansion of Time Based Metering.

TBFM will be deployed to 5 new sites (Teterboro (TEB), Morristown Municipal (MMU), Cleveland-Hopkins (CLE), Ronald Reagan Washington National (DCA) and Baltimore/Washington International (BWI)) and 5 Adjacent Center Metering Sites (Washington Dulles International (IAD), Los Angeles International (LAX), San Diego International (SAN), Hartsfield-Jackson Atlanta International (ATL) and San Francisco International (SFO)).

TBFM Tech Refresh will replace the aged equipment that was deployed in 2012 with new modern equipment in the FY 2016-2017 time frame. This equipment will begin to reach its end of life/end of maintenance by 2017. The TBFM program office, starting in the FY 2015 time frame, will begin the acquisition management process to reach a Final Investment Decision to replace this hardware.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Trajectory Management – Time Based Flow Management will begin to provide complete time based metering solutions across all flight phases, accept surface. 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. TMA has provided an average of 3-5% more efficient throughput.

Program Plans FY 2013 – Performance Output Goals

TBFM WP2:

- Design, develop, test and deploy information sharing functionality to all sites that will leverage the System Wide Information Management (SWIM) Service Oriented Architecture (SOA) infrastructure and standards to distribute TBFM information to NAS systems and users while also receiving flight data via this service.
- Design, develop test, and deploy to all sites the ability to display convective weather.
- Develop a system specifications document to accommodate Area Navigation/Required Navigation Performance routes (RNAV/RNP).
- Begin development of software enhancement to enable more accurate Area Navigation/Required Navigation Performance routes (RNAV/RNP).

Program Plans FY 2014 – Performance Output Goals

TBFM WP2:

- Complete the development, test and deployment of Extended Metering to all sites.
- Complete the test and deployment at all sites the software enhancement to enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes.
- Complete the implementation schedule as well as deploy TBFM system functionalities to additional facilities.
- Continue design, development, and test of Integrated Departure and Arrival Capability (IDAC).

Program Plans FY 2015 – Performance Output Goals

Tech Refresh:

- Develop a plan to conduct the Tech Refresh of the TBFM system.
- Develop documentation and coordination necessary to gain the acquisition approval for the Tech Refresh of the TBFM system, such as market surveys, cost analysis, and architecture artifacts.

Program Plans FY 2016 – Performance Output Goals

Tech Refresh:

- Complete investment analysis documentation for an Investment Decision on TBFM Tech Refresh Program.

Program Plans FY 2017 – Performance Output Goals

Tech Refresh:

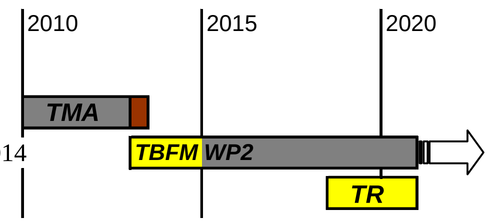
- Achieve Final Investment Decision for tech refresh activities and begin initial planning work.

System Implementation Schedule

Time Based Flow Management (TBFM)

WP2 First Operational Implementation: December 2012 -- Last: Sept 2014

Tech Refresh Operational Implementation: Dates are TBD



B. TERMINAL PROGRAMS

2B01, AIRPORT SURFACE DETECTION EQUIPMENT – MODEL X (ASDE-X)

FY 2013 Request $7.4M

- 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 conflicts. 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 potential collision.

Deployment of the 35 planned ASDE-X systems was completed in FY 2011. The first ASDE-X system was delivered in 2002. Some of the equipment has reached the end of its service life and is no longer supportable. The ASDE-X Tech Refresh program provides for the replacement and upgrade of hardware and software 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 is scheduled to be completed in September 2012 to determine the equipment/software that needs to be upgraded, updated, or replaced as part of 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Reduce Category A & B (most serious) runway incursions to a rate of no more than 0.395 per million operations, and maintain or improve thought FY 2013.*

Relationship to Performance Metric

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. For the latest data available (FY 2010), the number of Category A&B runway incursions at the 35 ASDE-X airports since the program started in FY 2004 is projected to be 65.87 (baseline). The target is to reduce the Category A&B runway incursions to 53.52 and the actual was 39.

Program Plans FY 2013 – Performance Output Goals
- Procure, install, and begin assessing the Technical Refresh solution on one of the ASDE-X support systems.
- Initiate procurement activities to support the ASDE-X Technical Refresh implementation effort.

Program Plans FY 2014 – Performance Output Goals
- Complete 90% of the procurement activities to support the ASDE-X Technical Refresh implementation effort.

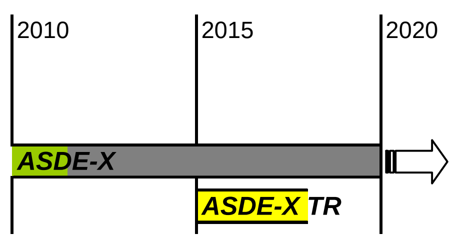
Program Plans FY 2015 – Performance Output Goals
- Complete installation of the ASDE-X Technical Refresh solution at 2 of the 35 airports.

Program Plans FY 2016 – Performance Output Goals
- Complete installation of the ASDE-X Technical Refresh solution at 13 of the 35 airports, 37% complete.

Program Plans FY 2017 – Performance Output Goals
- Complete installation of the ASDE-X Technical Refresh solution at the remaining 20 airports, 100% complete.

System Implementation Schedule

Airport Surface Detection Equipment – Model X (ASDE-X)
First ORD October 2003 -- Last ORD: July 2011
First site Delivery: 2015 -- Last site Delivery: 2017



2B02, TERMINAL DOPPLER WEATHER RADAR (TDWR) – PROVIDE
FY 2013 Request $2.5M

- 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 no later than 2017. Although program funding ends in 2014, installations by FAA personnel will continue after that time. 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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. There have been no wind shear accidents at any TDWR-protected airport since its TDWR was commissioned. The TDWR's required inherent availability (not including any logistics or administrative delays) is 99.967%. Since October 2008 (considering both scheduled and unscheduled outages), the TDWR has been in service about only 96.7% of the time. Even with a small portion of that time being due to logistics and administrative delays, it is clear that significant improvement in the TDWR's reliability and availability are still required.

Program Plans FY 2013 – Performance Output Goals
- Complete the field reliability test and acquisition of the production Antenna Drive Motor systems and install the modification at one more site.
- Install 20 radomes.
- Issue the Transmitter Sustainment modification to the field.
- Install Radar Data Acquisition (RDA) mod kits at 10 more sites and release upgraded RDA software.
- Complete the development testing, and procure the production Radar Product Generator (RPG) Tech Refresh computers and install seven of them.
- Acquire the last of the Radio-Frequency Filter Amplifier (RFFA) assemblies and issue the modification.
- Install the RPG UPS units at the last seven sites, October 2013 (APB milestone).
- Install new air conditioner systems at 10 more sites.

Program Plans FY 2014 – Performance Output Goals
- Install the Antenna Drive Motor modification at nine sites.
- Install the RDA modification at 11 sites.
- Complete RPG Computer evaluation and software development and make production decision.
- Install the Transmitter Sustainment modification at 47 sites, July 2014 (APB milestone).
- Install the air conditioners at the last 8 sites, July 2014 (APB milestone).
- Install new radomes at 20 sites.

Program Plans FY 2015– Performance Output Goals (Funded from prior years)
- Install the RFFA modification at 47 sites, November 2014 (APB milestone).
- Complete acquisition and installation of radomes (APB milestone), March 2015.

Program Plans FY 2016 – Performance Output Goals (Funded from prior years)
- Complete development, test and acquisition of mod kits: Radar Products Generator Computer Tech Refresh, July 2016 (APB milestone).
- Complete development, test, acquisition and implementation of mod kits: Receiver and Data Acquisition retrofit, March 2016 (APB milestone).

Program Plans FY 2017 – Performance Output Goals (Funded from prior years)
- Complete implementation of mod kits: Radar Products Generator Computer Tech Refresh, July 2017.
- Complete development, test, acquisition and implementation of mod kits: Antenna Drive Motor Replacement, September 2017 (APB milestone).
- Complete last segment of TDWR SLEP program, September 2017 (APB milestone).

2B03, STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS) (TAMR PHASE 1)
FY 2013 Request $34.5M

- A, Standard Terminal Automation Replacement System – Technical Refresh (TAMR Phase 1), A04.01-01
- B, Standard Terminal Automation Replacement System – Terminal Enhancements (TAMR Phase 1), A04.01-02

A, STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM – TECHNICAL REFRESH (TAMR PHASE 1), A04.01-01

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. The final TAMR Phase 1 site was completed in June 2010 with the installation of STARS equipment at the newly-construction Dayton Tower facility. The 47 STARS baseline deployments are complete, and STARS is in the Hardware Technology Refreshment 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. TAMR Phase I technology refresh is necessary to address technology, mobility, and security gaps with the existing systems. 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.

Technical Refresh is needed to address changes in hardware and to support the STARS upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

During FY 2010, STARS had an overall system availability (software/hardware) of 99.99998% at all operational sites (Source: National Outage Database, through June 2010). 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 control increased aircraft density without compromising safety. This program will modernize the STARS equipment to sustain this high level of availability. The STARS equipment is a Commercial Off the Shelf (COTS) product that has a life expectancy of three (3) to five (5) years. The current STARS equipment has been in the NAS since 1999 and is in dire need of equipment upgrades. This equipment is also reaching end of maintenance.

Program Plans FY 2013 – Performance Output Goals
- Procure 125 flat panel displays for upgrades at 6 sites, to include operational sites as well as support sites such as the Operational Support Facilities (OSFs), the Technical Center, and the Aeronautical Center.
- Procure processors for 6 sites for upgrades from G1to G4 configuration. Sites to include both operational sites as well as support sites (OSFs, Technical Center, Aeronautical Center).

Program Plans FY 2014 – Performance Output Goals
- Procure approximately 100 processors for upgrades from G1 to G4 configuration at 5 operational sites.
- Procure approximately 150 processors for upgrades flat panel displays for upgrades at 6 operational sites, to include operational sites.

Program Plans FY 2015 – Performance Output Goals
- Continue procurement installation of system Technical Refreshment of end -of-life COTS hardware, e.g., Sun Ultra 5 processors, etc.
- Continue procurement and installation of flat panel displays in support of flat panel replacement upgrades
- Identification, qualification, procurement and installation of emergent end -of-life COTS hardware.

Program Plans FY 2016 – Performance Output Goals
- Continue procurement installation of system Technical Refreshment of end -of-life COTS hardware, e.g., Sun Ultra 5 processors, etc.
- Continue procurement and installation of flat panel displays in support of flat panel replacement upgrades
- Identification, qualification, procurement and installation of emergent end -of-life COTS hardware.

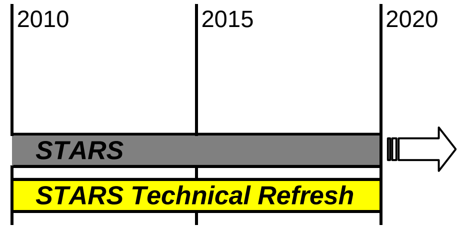
Program Plans FY 2017 – Performance Output Goals
- Continue procurement installation of system Technical Refreshment of end -of-life COTS hardware, e.g., Sun Ultra 5 processors, etc.
- Continue procurement and installation of flat panel displays in support of flat panel replacement upgrades
- Identification, 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 Technical Refresh: 2006 -- +2024



B, 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. 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. The final TAMR Phase 1 site was completed in June 2010 with the installation of STARS equipment at the newly-construction Dayton Tower facility. STARS baseline deployments are complete.

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), upgrading interfaces with other systems (surveillance, centers, oceanic) and the supporting infrastructure for the STARS Program, to include changes that may be required to the Tracker, and any systems engineering analysis that may need to be conducted to support future NextGen requirements. 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 upgrades needed for enhanced performance and capacity and support NextGen initiatives.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

During FY 2010, STARS had an overall system availability (software/hardware) of 99.99998% at all operational sites (Source: National Outage Database, through June 2010). 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 control increased aircraft density without compromising safety. This program will modernize the STARS equipment to sustain this high level of availability.

Program Plans FY 2013 – Performance Output Goals

- Conduct reliability-maintainability-availability (RMA) data analysis and provide overall program support.

Program Plans FY 2014 – Performance Output Goals

- Implement mandatory security and safety enhancements, and new functionality, upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Program Plans FY 2015 – Performance Output Goals

- Implement mandatory security and safety enhancements, and new functionality, upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Program Plans FY 2016 – Performance Output Goals

- Implement mandatory security and safety enhancements, and new functionality, upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

Program Plans FY 2017 – Performance Output Goals

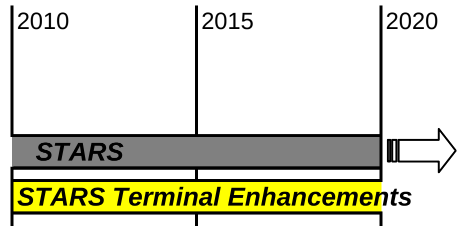
- Implement mandatory security and safety enhancements, and new functionality, upgrades needed for enhanced performance and capacity in support of NextGen initiatives.

System Implementation Schedule

Standard Terminal Automation Replacement System (STARS)

First site IOC: October 2002 -- Last site IOC: September 2007

STARS Terminal Enhancements: 2006 -- +2024



2B04, TERMINAL AUTOMATION MODERNIZATION/ REPLACEMENT PROGRAM (TAMR PHASE 3)

FY 2013 Request $153.0M

- Terminal Automation Modernization – Replacement (TAMR) – Phase 3, Segment 1, A04.07-01
- 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 four (4) 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.

Phase 3 of the TAMR program is planned to modernize or replace the automation systems at 105 air traffic control facilities. These sites presently operate with the Common Automated Radar Terminal System (CARTS - ARTS IIEs) 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 support mid-term NextGen requirements and convergence of automation systems into a standard configuration in the Terminal domain. On December 21, 2011, the JRC approved the Final Investment Decision for Segment 1.

Phase 3 Segment 1

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. In particular, TAMR Phase 3 Segment 1 will:

- Begin convergence to a single Terminal Automation hardware and software platform by replacing a IIIE facility with STARS at Dallas (D10) by 2013.
- Replace remaining ten (10) IIIE facilities with STARS by 2017 to complete the convergence of the IIIE's to a single Terminal Automation hardware and software baseline (Northern California (NCT), Atlanta (A80), Southern California TRACON (SCT), Potomac TRACON (PCT), Louisville (SDF), Denver (D01), Minneapolis (M98), St Louis (T75), Chicago (C90) and New York (N90)).

This approach for TAMR Phase 3 Segment 1 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. Final Investment decision was approved in December 2011.

<u>Phase 3 Segment 2</u>
TAMR Phase 3 Segment 2 will replace 94 ARTS IIE systems with STARS hardware, software, and displays at all Terminal Radar Approach Control (TRACONs) and their associated Air Traffic Control Towers (ATCTs). This segment will complete the convergence of all CARTS systems to a single automation system in the Terminal domain. Investment analysis is on going and a JRC FID approval for Segment 2 is planned for July 2012.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Improvements to the NAS can reduce the anticipated increase in flight delays and any resulting decrease in system efficiency. 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 2013 – Performance Output Goals
<u>Phase 3 Segment 1:</u>
- Complete IOC for Build 1 at key site.
- Initiate Operational Test & Evaluation (OT&E) for Build 2.
- Complete IOC for 1 additional site.

<u>Phase 3 Segment 2:</u>
- Procure systems, begin site prep, and complete installation at key site (pending investment decision).

Program Plans FY 2014 – Performance Output Goals
<u>Phase 3 Segment 1:</u>
- Complete IOC on second build at key site.
- Complete IOC at 4 additional sites (6 of 11 total, 54%).

<u>Phase 3 Segment 2:</u>
- Continue implementation of JRC preferred solution (Pending investment decision).

Program Plans FY 2015 – Performance Output Goals

Phase 3 Segment 1:

- Complete IOC at 5 additional sites (11 total, 100%).

Phase 3 Segment 2:

- Continue implementation of JRC preferred solution.

Program Plans FY 2016 – Performance Output Goals

Phase 3 Segment 1:

- Complete 3 ORDs.

Phase 3 Segment 2:

- Continue implementation of JRC preferred solution.

Program Plans FY 2017 – Performance Output Goals

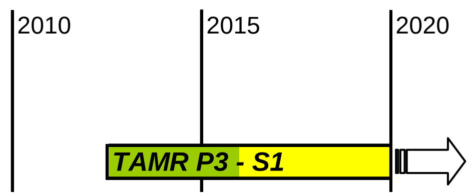
Phase 3 Segment 1:

- Complete ORD at last site (11th site).

System Implementation Schedule

Terminal Automation Modernization/Replacement (TAMR) Phase 3 - Segment 1

First site IOC: October 2012 -- Last site IOC: 2015



- JRC Decision – Authorization to Proceed – December 2010.
- Final Investment Decision for Segment 1 – December 2011.
- Contract Definitization – May 2012.

2B05, Terminal Automation Program

FY 2013 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 En route automation system, both the Host Computer System (HOST) and the En Route Automation Modernization (ERAM) system, and provides flight data information to NAS Terminal facilities. The FDIO system retrieves the flight data from the HOST/ERAM 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/ERAM.

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. The program is based on a 5 year replacement cycle for the various components in order to maintain system operational availability.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The FDIO program replaces end-of–life, obsolete FDIO equipment with modern COTS and modified COTS equipment, thereby reducing potential outages and delays. Reports indicate FDIO equipment has an average operational availability of 99.875% from 2007 thought 2010.

Program Plans FY 2013 – Performance Output Goals
- Contract Awarded for Terminal Server, Keyboard, and Monitor replacements, January 31, 2013.
- Complete delivery and installation of the First Article workstation at the WJHTC, September 30, 2013.
- Procure and field replacement Flight Data Input/Output (FDIO) system components (PC/RCU computer) acquired in 2012 at 50 FAA and DoD ATC facilities by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, and monitor) at 100 FAA and DoD ATC facilities.

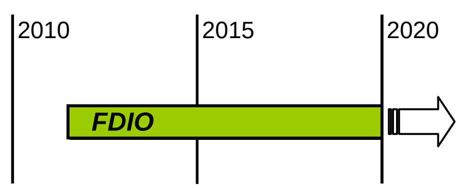
Program Plans FY 2015 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, and monitor) at 200 FAA and DoD ATC facilities.

Program Plans FY 2016 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, and monitor) at 200 FAA and DoD ATC facilities.

Program Plans FY 2017 – Performance Output Goals
- Procure and field replacement Flight Data Input/Output (FDIO) system components (terminal server, keyboard, and monitor) at 100 FAA and DoD ATC facilities.

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 2013 Request $64.9M

- 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The Terminal Air Traffic Control Facilities program contributes to the FAA goal of Delivering Aviation Access through Innovation 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. This program will ensure facilities are prepared to meet current and future levels of air traffic control services while supporting the performance metric of maintaining operational availability of the NAS.

Program Plans FY 2013 – Performance Output Goals
Projects are subject to change as a result of congressional interest:
- Design starts at three sites; Teterboro, Philadelphia and Tulsa-Riverside.
- Start construction at two sites; Tucson and West Palm Beach.
- Equipment installation and disposition at four sites and planned commissioning at five sites.
- Conduct preliminary analysis at multiple sites.

Program Plans FY 2014 – Performance Output Goals
Projects are subject to change as a result of congressional interest:
- Design starts at 3 sites.
- Start construction at 3 sites.
- Equipment installation and disposition at 5 sites and planned commissioning at 3 sites.
- Conduct preliminary analysis at multiple sites.

Program Plans FY 2015-2017 – 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.

2B07, ATCT/TERMINAL RADAR APPROACH CONTROL (TRACON) FACILITIES – IMPROVE

FY 2013 Request $25.2M

- 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 and tower cab consoles. 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 and upgrading structures to met seismic 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The ATCT/TRACON Modernization program upgrades and improves facilities to support the NAS. This program will enable facilities to meet current operational, environmental, seismic 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 2013 – Performance Output Goals

- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Initiate an average of 20 improve related projects per year.

Program Plans FY 2014 – Performance Output Goals
- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Initiate an average of 40 improve related projects per year.

Program Plans FY 2015 – Performance Output Goals
- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Initiate an average of 40 improve related projects per year.

Program Plans FY 2016 – Performance Output Goals
- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Initiate an average of 40 improve related projects per year.

Program Plans FY 2017 – Performance Output Goals
- Conduct up to 18 planning activities (e.g. Life Cycle Assessments, Condition Assessments, etc.) to determine requirements.
- Initiate an average of 40 improve related projects per year.

2B08, TERMINAL VOICE SWITCH REPLACEMENT (TVSR)
FY 2013 Request $4.0M

- 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. 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The TVSR program supports the Performance Metric of maintain operational availability of the NAS 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 2013 – Performance Output Goals
- Deliver 4 terminal voice switches and voice switch bypass (VSBP) systems to various FAA facilities.

Program Plans FY 2014 – Performance Output Goals

- Deliver 5 terminal voice switches to various FAA facilities.

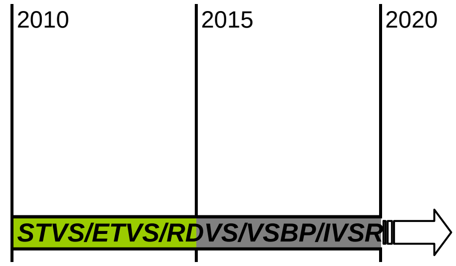
Program Plans FY 2015-2017 – Performance Output Goals

- 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: TBD



2B09, NAS FACILITIES OSHA AND ENVIRONMENTAL STANDARDS COMPLIANCE

FY 2013 Request $26.0M

- NAS Facilities OSHA & Environmental Standards Compliance, F13.03-00

Program Description

Establish and implement an Environmental and Occupation Safety and Health Program that ensures the health and safety of all FAA employees by providing compliance with Federal, state, and local regulations and bargaining unit agreements.

OSHA & Environmental Standards Compliance

This program provides 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 and completion of policy guidance, technical assistance, employee training, job hazard assessments, 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.

Tower Fire Life Safety

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 276 of the 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, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice.*
- *FAA Outcome 2 – FAA is widely recognized as an employer of choice.*
- *FAA Performance Metric 1 – The FAA is rated in the top 25 percent of places to work in the federal government by employees.*

Relationship to Performance Metric

The NAS Facilities OSHA and Environmental Standards Compliance program supports the FAA's Strategic Goal of Workplace of Choice by continuing to improve the safety of the FAA's workplaces through the implementation of such critical programs as fall protection, electrical safety, indoor air quality, including mold, fire life safety, training and workplace inspections and abatement of safety hazards. The implementation of these programs results in making the FAA a healthful place in which to work and ranking the FAA in the top 25 percent of places to work in the federal government by employees. For example, the FAA ensures that 100% of all staffed and at least 95% of all unstaffed Air Traffic Organization workplaces listed in the Workplace Inspection Tool and as required by FAA policy and Federal regulations, are inspected annually.

The ATO Workplace Inspections Program is responsible for overseeing the annual EOSH inspection of over 11,400 separate facilities nationwide. During these inspections, ATO workplaces are evaluated for both OSH and Environmental compliance and deficiencies are noted as workplace hazards. Workplace hazards are recorded in the FAA Workplace Inspection Tool (WIT) database, along with a risk assessment and an estimated cost to correct each individual hazard. The ATO Hazard Abatement Program then tracks the identified hazards until they are completely abated. As of FY 2011 the FAA WIT is tracking 106,260 individually identified workplace hazards, of which 93,123 (87.6%) have been completely abated.

Program Plans FY 2013 – Performance Output Goals

<u>OSHA & Environmental Standards Compliance:</u>

- Complete upgrades on 154 fall protection systems on NAS Communication, Navigation, Radar, and Terminal facilities to comply with Occupational Safety and Health (OSHA) regulations, FAA requirements, and industry standards.
- Provide fall protection training to 1250 employees.
- Provide 246 fall protection equipment kits to implement requirements of new ATO Fall Protection Program, JO 3900.63.
- Conduct 4 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Complete the FAA tracking process for 100% of mold and moisture intrusion findings identified through the Agency identification process for FY 2012.
- Conduct job hazard analyses on additional NAS equipment/tasks through the Job Hazard Analysis Program.
- Update and post lockout/tagout procedure templates for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.
- Provide permit-required confined space training to 550 employees.
- Provide 13 districts with permit-required confined space entry equipment to implement requirements of ATO Confined Space Program.
- Provide first aid/CPR training to 3000 Airway Transportation System Specialists (ATSSs) and volunteer lay responders.

<u>Tower Fire Life Safety:</u>

- Begin an average of 20 ATCT fire life safety upgrades per year.
- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2014 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 131 fall protection systems on NAS Communication, Navigation, and Radar facilities to comply with Occupational Safety and Health (OSHA) regulations, FAA requirements, and industry standards.
- Provide fall protection training to 1000 employees.
- Provide 246 fall protection equipment kits to implement requirements of new ATO Fall Protection Program, JO 3900.63.
- Conduct 4 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Complete the FAA tracking process for 100% of mold and moisture intrusion findings identified through the Agency identification process for FY 2012.
- Conduct job hazard analyses on additional NAS equipment/tasks through the Job Hazard Analysis Program.
- Update and post lockout/tagout procedure templates for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.
- Provide permit-required confined space training to 450 employees.
- Provide 13 districts with permit-required confined space entry equipment to implement requirements of ATO Confined Space Program.
- Provide first aid/CPR training to 2000 ATSSs and volunteer lay responders.

Tower Fire Life Safety:

- Begin an average of 20 ATCT fire life safety upgrades per year.
- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2015 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems on NAS Communication, Navigation, Radar, and Terminal facilities to comply with Occupational Safety and Health (OSHA) regulations, FAA requirements, and industry standards.
- Conduct 4 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Complete the FAA tracking process for 100% of mold and moisture intrusion findings identified through the Agency identification process for FY 2012.
- Conduct job hazard analyses on additional NAS equipment/tasks through the Job Hazard Analysis Program.
- Update and post lockout/tagout procedure templates for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.
- Provide permit-required confined space training to 350 employees.
- Provide 12 districts with permit-required confined space entry equipment to implement requirements of ATO Confined Space Program.

Tower Fire Life Safety:

- Begin an average of 20 ATCT fire life safety upgrades per year.
- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2016 – Performance Output Goals

OSHA & Environmental Standards Compliance:

- Upgrade 100 fall protection systems on NAS Communication, Navigation, Radar, and Terminal facilities to comply with Occupational Safety and Health (OSHA) regulations, FAA requirements, and industry standards.
- Conduct 4 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Complete the FAA tracking process for 100% of mold and moisture intrusion findings identified through the Agency identification process for FY 2012.
- Conduct job hazard analyses on additional NAS equipment/tasks through the Job Hazard Analysis Program.

- Update and post lockout/tagout procedure templates for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.
- Provide permit-required confined space classes to 100 employees.

Tower Fire Life Safety:
- Begin an average of 20 ATCT fire life safety upgrades per year.
- Complete 20 ATCT fire life safety upgrades.

Program Plans FY 2017 – Performance Output Goals
OSHA & Environmental Standards Compliance:
- Upgrade 100 fall protection systems on NAS Communication, Navigation, Radar, and Terminal facilities to comply with Occupational Safety and Health (OSHA) regulations, FAA requirements, and industry standards.
- Conduct job hazard analyses on additional NAS equipment/tasks through the Job Hazard Analysis Program.
- Complete the FAA tracking process for 100% of mold and moisture intrusion findings identified through the Agency identification process for FY2012.
- Conduct 4 Arc-flash analyses at large facilities in the ATO Service Areas to comply with National Fire Prevention Association regulations, FAA requirements, and industry standards.
- Update and post lockout/tagout procedure templates for additional ATO facilities and equipment through the Lockout/Tagout Program.
- Conduct at least 1 field review for the hearing conservation program.
- Provide permit-required confined space classes to 100 employees.

Tower Fire Life Safety:
- Begin an average of 20 ATCT fire life safety upgrades per year.
- Complete 20 ATCT fire life safety upgrades.

2B10, AIRPORT SURVEILLANCE RADAR (ASR-9) SERVICE LIFE EXTENSION PROGRAM (SLEP)
FY 2013 Request $6.4M

- ASR-9 SLEP – Phase 2 and 3, S03.01-09
- ASR-9 SLEP – Antenna Raises and UPS Establishments, S03.01-10

Program Description

ASR-9 systems provide aircraft detection and weather information to air traffic controllers at the highest activity airports. The ASR-9 tracks all aircraft within its range and provides those tracks, as well as six-level weather intensity information, to terminal automation systems. Air traffic controllers utilize this information to safely and efficiently separate aircraft in the terminal environment. The ASR-9 also provides data to AMASS and ASDE-X to aid in the prevention of accidents resulting from runway incursions.

ASR-9 SLEP – Phase 2:
Without modifications to the ASR-9, the system will continue to experience decreasing reliability and availability over time. The supportability of the ASR-9 system is at risk due to the lack of commercial availability of some components. The cost of technology refresh has been deemed more cost-effective than acquiring full replacement systems, because the current performance is effective in meeting both the safety and capacity needs of the nation's air traffic system at major airports. The benefits of this service life extension program will lower O&M costs associated with the ASR-9 beginning in 2016.

The program will continue studies to address obsolescence and supportability issues of system components within the ASR-9 system. A business case is currently being made to determine the scope of the ASR-9 SLEP, Phase 2 program. Phase 2 investment decision is planed for June 2012 with the following projects:

- Digital Remote Surveillance Communication Interface Processor Replacement (DRSR),

- Spectrum Analyzer and Power Meter, and
- Transmitter Backplane.

ASR-9 SLEP – Phase 3:
Engineering studies will be performed to determine the scope of the ASR-9 SLEP Phase 3 program. There are components that will not be supportable through 2020 and these analyses will determine the extent of re-engineering and system modifications needed. Candidates for such analyses include the Maintenance Display Unit, Analog/Digital Converter Circuit Card Assembly and various Power Supplies. An investment decision for Phase 3 is planned for 2015.

ASR-9 SLEP – Antenna Raises and UPS Establishments:
Near term activities include Antenna raises and UPS installations – Antenna raises are needed to mitigate radar coverage problems and UPS installations are needed to mitigate the effects of recurring interruptions of commercial power.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

ASR-9 terminal service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers' information that allows closer aircraft operations and increases air traffic arrival and departure operations. This program, ASR-9 Service Life Extension Program Phase 2, reduces the risk of unscheduled outages and ensures the continuation of service capabilities. Currently ASR-9 systems are functioning at an operational availability of 99.48 percent, which is below the FAA performance metric of 99.7 percent. Without modifications to the ASR-9, the system will continue to experience decreasing reliability and availability over time. The intent of this program is to maintain operational availability of the ASR-9 system.

Program Plans FY 2013 – Performance Output Goals
ASR-9 SLEP – Phase 2:
- Complete Digital Remote Surveillance Communication Interface Processor Replacement (DRSR) Development Testing.
- Complete Transmitter Backplane Operational Test.

ASR-9 SLEP – Phase 3:
- Complete engineering study for long term support of Analog-Digital Converter Circuit Card Assembly.

ASR-9 SLEP – Antenna Raises and UPS Establishments:
- Start design of two antenna raise projects and two UPS installation projects.

Program Plans FY 2014 – Performance Output Goals
ASR-9 SLEP – Phase 2:
- Complete Operational Test of Transmitter Backplane.
- Complete Operational Test of Digital Remote Surveillance Communication Interface Processor Replacement.

ASR-9 SLEP – Phase 3:
- Activities will be developed once the program is approved by FAA management.

ASR-9 SLEP – Antenna Raises and UPS Establishments:

- Complete design of two antenna raise projects and two UPS installation projects.

Program Plans FY 2015 – Performance Output Goals

ASR-9 SLEP – Phase 2:

- Award contract for Digital Remote Surveillance Communication Interface Processor Replacement Materials.
- Award Contract for Transmitter Backplane Materials.

ASR-9 SLEP – Phase 3:

- Activities will be developed once the program is approved by FAA management.

Program Plans FY 2016 – Performance Output Goals

ASR-9 SLEP – Phase 2:

- Complete Installation of Digital Remote Surveillance Communication Interface Processor Replacement at 25% of ASR-9 sites.
- Complete Installation of Transmitter Backplane at 25% of ASR-9 sites.

ASR-9 SLEP – Phase 3:

- Activities will be developed once the program is approved by FAA management.

Program Plans FY 2017 – Performance Output Goals

ASR-9 SLEP – Phase 2:

- Complete Installation of Digital Remote Surveillance Communication Interface Processor Replacement at 75% of ASR-9 sites.
- Complete Installations of Transmitter Backplane at 75% of ASR-9 sites.

ASR-9 SLEP – Phase 3:

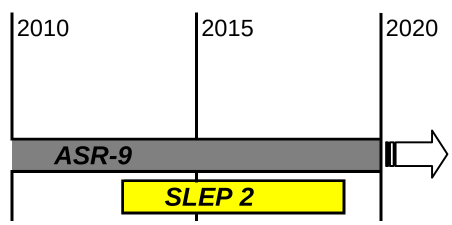
- Activities will be developed once the program is approved by FAA management.

System Implementation Schedule

Airport Surveillance Radar-Model 9 (ASR-9) Service Life Extension Program (SLEP) Phase 2

Phase 1: Implementation 2005 -- 2010

Phase 2: First Site Install: 2014 -- Last Site Install: 2017



2B11, Terminal Digital Radar (ASR-11) Technology Refresh

FY 2013 Request $8.2M

- 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-11 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. This is an ongoing program to address obsolescence and maintenance issues and will be accomplished in sequential 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 ASR-11 Tech Refresh Segment 2 (S03.02-05) is not fully defined yet and a business case analysis is being prepared 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 electronic 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.

Program Plans FY 2013 – Performance Output Goals

<u>ASR-11 Tech Refresh Segment 1:</u>

- Complete installation of ASR-11 ASDP retrofit kits at 5 sites by March 31, 2013.
- Complete installation of ASR-11 ASDP retrofit kits at 6 sites by September 30, 2013.
- Site Certified for operation use 75% complete (51 sites).

<u>ASR-11 Tech Refresh Segment 2:</u>

- Complete Final Investment Decision documentation development for FID by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals

<u>ASR-11 Tech Refresh Segment 1:</u>

- Complete installation of ASR-11 retrofit kits at 5 sites by March 31, 2014.
- Sites certified for operational use 100% complete (68 sites).

ASR-11 Tech Refresh Segment 2:

- Establish procurement vehicle by March 31, 2014.
- Begin procurement for Tech Refresh Segment 2 by September 30, 2014.

Program Plans FY 2015-2017 – Performance Output Goals

ASR-11 Tech Refresh Segment 2:

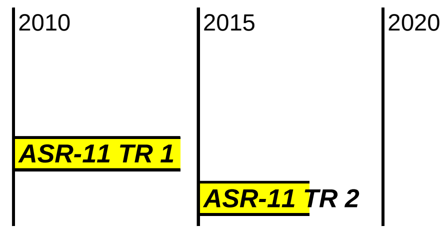
- Future activities will be developed once the program is approved by FAA management.

System Implementation Schedule

Airport Surveillance Radar - Model 11 (ASR-11) Tech Refresh - Segment 1 and 2

First site Delivery: September 2009 -- Last site Delivery: March 2014

First site Delivery: TBD -- Last site Delivery: TBD



B, MOBILE AIRPORT SURVEILLANCE RADAR (MASR), S03.02-06

Program Description

The Mobile Airport Surveillance Radar (MASR) is a terminal surveillance radar capability 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 includes both primary and secondary radar systems and will have the performance capabilities of existing systems.

The MASR can 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 function as an existing ASR-8, ASR-9 or ASR-11 terminal radars as needed and be interoperable with their associated automation interfaces.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The MASR investment will provide a capability that can be installed quickly to maintain operational availability at the goal levels during periods of planned or unplanned outages of terminal surveillance radars.

Program Plans FY 2013 – Performance Output Goals

- Establish Interagency Agreement (IAA) modification with USAF for funding of Mobile ASR Program development by May 31, 2013.
- Issue Delivery Order for Mobile ASR-11 development by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals
- Start Development Test (DT) activity by March 31, 2014.
- Issue Delivery Order for Mobile ASR-11 production by September 30, 2014.

Program Plans FY 2015-2017 – Performance Output Goals
- Future activities will be developed once the program is approved by FAA management.

2B12, Runway Status Lights (RWSL)
FY 2013 Request $35.3M

- Runway Status Lights (RWSL) – Implementation, 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 this signal to aircraft planning to cross or enter a runway from an intersecting taxiway. Takeoff Hold Lights (THL) provide a 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 1 – Reduce Category A & B (most serious) runway incursions to a rate of no more than 0.395 per million operations, and maintain or improve thought FY 2013.*

Relationship to Performance Metric

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 they cross the hold line or an aircraft begins its takeoff. The FY 2014 RWSL projected benefits include a reduction in cumulative A&B runway incursions at the 23 RWSL airports by ~17% (from 9.68 in baseline to 8.02 with RWSL); and a reduction in cumulative runway incursions caused by Pilot Deviations by ~22% (from 41.03 in baseline to 32.17 with RWSL).

Program Plans FY 2013 – Performance Output Goals
- Start construction at 2 of 23 operational sites.
- Complete installation at 2 of 23 operational sites.
- Achieve IOC at 3 of 23 (43%).

Program Plans FY 2014 – Performance Output Goals
- Start construction at 4 of 23 operational sites.
- Complete installation at 2 of 23 operational sites.
- Achieve IOC at 3 of 23 (57%) operational sites.

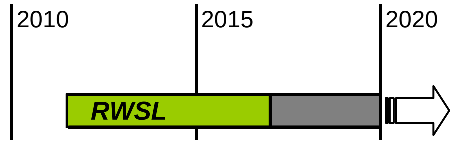
Program Plans FY 2015 – Performance Output Goals
- Start construction at 4 of 23 operational sites.
- Complete installation at 6 of 23 operational sites.
- Achieve IOC at 2 of 23 (65%) operational sites.

Program Plans FY 2016 – Performance Output Goals
- Complete installation at 1 of 23 operational sites.
- Achieve IOC at 8 of 23 (100%) operational sites.
- Achieve last site ORD at 23rd airport, September 2016.

Program Plans FY 2017 – Performance Output Goals
- None

System Implementation Schedule

Runway Status Lights (RWSL)
First site IOC: July 2011 -- Last site IOC: August 2016



2B13, NATIONAL AIRSPACE SYSTEM VOICE SYSTEM (NVS)
FY 2013 Request $10.3M

- 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 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 (expanding or contracting a controller's volume of airspace electronically) and off-loading selected sector control to other facilities 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.

The NVS will replace the service that is currently provided by 13 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 NVS program will award a contract in FY 2012 that will be implemented in two parallel paths. The parallel path approach is intended to achieve program objectives, minimize risk, and align to agency priorities and constraints. One path will focus on the demonstration of NextGen capabilities. The second path will focus on the establishment of a production system that is capable of meeting the requirements of any of the target environments. After a production system has been validated, the program will request a Final Investment Decision prior to purchasing production systems. The scope of the NVS contract will address both the demonstration and production systems.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

The NVS program supports the average daily airport capacity by providing an architecture that supports future growth and load-sharing within a flexible network. NVS will support the NextGen concept of operations for networked facilities, dynamic re-sectorization (expanding or contracting a controller's volume of airspace electronically) and off-loading selected sector control to other facilities during non-peak operations. These capabilities will increase capacity by improving the efficiency of operations and the ability to quickly respond to demand changes.

Program Plans FY 2013 – Performance Output Goals

- Acceptance of first demonstration system from NVS vendor.

Program Plans FY 2014 – Performance Output Goals

- Complete demonstration of NextGen capabilities.
- Deliver NextGen demonstration systems to FAATC and MMAC

Program Plans FY 2015 – Performance Output Goals

- Achieve Final Investment Decision from Joint Resources Council (JRC).

Program Plans FY 2016 – Performance Output Goals

- Deliver system to first operational site.

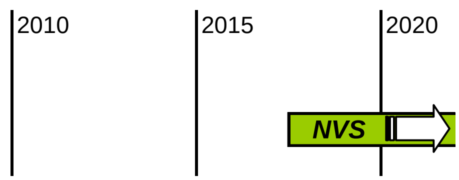
Program Plans FY 2017 – Performance Output Goals

- Achieve first site IOC.

System Implementation Schedule

NAS Voice System (NVS)

First site IOC: September 2017 -- Last site IOC: September 2024



2B14, INTEGRATED DISPLAY SYSTEM (IDS)

FY 2013 Request $4.2M

- 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 NAS relies on the continuation of the capabilities provided by IDS4 until these capabilities are integrated into a future flight data system such as the Terminal Flight Data Manager (TFDM) system.

IDS Replacement:
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 IDS Replacement program modernizes the IDS4 with current technology. The prime contract was awarded in May 2010 and design efforts were completed in late 2011.

IDS Replacement – Tech Refresh:
The IDS4 will be replaced 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 2016 (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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

By replacing the legacy IDS4 systems with state-of-the-art equipment, outages are reduced, thereby reducing delays at the 390 FAA facilities nationwide, including the 30 core airports.

Program Plans FY 2013 – Performance Output Goals
IDS Replacement:
- Complete system installation at 14 operational facilities.

Program Plans FY 2014 – Performance Output Goals
IDS Replacement:
- Complete system installation at 26 operational facilities.

Program Plans FY 2015 – Performance Output Goals
IDS Replacement:
- Complete system installation at 27 operational facilities.

IDS Replacement – Tech Refresh:
- Complete system analysis for technical refresh of hardware to replace obsolete components.

Program Plans FY 2016 – Performance Output Goals
IDS Replacement:
- Complete system installation at 28 operational facilities.

IDS Replacement – Tech Refresh:
- Award contract for Tech Refresh.

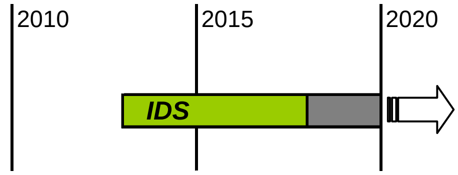
Program Plans FY 2017 – Performance Output Goals
IDS Replacement:
- Complete system installation at 13 operational facilities.

IDS Replacement – Tech Refresh:
- Begin technical refresh of hardware to replace obsolete components.

System Implementation Schedule

Integrated Display System (IDS)

First site IOC: March 2013 -- Last site IOC: December 2017



2B15, REMOTE MONITORING AND LOGGING SYSTEM (RMLS) TECHNOLOGY REFRESH

FY 2013 Request $4.7M

- A, Remote Monitoring and Logging System (RMLS) – National Remote Maintenance Monitoring (RMM) Network (NRN), M07.04-01
- B, Automated Maintenance Management System (AMMS), M07.05-01
- X, Remote Monitoring and Logging System (RMLS) – Technology Refreshment, M07.04-02

A, REMOTE MONITORING AND LOGGING SYSTEM (RMLS) – NATIONAL REMOTE MAINTENANCE MONITORING (RMM) NETWORK (NRN), M07.04-01

Program Description

The Remote Maintenance Monitoring (RMM) has 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 RMM 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 provide updated hardware and software in two phases. Phase I, is the RMLS National Logging Network (NLN) which improves reliability of the RMM 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 RMM. RMLS NRN will replace the Maintenance Processor Subsystem (MPS) hardware platform and re-host the Maintenance Automation System Software (MASS) client at each of the equipment locations. In FY 2007 and FY 2008 the Remote Maintenance System Engineering Team (RMSET) successfully developed a prototype design for RMLS NRN. The prototype hardware for RMLS NRN was installed at the Alaska Center (ZAN) in early CY 2010, Key site testing and remaining sites implementation, scheduled to begin in FY 2012.

The RMLS NRN is a direct functional replacement of the legacy system. The user of the system will not notice any difference in the look, feel, or function of the system. RMLS NRN is scheduled for Full Operational Capability (FOC) in all Service Areas by March 2013.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

RMLS NRN supports the FAA operational availability performance metric 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 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 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

- None.

Program Plans FY 2015 – Performance Output Goals

- None.

Program Plans FY 2016 – Performance Output Goals

- None.

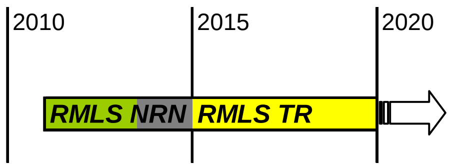
Program Plans FY 2017 – Performance Output Goals

- None.

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



B, AUTOMATED MAINTENANCE MANAGEMENT SYSTEM (AMMS), M07.05-01

Program Description

AMMS will provide more efficient data input and improved access to information relating to the operation and maintenance of FAA NAS systems. Currently FAA technicians who maintain the NAS use multiple stand-alone systems to perform their tasks. AMMS will reduce technician's time to perform these tasks plus provide them the information to make more effective decisions. Examples of some of the existing information sharing shortfalls that AMMS will address:

- Technicians do not have easy access to the Logistics Inventory in order to determine the availability of replacement parts and to order needed parts.
- Technicians are needed to support flight inspection activities but do not have direct access to the inspection schedules.
- Technicians have to prepare hand written forms for Notices to Airmen to document a system out of operation. This input is untimely and inefficient.
- Technicians do not have near-real time information on the status of systems and their ability to proactively respond to critical system issues is limited.

AMMS will be the foundation of an Open System Interface to automate and integrate legacy Tech Ops operation and maintenance systems, web-based systems, and future NextGen systems in a secure net-centric environment. AMMS will integrate information from several current and planned operation and maintenance systems being considered as program candidates and provide that information to technicians in a useable format. Also technicians will be able to easily enter data into various systems needing updates. System safety will also be improved as a result of more timely information and the ability to respond quickly to system issues. The system will be compliant with System Wide Information Management (SWIM) protocols and will address NextGen requirements for future systems operation and maintenance.

AMMS is in the initial stages of investment planning. Specific operational concepts, requirements, and architectures are being developed. Following a successful IARD, the Initial Investment Decision (IID) is planned for January 2013, followed by a Final Investment Decision (FID) in December 2013.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The AMMS will support the FAA performance metric to maintain operational availability of the NAS by:

- Improving Situational Awareness of Air Traffic Systems through interfaces with customers, to share operational status of NAS equipment with users, including estimates of time to repair outages, so users can more easily plan flight operations through web-services.
- Performing Predictive Analysis and Intervention (PA&I) using Remote Maintenance Monitoring and Control (RMMC) and performing intervention to prevent failures and minimize impact.
- Improving upward reporting of Tech Ops users (i.e., Control Centers) responsible for situational awareness within their area of responsibility. Using web services, AMMS will ensure that decision makers and upper management are aware of NAS anomalies that are, or have the potential of, causing an impact to operators and users of the NAS.

Program Plans FY 2013 – Performance Output Goals

- Complete Investment Analysis requirements for Initial Investment Decision (IID) by January 2013.

Program Plans FY 2014 – Performance Output Goals

- Complete Investment Analysis requirements for Final Investment Decision (FID) by December 2013.
- Award Contract to implement beta services for the planned LCSS / 2-Dimentional Bar Coding system interface candidates.

Program Plans FY 2015-2017 – Performance Output Goals

- Future activities will depend upon approval of funding by FAA management.

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

Program Description

The RMLS supports new opportunities to improve the effectiveness of Air Traffic Organization Technical Operations Services (ATO-W) maintenance processes and practices. The RMLS exists as one system across the FAA's Technical Operations enterprise and manages the entire Event Management life cycle, from generation of the initial event through assignment, updates, and event closure. In addition, RMLS is responsible for routing status messages to field operators, as well as routing commands to NAS devices.

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 Air Route Traffic Control Centers (ARTCCs). Technology refreshment is scheduled to begin in FY 2015. RMLS Tech Refresh replaces the commercial off the shelf (COTS) logical components of the RMLS. This Tech Refresh provides procurement for hardware and software at the National Operations Control Center (NOCC), Atlantic Operations Control Center (AOCC), Mid-States Operations Control Center (MOCC), Pacific Operations Control Center (POCC) and the William J. Hughes Technical Center (WJHTC).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The RMLS Tech Refresh supports the FAA operational availability performance metric by generating, 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 RMLS 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 2013-2014 – Performance Output Goals

- None.

Program Plans FY 2015 – Performance Output Goals

- Lifecycle RMLS NLN hardware refresh at 3 sites, NOCC, POCC, and Tech Center OT System.
- Lifecycle RMLS NRN hardware refresh at 2 sites, POCC and AOCC.

Program Plans FY 2016 – Performance Output Goals

- Lifecycle RMLS NLN hardware refresh at 3 sites, MOCC, AOCC and Tech Center IT System.
- Lifecycle RMLS NRN hardware refresh at 2 sites, MOCC and Tech Center IT System.

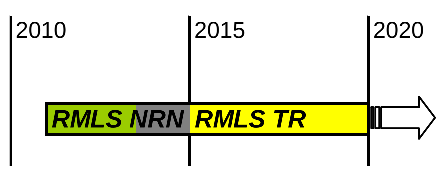
Program Plans FY 2017 – Performance Output Goals

- Lifecycle RMLS hardware refresh for the Operations Data Repository at Potomac Consolidated TRACON (PCT).
- Lifecycle RMLS NRN hardware refresh of the Protocol Converter Box (PCB) equipment at 8 ARTCC's.

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 2013 Request $4.0M

- MODE S SLEP, Phase 2 and 3, S03.01-08

Program Description

The Mode S is a secondary surveillance radar system that provides beacon or secondary aircraft surveillance in terminal airspace and en route coverage areas. The Mode S uses selective beacon detection technology to provide target data as digital formatted messages and analog video tailored for automation and display systems. The Mode S is integrated with collocated Airport Surveillance Radar Model 9 (ASR-9) and ASR-8, and Air Route Surveillance Radar Model 1E (ARSR-1E) and ARSR-2. The Mode S system is capable of providing correlated radar and beacon reports and weather map reports to NAS en route and terminal automation, U.S. Department of Defense (DoD), and other users. Digital data is provided in ASR-9/Common Digitizer (ASR/CD) format to FAA automation systems at Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) facilities, DoD, and other external organizations.

<u>MODE S SLEP, Phase 2:</u>
The Mode S SLEP 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 and the beacon video reconstitutors will be replaced with more modern components and antennas will be purchased to address obsolescence and supply/support 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. Phase 2 investment decision is planned for June 2012 with the following projects:

- Beacon Video Reconstitutor
- Sliding Window Detector Portion of Modular Mode S Bus Modification at Long Range Radar Sites
- High Gain Open Planar Array Antenna

<u>MODE S SLEP, Phase 3:</u>
The Mode S SLEP Phase 3 will include the Terminal version of the Modular Mode S Bus Modification and other modifications to extend the service life of the system. Engineering studies will be performed to determine the scope of the Mode S SLEP Phase 3 program. There are components that will not be supportable through 2020 and these analyses will determine the extent of re-engineering and system modifications needed. Candidates for such analyses include the peripheral computers and power amplifiers. An investment decision for Phase 3 is planned for 2015.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

Mode S terminal and en route service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers information that allows closer aircraft operations and increases air traffic arrival and departure operations. Providing for the Mode S service life extension modifications reduces the risk of unscheduled outages and ensures the continuation of service capabilities. Currently Mode S systems are functioning at an operational availability of 99.48 percent, which is below the FAA performance metric of 99.7 percent. Without modifications to the Mode S, the system will continue to experience decreasing reliability and availability over time. The intent of this program is to maintain operational availability of the Mode S system.

Program Plans FY 2013 – Performance Output Goals

Mode S SLEP – Phase 2:

- Award Contract for parts for Sliding Window Detector portion of Modular Mode S Bus Modification at Long Range Mode S Radar.
- Install beacon video reconstitutor replacement at key sites.

Mode S SLEP – Phase 3:

- Complete engineering study for the replacement of power amplifiers.

Program Plans FY 2014 – Performance Output Goals

Mode S SLEP – Phase 2:

- Complete installation of Beacon Video Reconstitutor at 100% of sites.
- Begin installation of Sliding Window Detector portion of Modular Mode S Bus Modification at Long Range Mode S Radar Key Sites.

Mode S SLEP – Phase 3:

- Complete engineering study for the replacement of peripheral computers.
- Complete Development Testing of Modular Mode S Bus Modification – Terminal Version.

Program Plans FY 2015 – Performance Output Goals

Mode S SLEP – Phase 2:

- Complete installations of Modular Mode S Bus Modification Sliding Window Detector at 25% of Long Range Mode S Radar Sites.

Mode S SLEP – Phase 3:

- Activities will be developed once the program is approved by FAA management.

Program Plans FY 2016 – Performance Output Goals

Mode S SLEP – Phase 2:

- Complete Installations of Modular Mode S Bus Modification Sliding Window Detector at 50% of Long Range Mode S Radar Sites.

Mode S SLEP – Phase 3:

- Activities will be developed once the program is approved by FAA management.

Program Plans FY 2017 – Performance Output Goals

Mode S SLEP – Phase 2:

- Complete Installations of Modular Mode S Bus Modification Sliding Window Detector at 75% of Long Range Mode S Radar Sites.

Mode S SLEP – Phase 3:

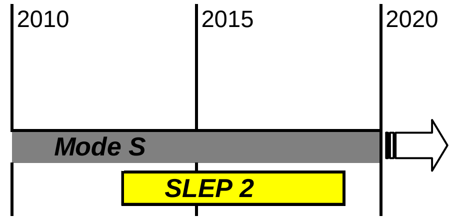
- Activities will be developed once the program is approved by FAA management.

System Implementation Schedule

Mode Select (Mode S) Service Life Extension Program (SLEP) Phase 2

Phase 1: Implementation 2005 -- 2008

Phase 2: First Site Install: 2013 -- Last Site Install: 2018



2B17, SURVEILLANCE INTERFACE MODERNIZATION (SIM)
FY 2013 Request $2.0M

- Surveillance Interface Modernization (SIM), S13.01-01

Program Description

The Surveillance Interface Modernization (SIM) program will upgrade the legacy systems to provide modern interface capabilities that will allow the surveillance systems (48/ASR-8, 135/ASR-9, 36/WSP, 70/ASR-11, 134/Mode-S, 127/ATCBI-6, 59/ATCBI-5) as well as the automation platforms (166/STARS, 21/ERAM, 6/MEARTS, 3/ITWS) to transition to standard data formats. These formats allow surveillance information to be transmitted in Internet Protocol (IP) format over a modern network. The surveillance information can be transferred via FAA Telecommunication Infrastructure (FTI) circuits and equipment to those end users who are allowed access to the service-oriented network to support net-centric data sharing. This net-centric network occurs at the automation platform input. The transition to ASTERIX format enables extensive data, which can only be determined at the radar platform, to be delivered to the automation processor. The processing of this information, including the 24-bit aircraft address, the time stamp associated with the position information, and additional resolution bits provides a more accurate determination of aircraft position.

Converging all legacy radar interfaces and applications to a common industry standard communications architecture and format will significantly reduce the cost of maintaining these interfaces as the NAS transitions to NextGen. It is also expected that, as a result of using a more modern architecture, the distribution of all available data at the radar site to both the FAA and external users will be made more effective and efficient, and information security measures can be applied more consistently. The availability of additional radar data is expected to enhance performance of ATC automation systems, and allow (in the longer-term) more robust support of future operational improvements (OIs), future facilities, as well as providing improved backup capabilities when ADS-B surveillance reduces the need for existing beacon radar infrastructure.

An Initial Investment Decision is planned for late 2012 for the SIM program, and the Final Investment decision is planned for late 2014.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

As part of NextGen, existing surveillance systems will be required to serve as backup to ADS-B surveillance, and to provide surveillance data critical to other government agency missions (e.g. Department of Defense, Homeland Security). In order to support the transfer and distribution of legacy radar data, these systems must be modernized to incorporate modern interface requirements. To align with future NextGen requirements legacy systems will be required to provide data distribution other than point-to-point via modern networking techniques and transition to standard interface message formats with higher reporting precision which also provide additional target information to support future operational improvements (OIs). This program will implement a common industry standard communications architecture and format.

Program Plans FY 2013 – Performance Output Goals

- Complete development of an Initial Business Case Analysis Report.

Program Plans FY 2014-2017 – Performance Output Goals

- Future activities will be developed once the program is approved by FAA management.

2B18, TERMINAL FLIGHT DATA MANAGER (TFDM)

FY 2013 Request $37.6M

- Flexible Terminal Environment – 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.

TFDM provides several enhancements for tower personnel and provides an automation system that:

- Integrates flight data with terminal area and surface surveillance data, where available, including associated alerts and alarms indicating potentially unsafe conditions on the surface or between arriving and departing aircraft.
- Electronically processes and distributes flight data to different control positions in the tower.
- Provides a suite of Decision Support Tools (DST) that assist air traffic controllers in providing efficient and safe airport operations.
- Consolidates disparate legacy tower systems into an open, scalable architecture. Consolidation and replacement of legacy platforms, input devices, and displays will allow better use of limited tower cab space and reduce equipment end-of-life issues.
- Provides a platform for flight data exchange across domains and enhances collaborative tactical decision making for airport surface operations.
- Collects data and distributes it to internal and external NAS users.

Use of common data will make TFDM a highly integrated tower automation system. The electronic processing and distribution of flight data will enhance data exchange between the en route, terminal, and Traffic Flow Management (TFM) domains; Airline Operations Centers (AOCs); and Airport Operators. The DSTs will provide tower controllers with the first major automated decision support tools beyond Airport Surface Detection Equipment-Model X (ASDE-X). TFDM will provide an integrated tower automation environment supporting:

- Flight Data,
- Surveillance Data ,

- Tower Management,
- Aeronautical and Weather Data,
- Decision Support Tools, and
- Tower platform consolidation.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 airport capacity.

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

- Conduct Preliminary Design Review (PDR).
- Conduct Critical Design Review (CDR).

Program Plans FY 2016 – Performance Output Goals

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

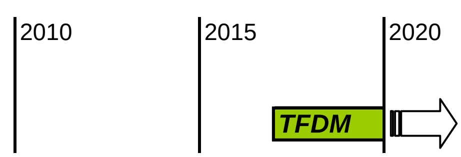
Program Plans FY 2017 – Performance Output Goals

- Complete Key Site installation and checkout.
- Complete Key Site operational test.
- Complete Key Site Initial Operating Capability (IOC).

System Implementation Schedule

Terminal Flight Data Manager (TFDM)

First site IOC: June 2017 -- Last site IOC: TBD



2B19X, INTEGRATED TERMINAL WEATHER SYSTEM (ITWS)
FY 2013 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 (TCWF), improvements to ITWS algorithms (e.g. Dry Microburst, Vertically Integrated Liquid (VIL) 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 Core 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 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 in support of collaborative decision-making.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

ITWS Tech Refresh will support the Performance Metric for operational availability by replacing unsupportable equipment. 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 core airports where ITWS is currently installed, but the tech refresh is necessary to provide this availability in future years.

Program Plans FY 2013 – Performance Output Goals
- None.

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 System Support Modification (SSM).
- Perform ITWS Tech Refresh Keysite testing.
- Commence ITWS Tech Refresh deployment at six (6) ITWS sites.
- Establish ITWS interface to NWP/NNEW environment.

Program Plans FY 2016 – Performance Output Goals
- Complete ITWS Tech Refresh deployment and associated activities at 14 additional ITWS sites.

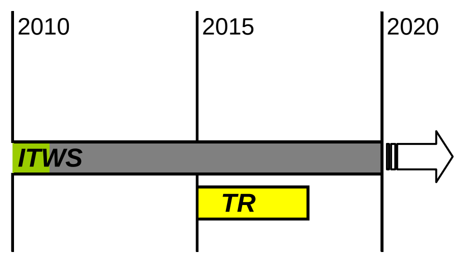
Program Plans FY 2017 – Performance Output Goals
- Complete ITWS Tech Refresh deployment and associated activities at the final 17 ITWS sites.

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



C. FLIGHT SERVICE PROGRAMS

2C01, FUTURE FLIGHT SERVICE PROGRAM (FFSP) – FORMERLY REFERRED TO AS FLIGHT SERVICE AUTOMATION MODERNIZATION (FSAM)

FY 2013 Request $8.0M

- Future Flight Service Program (FFSP), A34.01-01

Program Description

FFSP is a Performance Based Service Acquisition with a goal of integrating all Flight Services into a single service entity. Current FS automation is provided by three separate contracts (direct user access terminal system (DUAT/S), automated flight service station (AFSS) Flight Service 21, and operational and supportability implementation system (OASIS)) in the US.

The Alaska automation system (OASIS) is contractor owned and FAA personnel provide the services. In CONUS, contractor personnel use a proprietary system (Flight Service 21) to provide Flight Services. Lastly, the DUATS program provides web-portal to allow General Aviation (GA) pilots and dispatchers to directly access flight service information, eliminating the need to talk to a flight service specialist.

The objective for FFSP is to integrate these contracts into a single contractual vehicle and to provide the opportunity for innovation of the services. The alternatives being examined concern when and how the system in Alaska and the web-portal will be integrated. The goals of this acquisition are to increase safety and incentivize innovation to control cost. Some of the possibilities for innovation are:

- 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 on the displays of FFSP automation systems; and
- The development of a web portal that will provide both flight service specialists 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

A. FFSP anticipates that the new system will foster better safety awareness for pilots by providing critical updates on changing weather conditions, which will allow pilots to make decisions to avoid hazardous weather sooner.
B. FFSP anticipates that the new system, once selected, will provide through, vendor innovation, a more timely Search and Rescue (SAR) response based on conformance with flight plan information.

Program Plans FY 2013 – Performance Output Goals

- Achieve FFSP Initial Investment Decision (IID).
- Release SIR for new service(s).

Program Plans FY 2014 – Performance Output Goals
- Achieve Final Investment Decision for FFSP.
- Award contract based upon FFSP FID.

Program Plans FY 2015-2017 – Performance Output Goals
- Future activities will depend upon approved investment decision.

2C02, ALASKA FLIGHT SERVICE FACILITY MODERNIZATION (AFSFM)
FY 2013 Request $2.9M

- Alaska Flight Service Facility Modernization (AFSFM), F05.04-02

Program Description

The Alaska Flight Service Facility Modernization (AFSFM) 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 17 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. Notably, the Dillingham Flight Service Station (FSS) is currently not compliant with FAA Standards, current local building codes, and current fire/life safety regulations. After years of continuous and constant operations in a harsh, maritime climate, the facility has far exceeded its expected useful service life. Construction of a new Dillingham FSS will begin in 2012. A Flight Services Delivery Study is underway 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.

In coordination with Alaska Technical Operations and the Western Service Center, plans are being developed to maintain and sustain Alaskan Flight Services facilities.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The AFSFM program will directly contribute to the FAA's Aviation Access 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 2013 – Performance Output Goals
These actions may be superseded if a higher priority need is entered into the FAA's Corporate Work Plan (CWP) prior to their performance:
- Complete relocation of Dillingham operations into the new building;
- Complete installation of an engine generator and new fuel tank at Barrow FSS; and,
- Perform interior upgrades at the FSS's in Kenai, Iliamna, and Northways.

Program Plans FY 2014 – Performance Output Goals

These actions may be superseded if a higher priority need is entered into the CWP prior to their performance:

- Decommission the old Cold Bay FSS building;
- Complete installation of ABAAS (Architectural Barrier and Accessibility Standards) upgrades at Fairbanks and Palmer FSSs.

Program Plans FY 2015 – Performance Output Goals

These actions may be superseded if a higher priority need is entered into the CWP prior to their performance:

- Complete refurbishment of restrooms at Kenai FSS;
- Complete installation of building security upgrades at Palmer FSS;
- Complete construction of garage/equipment storage/staging area at Homer FSS;
- Decommission old Nome FSS building.

Program Plans FY 2016-2017 – Performance Output Goals

- Perform projects to repair, replace, or correct deficiencies identified during facility condition assessments conducted during the previous year. The specific projects to be accomplished are determined based on the priority assigned to the project and associated costs to address.

2C03, WEATHER CAMERA PROGRAM

FY 2013 Request $4.4M

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

Program Description

Between 1990 and 2006, there were 1497 commuter and air taxi crashes in the United States. Of these accidents, 520 occurred in Alaska (35% of the total). Historically, the NTSB has stated that on a national average, 22.6% of all accidents are in some way weather related. For the State of Alaska, this would translate into an average of 7.3 weather related accidents per year within the 1990-2006 time frames. Two of the Weather Camera Program's, multiple goals/metrics are vital to helping reduce weather related accidents in Alaska,. First, reduce En Route or Approach and Landing Low visibility related Accident rate per 100,000 operations for Non-IFR capable commercial and General Aviation aircraft within the state of Alaska. Second, reduce the number unnecessary flight hours caused by lack of weather information.

In the state of Alaska, flying is equivalent to driving in the contiguous US, making the use of small aircraft essential to everyday life. Many times flying is the only means to get children to/from school activities; to transport service providers such as clergy, doctors, dentists, and nurses; to deliver patients to medical facilities; and to supply the communities with groceries, fuel, and mail. Even though flying is essential, the rapidly changing weather presents challenges that affect the accident rate in Alaska. According to the National Institute for Occupational Safety and Health, accident rates in Alaska have been nearly 400 percent above the national average

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 can lead to accidents or unnecessary fuel costs, caused by the need to circumvent bad weather or land at an alternate airport. 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. A need for pictorial views of current weather conditions accessible to the aviation community in Alaska was established, and the FAA Weather Camera Program has installed aviation weather cameras as an aid to Visual Flight Rule (VFR) pilots operating in Alaska.

The Weather Camera Program has a proven track record of improving safety and efficiency, which justifies the continued installation of new camera sites to provide near real-time camera weather related images to pilots. 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 to be used in a loop function for weather trending analysis by pilots. These images are made available through a user-friendly, web-enabled application (http://avcams.faa.gov). In addition to the safety benefits, it is estimated that the cameras will improve operator efficiency by reducing unnecessary flight time by 48%. Over the life cycle of the Weather Camera Program, this calculates into millions of dollars of savings in fuel expenses and reduces the overall carbon footprint.

The program funds procurement and installation of weather camera sites. Segment 1of this program is intended to fund the implementation of camera sites through FY 2013. The Future Segment funds the completion of six remaining sites and periodic system tech refresh from FY 2014 through the end of the program.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

One of the Strategic Plan initiatives 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. The Alaska region has established a supporting safety goal/metric of this effort to reduce weather related accidents from the baseline level of 0.28 to no more than 0.15 accidents per 100,000 operations within the State of Alaska, which supports the overall goal of reducing the general aviation accident rate.

Program Plans FY 2013 – Performance Output Goals
<u>Segment 1:</u>
- 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
<u>Future Segment:</u>
- Install and make operational an additional 6 camera sites for a total of 221 sites by September 30, 2014.
- Complete system tech refresh. Upgrade system servers and automation equipment at Anchorage, AK.

Program Plans FY 2015 – Performance Output Goals
<u>Future Segment:</u>
- Complete system tech refresh at five camera sites.

Program Plans FY 2016 – Performance Output Goals
<u>Future Segment:</u>
- Complete system tech refresh at five camera sites.

Program Plans FY 2017 – Performance Output Goals
<u>Future Segment:</u>
- Complete system tech refresh at five camera sites.

D. Landing and Navigational Aids Programs

2D01, VHF Omnidirectional Range (VOR) With Distance Measuring Equipment (DME)

FY 2013 Request $2.5M

- 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 TACAN 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.

This program also procures and installs Doppler VOR (DVOR) electronic kits and DVOR antenna kits to dopplerize a conventional VOR. There are numerous VORs that have restrictions due to encroachment of the VOR sighting criteria caused by natural and manmade obstacles. These restrictions are having a serious impact on both en-route and arrival and departure procedures. The main natural encroachment comes from the growth of vegetation, mostly trees, that are located outside the sighting restriction area but are now tall enough to cause electromagnetic interference. There are many manmade obstacles that cause the same electromagnetic interference, resulting from the growth of nearby towns/cities such as the construction of tall buildings, new industrial parks with their high concentration of metal buildings, transmission lines, radio/TV/cell towers and most recently, wind farms. Dopplerizing a VOR eliminates most of these restrictions.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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.

Program Plans FY 2013 – Performance Output Goals
- Procure two DVOR electronics kits.
- Procure one DVOR Antenna kit.

Program Plans FY 2014 – Performance Output Goals
- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.

Program Plans FY 2015 – Performance Output Goals
- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.

Program Plans FY 2016 – Performance Output Goals
- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.

Program Plans FY 2017 – Performance Output Goals
- Complete installation for one (Dopplerize) Very High Frequency Omnidirectional Range facility.

2D02, Instrument Landing Systems (ILS) – Establish
FY 2013 Request $7.0M

- 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. The program will replace existing ILSs at core airports and upgrade selected locations with equipment necessary for CAT II/III operations (ILS and supporting equipment). 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., High Intensity Approach Lighting System with Sequenced Flashing Lights (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 for aircraft landing in adverse weather conditions.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

Establishing ILS precision approach capability allows lower minimums for landings and helps to maximize NAS use. Lowering minimums allows operations in poor weather conditions, which, in effect, is the same as an increase in airport capacity.

Program Plans FY 2013 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2014 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2015 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2016 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

Program Plans FY 2017 – Performance Output Goals
- Procure five Instrument Landing Systems.
- Install Instrument Landing Systems at five locations.

2D03, Wide Area Augmentation System (WAAS) for GPS
FY 2013 Request $96.0M

- A, Wide Area Augmentation System (WAAS), N12.01-00
- B, Wide Area Augmentation System (WAAS) – Surveys , N12.01-06

A, Wide Area Augmentation System (WAAS), N12.01-00

Program Description

WAAS provides precise navigation and landing guidance to equipped aircraft in all weather conditions, over the entire National Air Space. WAAS is able to provide service to all eligible airports within the service area, overcoming ground-based navigation system limitations due to signal blockage or other siting issues. 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 is currently in Phase III of the program, Full LPV-200 Performance, until 2013 and will begin Phase IV, Dual Frequency Operations, in 2014 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 5^{th}, 6^{th} and 7th future GEO payloads;
2. Development efforts in the transition to a second civil frequency (L5), GIII receiver, and terrestrial communication system (TCS) upgrades;
3. Survey Development;
4. Development of 500 approach procedures, 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, ionospheric effects analysis, safety analysis, and GNSS evolutionary architecture studies support 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/Localizer Performance (LP) procedures per year enabling more access into airports. WAAS supports 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; 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 due to lack of radar coverage. 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 is currently supporting 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. In 2008, the Department of Defense (DoD) notified the GPS user community through a Federal Register Notice (Vol. 73, NO. 96) that the L2 P(Y) signal will end in December 2020. The FAA intends to replace the use of L2 P(Y) by WAAS with the second civil frequency (L5). As a civilian signal, L5 can be used by civilian receivers and provides improved accuracy for civil users of GPS. Users who equip with new dual frequency (L1/L5) avionics will be able to process inputs from both GPS frequencies to internally calculate ionospheric corrections providing 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 Phase IV. 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

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, in all meteorological conditions. The WAAS navigation signal allows pilots to fly with reduced position uncertainty regardless of location within the NAS, enhancing 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 time period and saving over 250 lives when using WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. Currently, ILS provides precision vertically guided approaches at only 1,231 of the nation's 19,000 runway ends. WAAS is able to provide the same level of precision at over 2,800 runway ends.

Program Plans FY 2013 – Performance Output Goals

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.
- Provide funding for three (3) WAAS geostationary satellite leases.
- Release 4 – Complete Build Merge, consolidates into one software baseline the Geostationary Communication and Control Segment (GCCS), LNAV and WAAS.
- Conduct preliminary work for Release 5 – L5 Development Phase I:
  - Complete Critical Design Review (CDR) of the Safety Computer.
  - Complete G-III Reference receiver development.
  - Complete development of WAAS Terrestrial Communications Subsystem (TCS) test bed for L5 capability.
- Complete GEO preliminary design review (PDR).

Program Plans FY 2014 – Performance Output Goals

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.
- Provide funding for three (3) WAAS geostationary satellite leases.
- Release 5 – L5 Development Phase I: Develop draft L5 algorithm.
- Implement WAAS TCS Upgrades for GIII receiver.
- Develop and complete GEO Signal Generator Subsystem-Type (SGS-T) installation.

Program Plans FY 2015 – Performance Output Goals

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.
- Provide funding for three (3) WAAS geostationary satellite leases.
- Release 6 – L5 Development Phase II: Complete L5 algorithm development.
- Complete 5th GEO SGS-T fielding and Milestone 1 – GEO integration and testing.
- Complete G-III Reference receiver fielding into WAAS.
- Complete government acceptance of Safety Computer – production version.

Program Plans FY 2016 – Performance Output Goals

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.
- Provide funding for three (3) WAAS geostationary satellite leases.
- Complete Safety Computer Upgrade and integration into WAAS.
- Complete 5th GEO Integration into WAAS.
- Complete 6th GEO SGS-T fielding and Milestone 1 – GEO integration and testing.
- Complete Release 7 for WAAS hardware and software to implement L5 algorithm.

Program Plans FY 2017 – Performance Output Goals

- Develop and publish 500 WAAS LPV/LP approach procedures per year including 250 at Non-ILS runway ends.
- Provide funding for three (3) WAAS geostationary satellite leases.
- Release 8 – Complete test and verification of the L5 functionality.
- Complete 6th GEO Integration into WAAS.
- Complete 7th GEO SGS-T fielding and Milestone 1 – GEO integration and testing.

B, WIDE AREA AUGMENTATION SYSTEM (WAAS) – SURVEYS, 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 required to meet procedure publication goals is larger than the number of approach procedures published due to the 30-30% of surveyed airport approaches not meeting the required obstruction separation 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 called 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Develop 650 surveys in order to develop and publish 500 WAAS LPV approach procedures per year, including 250 at Non-ILS runway ends.

Program Plans FY 2014 – Performance Output Goals
- Develop 650 surveys in order to complete development and publication of 500 WAAS LPV/LP approach procedures per year, including 250 at Non-ILS runway ends.

Program Plans FY 2015-2017 – Performance Output Goals
- None.

2D04, RUNWAY VISUAL RANGE (RVR)
FY 2013 Request $4.0M

- 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 measurement of 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 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. There are 289 RVR systems in the NAS.

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 take off 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 sites that have recently qualified for an upgrade from a Category I to a Category II/III precision approach.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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, and supports the performance measure to maintain operational availability of the NAS.

Program Plans FY 2013 – Performance Output Goals
- Install RVR systems at 14 locations.

Program Plans FY 2014 – Performance Output Goals
- Install RVR systems at 14 locations.

Program Plans FY 2015 – Performance Output Goals
- Install RVR systems at 14 locations.

Program Plans FY 2016 – Performance Output Goals
- Procure eight RVR systems.
- Install RVR systems at eight locations.

Program Plans FY 2017 – Performance Output Goals
- Procure eight RVR systems.
- Install RVR systems at eight locations.

2D05, APPROACH LIGHTING SYSTEM IMPROVEMENT PROGRAM (ALSIP)
FY 2013 Request $3.0M

- 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 entire approach lighting system is replaced when non-frangible structures are replaced. 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, Outcome, and Performance Metric
- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric
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 inadvertently descend below the minimum recommended altitudes and risk striking these structures during departure or landing. Reducing the impact and damage aircraft sustain when striking these lightweight and low-impact resistant structures contributes to FAA's performance metric of reducing air carrier fatalities by diminishing the probability of fatal accidents if these structures are hit.

Program Plans FY 2013 – Performance Output Goals
- Procure eight Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights systems.
- 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
- Procure four Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights systems.
- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at two locations.

Program Plans FY 2015 – Performance Output Goals

- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.
- 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.

Program Plans FY 2017 – Performance Output Goals

- Replace the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights at three locations.

2D06, Distance Measuring Equipment (DME)

FY 2013 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 DME 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 4 – Achieve an average daily airport capacity for the Core Airports of 86,835 arrivals and departures per day by FY 2012 and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Procure 25 Distance Measuring Equipment systems.
- Install Distance Measuring Equipment systems at 18 locations.

Program Plans FY 2014-2017 – Performance Output Goals
- None.

2D07, VISUAL NAVAIDS – ESTABLISH/EXPAND
FY 2013 Request $3.5M

- 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 the pilot with a rapid and positive identification of the approach end of a runway. 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, Outcome, and Performance Metric
- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric
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 runway end to the pilot.

Program Plans FY 2013 – Performance Output Goals
- Procure ten Precision Approach Path Indicator systems.
- Install Precision Approach Path Indicator systems at ten locations.

Program Plans FY 2014-2017 – Performance Output Goals
- None.

2D08, INSTRUMENT FLIGHT PROCEDURES AUTOMATION (IFPA)
FY 2013 Request $7.1M

- Instrument Flight Procedures Automation (IFPA) – Tech Refresh, Segment 1, A14.02-02
- X, Instrument Flight Procedures Automation (IFPA) – Tech Refresh, Segment 2, A14.02-03

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. These procedures are printed in booklets and used by pilots to determine the safe altitudes, appropriate headings and other information to successfully fly precision and non-precision approaches to airports and departures. 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 effectively increases the capacity of the NAS. As additional runways are equipped to handle instrument operations, new and revised instrument flight procedures must be developed and published.

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. The new Instrument Flight Procedures Automation (IFPA) will be more efficient and comprehensive 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 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 Segment 1 cost and schedule baseline was approved by the Joint Resources Council (JRC).

A study will be conducted to determine the equipment that will be included in the IFPA Tech Refresh Segment 2 effort and develop a schedule and milestones.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 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 COTS Servers replacement, IPDS COTS Software Tech Refresh – Phase 1.

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.

Program Plans FY 2017 – Performance Output Goals
- Begin planning for IFPA Tech Refresh Segment. Actual milestones will be determined after Tech Refresh Phase 2 Investment Analysis

System Implementation Schedule

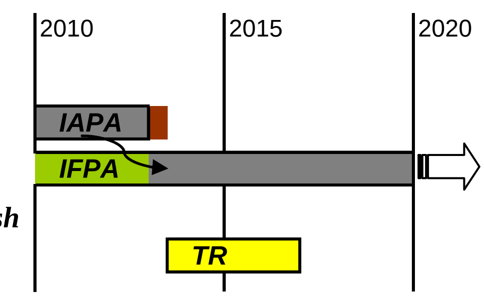
Instrument Flight Procedures Automation (IFPA)

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 2013 Request $8.0M

- 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, and
- Runway End Identifier Lights (REIL).

This program also supports Instrument Landing Systems (ILS) sustain and replace efforts at non-Core Airports 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 Core 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, re-cable 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 some 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 fixtures.
- Replace existing MALSR green threshold and white steady burning lights with LED lights.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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 contributes to maintaining operational availability of the NAS.

Program Plans FY 2013 – Performance Output Goals

- Procure six ALSF-2 Runway Lamp Monitoring System Kits.
- Replace the Runway End Identifier Lights at 20 locations.
- Install the ALSF-2 Runway Lamp Monitoring System Kits at six locations.
- Replace Instrument Landing Systems at five locations.

Program Plans FY 2014 – 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.

Program Plans FY 2015 – 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.

Program Plans FY 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.

Program Plans FY 2017 – 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 2013 Request $4.0M

- Visual Navaids – Replace Visual Approach Slope Indicator (VASI) with Precision Approach Path Indicator (PAPI), N04.02-00

Program Description

The International Civil Aviation Organization (ICAO) has recommended that all International airports replace the Visual Approach Slope Indicator (VASI) lights with Precision Approach Path Indicators (PAPI) lights. This standardizes the equipment used to allow pilots to determine visually that they are on the proper glideslope for landing. The program supports the procurement, installation, and commissioning of PAPI systems in order to comply with this ICAO recommendation.

At the inception of this program, there were approximately 1,387 older (pre-1970's) VASIs at international and other validated locations requiring replacement. The first phase of the program addresses replacement of VASI systems at approximately 329 ICAO runway ends. The remaining VASI systems in the NAS will be replaced during the second phase of the program.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Procure 12 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 16 locations.

Program Plans FY 2014 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2015 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2016 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

Program Plans FY 2017 – Performance Output Goals
- Procure 18 Precision Approach Path Indicator systems.
- Replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicators lights at 18 locations.

2D11, GLOBAL POSITIONING SYSTEM (GPS) CIVIL REQUIREMENTS
FY 2013 Request $40.0M

- 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 FY2009-2015 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, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice*
- *FAA Outcome 1 – FAA has the right people with the right skills in the right position at the right time to achieve our goals*
- *FAA Performance Metric 1 – Achieve a 90% success rate in the areas of financial management and human resources management: Receive annual Unqualified Audits with no material weaknesses; Maintain the competitive status of all FAA employees within the federal personnel system; Improve the "effective*

leadership" index score on the OPM Employee Viewpoint survey by 8 percent; Improve the "talent management" index score on the OPM Employee viewpoint survey by 8 percent.

Relationship to Performance Metric

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 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 – 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 2015 – 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 2016-2017 – Performance Output Goals
- None.

2D12, Runway Safety Areas – Navigation Mitigation
FY 2013 Request $30.0M

- 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 navigational aids (NavAid) 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.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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.

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 2013 – Performance Output Goals
- Complete 257 F&E-funded RSA improvement projects.
- Provide funding and procure 25 systems for RSA projects.

Program Plans FY 2014 – Performance Output Goals
- Complete 257 F&E-funded RSA improvement projects.
- Provide funding and procure 20 systems for RSA projects.

Program Plans FY 2015 – Performance Output Goals
- Complete 257 F&E-funded RSA improvement projects.
- Provide funding and procure 4 systems for RSA projects.

Program Plans FY 2016 – Performance Output Goals
- Complete 257 F&E-funded RSA improvement projects.

Program Plans FY 2017 – Performance Output Goals
- None.

E. OTHER ATC FACILITIES PROGRAMS

2E01, FUEL STORAGE TANK REPLACEMENT AND MONITORING
FY 2013 Request $6.6M

- 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 costs are 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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 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).

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).

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).

Program Plans FY 2016 – Performance Output Goals
- Implement ARTCC fuel system upgrade at 2 sites, Anchorage Center (ZAN)/ Jacksonville Center (ZJX).
- Implement TRACON fuel system upgrades at 2 sites, Honolulu Combined Facility (HCF) / Potomac TRACON PCT.

Program Plans FY 2017 – Performance Output Goals
- Implement TRACON fuel system upgrades at 2 sites, Southern California TRACON (SCT) / Northern California TRACON (NCT).

2E02 UNSTAFFED INFRASTRUCTURE SUSTAINMENT

FY 2013 Request $18.0M

- 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 from the 36,293 unstaffed facilities within the NAS. The UIS Program is pursuing Acquisition Program Baselines for two (2) program segments; segment 1 is unstaffed communication infrastructure; and segment 2 is unstaffed navigation, surveillance and weather infrastructure. Segment 1 was approved to for Concept Requirements and Definitions (CRD) phase of the Acquisition Management System (AMS) process in March 2011, and Segment 2 is currently scheduled to present for approval to enter the CRD phase in November 2011. Segment 1 is scheduled for Investment Analysis Readiness Decision (IARD) in the 1st quarter of calendar year (CY) 2012 and segment 2 is anticipated to pursuing IARD in the 3rd quarter of CY 12.

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 sites, which require unique logistical solutions;
- Replacement or renovation of NAS 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 develops the projects 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; and
- Life Safety: Significant and unacceptable occupational safety and health risks (i.e., electrical hazards, fall protection, and physical hazards associated with deteriorated infrastructure) have been identified at over 50 FAA facilities. These risks place the safety of FAA employees conducting maintenance at these facilities at risk 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The FAA Unstaffed Infrastructure Sustainment Program supports the FAA's strategic goal of Delivering Aviation Access through Innovation 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. A few of the many examples of recent infrastructure failures that resulted in direct impacts to the NAS include: a roof leak taking the Idaho Falls (IDA) VOR off line for 7 hours and 15 minutes; roof leaks at the Andrews (ADW) VOR causing 280 hours in outages; and Pawnee City (PWE) VOR being off-line for 369 days due to failure of the roof.

Program Plans FY 2013 – Performance Output Goals

- Complete and brief JRC Initial Investment Decision package for unstaffed communications infrastructure by February, 2013.
- Complete and brief JRC Initial Investment Decision package for unstaffed navigation, surveillance and weather infrastructure by June, 2013.
- Complete 80 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- Develop a comprehensive inventory of unstaffed and staffed facilities within the FAA and increase accuracy of the overall inventory of unstaffed infrastructure and develop an 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.

Program Plans FY 2014 – Performance Output Goals

- Complete and brief JRC Final Investment Decision package for unstaffed communications infrastructure by February 2014.
- Complete and brief JRC Final Investment Decision package for unstaffed navigation, surveillance and weather infrastructure by March 2013.
- Complete 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.

Program Plans FY 2015 – Performance Output Goals

- Complete 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.

Program Plans FY 2016 – Performance Output Goals

- Complete 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.

Program Plans FY 2017 – Performance Output Goals

- Complete 120 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.
- By 9/30/2017, establish FY 2018 prioritization plan for deferred maintenance and safety related deficiencies and coordinate with EOSH Service (AJW-23) to ensure compliance requirements are addressed.

2E03, AIRCRAFT RELATED EQUIPMENT PROGRAM

FY 2013 Request $10.1M

- A, Aircraft Related Equipment Program, M12.00-00
- B, Advanced Fly-By-Wire Simulator – Technical Refresh, M12.01-03 and X, Advanced Fly-By-Wire Simulator – Additional Technical Refresh Projects, M12.01-04

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.

The FI aircraft fleet is composed of 32 specially equipped aircraft. Currently, 66 percent of the FI fleet is limited in its support capabilities. This program provides the technical equipment upgrades and/or replacements to existing aircraft, avionics, and flight inspection mission equipment to meet current and future performance requirements. It also provides the Flight Operations Management System (FOMS) (used to schedule and manage the inspection process) and the navigation facility data upgrades needed for the inspection systems.

The new equipment provides the capability for flight validation & inspection of:

- WAAS/LPV/LP.
- RNP/ Special Aircraft and Aircrew Authorization Required (SAAR).
- RNAV SIDs/STARs.
- DME/DME and GPS routes.
- ADS-B.
- Wide Area Multi-lateration (WAM).

The ARE program is grouped into 3 activities:

1. <u>Aircraft Modernization</u> projects support avionics technical refreshes and new or changing regulatory requirements for operating aircraft in domestic and international airspace.
2. <u>Flight Inspection System Sustainment</u> projects support mission equipment technical refreshes and new or changing regulatory requirements necessary to continue flight inspection of legacy NAS systems.
3. <u>Flight Inspection System Modernization</u> projects support new mission equipment requirements and new or changing regulatory requirements necessary to provide flight inspection of Performance Based Navigation and implementation of evolving NextGen systems.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The FAA sustains system availability by ensuring the accuracy of navigational aid electronic signals, as well as validating and certifying the approach/departure flight procedures and terminal routes at all airports within the NAS and at military facilities world-wide. To do this the fleet of flight inspection aircraft must be modernized and updated to be compatible with the latest equipment and procedures. By constantly checking electronic aids for navigation and landing, and the associated procedures, availability is maintained. As the data below shows, the checks identify discrepancies that are fixed before they cause delays and diversions of aircraft.

In FY 2011, a total of 14,554 flight inspections were conducted of existing ground based navigational aids and existing Instrument Flight Procedures (IFPs) and 662 had reportable discrepancies. This equates to 4.5% of published IFPs and associated ground based navigational aids requiring further attention. In addition, 3,215 IFPs required flight inspection in order to publish a new or amended flight procedure. The results of those flight inspections required 256 IFPs to be adjusted and found 126 IFPs to be unsatisfactory. Of the new or amended IFPs, 11.9% required correction and thereby avoided potentially unsafe IFPs from being published.

Program Plans FY 2013 – Performance Output Goals

<u>Aircraft Modernization</u>:
- Install Pro Line 21 avionics suite in six (6) Beech 300 aircraft.
- Complete interior modifications on five (5) Beech 300 aircraft.
- Complete exterior paint on five (5) Beech 300 aircraft.

<u>Flight Inspection System Sustainment</u>:
- Develop Prototype Flight Operations Management System (FOMS) integrated with airborne systems.

<u>Flight Inspection System Modernization:</u>
- Install NAFIS Phase I in six (6) Beech 300 aircraft
- Install NAFIS Phase II prototype in the Challenger 604 aircraft
- Install NAFIS Phase I in one (1) Challenger 601 aircraft
- Replace legacy AFIS camera with high definition digital camera, install graphical user interface and remove hard copy printer, and replace MILTOPE computer with JETLAN computer on six (6) Beech 300 aircraft.
- Develop technical refresh of the AIRNAV database load for NAFIS.

Program Plans FY 2014 – Performance Output Goals

<u>Aircraft Modernization</u>:
- Install Pro Line 21 avionics suite in six (6) Beech 300 aircraft.
- Develop installation plan for ADS-B avionics FI Fleet.
- Acquire and install ADS-B aircraft avionics for the Challenger fleet (6).
- Complete interior modifications on five (5) Beech 300 aircraft.
- Complete exterior paint on five (5) Beech 300 aircraft.

<u>Flight Inspection System Sustainment</u>:
- Deploy Flight Operations Management System (FOMS) integrated with airborne systems.

<u>Flight Inspection System Modernization:</u>
- Install NAFIS Phase I in three (3) Beech 300 aircraft.
- Install NAFIS Phase I in two (2) Challenger 601 aircraft.

- Replace legacy AFIS camera with high definition digital camera, install graphical user interface and remove hard copy printer, and replace MILTOPE computer with JETLAN computer on three (3) Beech 300 aircraft.

Program Plans FY 2015 – Performance Output Goals
Aircraft Modernization:
- Install Pro Line 21 avionics suite in one (1) Beech 300 aircraft.
- Acquire ADS-B aircraft avionics for the Learjet and Beech Fleet.
- Complete interior modifications on five (5) Beech 300 aircraft.
- Complete exterior paint on six (6) Beech 300 aircraft.

Flight Inspection System Sustainment:
- None.

Flight Inspection System Modernization:
- Complete NAFIS FIAPA Software Block 2 development and integration.
- Install NAFIS Phase II on three (3) Beech 300 aircraft.
- Install Operational NAFIS Phase II on one (1) Challenger 604.
- Upgrade legacy AFIS system as required.

Program Plans FY 2016 – Performance Output Goals
Aircraft Modernization:
- Acquire flight deck navigation updates for the Challenger 601 fleet.
- Acquire flight deck navigation updates for the Learjet fleet.
- Install ADS-B aircraft avionics on three (3) Learjet and ten (10) Beech 300 aircraft.

Flight Inspection System Sustainment:
- None.

Flight Inspection System Modernization:
- Install NAFIS Phase II in four (4) Beech 300 aircraft.
- Install NAFIS Phase II on one (1) Challenger 601.
- Install NAFIS Phase II on one (1) Challenger 605.
- Upgrade legacy AFIS system as required.

Program Plans FY 2017 – Performance Output Goals
Aircraft Modernization:
- Installation of prototype flight deck navigation updates on one (1) Challenger 601.
- Installation of prototype flight deck navigation updates on one (1) Learjet.
- Install ADS-B avionics on three (3) Learjet and eight (8) Beech 300 and two (2) C90 aircraft.

Flight Inspection System Sustainment:
- None.

Flight Inspection System Modernization:
- Install NAFIS Phase II in four (4) Beech 300 aircraft.
- Install NAFIS Phase II on two (2) Challenger 601.
- Install NAFIS Phase II on one (1) Challenger 605.
- Install NAFIS Phase II on one (1) Learjet aircraft.
- Upgrade legacy AFIS system as required.

B, ADVANCED FLY-BY-WIRE SIMULATOR – TECHNICAL REFRESH, M12.01-03 AND X, ADVANCED FLY-BY-WIRE SIMULATOR – ADDITIONAL TECHNICAL REFRESH PROJECTS, M12.01-04

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 Operations (CSPO), Required Navigation Performance (RNP), and Human-in-the-Loop (HITL) pilot/controller/aircraft terminal operations performance during introduction of new NextGen technology initiatives. These initiatives include upgrading the A330/340 simulator to incorporate the following technologies: Automatic Dependent Surveillance-Broadcast (ADS-B) Forward Field-Of-View (FFOV), ADS-B Autopilot upgrade, and advanced Head-Up–Display (HUD) with Synthetic Vision System (SVS) technology. Additional technical refresh projects are projected to include upgrades to the flight simulator, Controller Pilot Data Link Communication (CPDLC) System, High Level Architecture (HLA) linking systems/software, HUD, Enhanced Flight Vision System (EFVS), SVS and avionics/cockpit displays. 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.

The Final Investment Decision (FID) 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. An additional Airbus simulator follow-on Technical Refresh CIP is being planned for FY 2015, FY 2016 and FY 2017.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Award Contract for A380 Aerodynamic Performance Model, May 3, 2013.

Program Plans FY 2014 – Performance Output Goals
- Achieve Initial Operational Capability (IOC) for advanced HUD, October 2013.
- Achieve IOC for SVS, October 2013.
- Achieve IOC for ADS-B Forward Field-Of-View upgrade, February 2014.
- Achieve IOC for ADS-B Autopilot upgrade, March 2014.
- Award Contract for A350 Aerodynamic Performance Model, September 29, 2014.

Program Plans FY 2015 – Performance Output Goals
- Achieve IOC for Airbus 380 Simulator Aerodynamic Model, December 2014.
- Award Contract for CPDLC and HLA Linking System/Software upgrade, August 20, 2015.

Program Plans FY 2016 – Performance Output Goals
- Achieve IOC for Airbus 350 Simulator Aerodynamic Model, May 2016.
- Achieve IOC for CPDLC and HLA Linking System/Software Upgrade, July 15, 2016.
- Award Contract for HUD, EFVS, and SVS upgrade, August 2016.

Program Plans FY 2017 – Performance Output Goals
- Award Contract for Avionics/Cockpit Displays Technology Upgrade, June 2017.

2E04, AIRPORT CABLE LOOP SYSTEMS – SUSTAINED SUPPORT
FY 2013 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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. There have been 981 delays associated with outages since 1998 for the 35 largest airports in the NAS. The number of associated delays has decreased an average of 3% annually since that time. For the FY 2013 sites identified to have corrective action taken, 233 of the delays will be mitigated from having a reoccurrence.

Program Plans FY 2013 – Performance Output Goals
- Complete Add Drop Multiplexer (ADM) installation at Ronald Regan Washington National Airport (DCA).
- Complete ADM installation at Portland International Airport (PDX).
- Complete ADM installation at Spokane International Airport (GEG).
- Complete ADM installation at Seattle-Tacoma International Airport (SEA).

Program Plans FY 2014 – Performance Output Goals
- Complete ADM installation at Cleveland, OH Airport (CLE).
- Complete ADM installation at Denver, CO Airport (DEN).

Program Plans FY 2015 – Performance Output Goals
- Complete ADM installation at Austin, TX Airport (AUS).
- Complete ADM installation at Dallas-Fort Worth, TX Airport (DFW).

Program Plans FY 2016 – Performance Output Goals
- Complete fiber installation at Miami, FL Airport (MIA).
- Complete construction at Ft Lauderdale, FL Airport (FLL).

Program Plans FY 2017 – Performance Output Goals
- Three additional airports will be started this year. The FY 2015 planning activities will confirm the sites.

2E05, ALASKAN SATELLITE TELECOMMUNICATIONS INFRASTRUCTURE (ASTI)
FY 2013 Request $6.8M

- Alaskan Satellite Telecommunication Infrastructure (ASTI), C17.02-01

Program Description

The Alaskan Satellite Telecommunication Infrastructure (ASTI) (formerly named Alaskan NAS Interfacility Communications System (ANICS)) is an FAA owned and operated communications network (using satellite transmissions of data) that provides Alaska with critical, essential and routine air traffic control telecommunications services such as:
- Remote Control Air Ground and Remote Communications Outlets for voice communication with pilots;
- En Route and Flight Service Station Radio Voice Communications;
- En Route and Terminal Radar Surveillance Data; Digitized Radar Data and Digitized Beacon Data;
- Flight Service Station Flight Service Data processing System and the Digital Aviation Weather Network;
- Weather Advisories, Briefings, and Products supporting Automatic Surface Observation System (ASOS), Automated Weather Observation System (AWOS), and AWOS Data Acquisition System (ADAS);
- WAAS Reference Station; and
- Automatic Dependent Surveillance-Broadcast (ADS-B).

ASTI uses primary and alternate satellites to meet FAA Order 6000.36 to provide system circuit diversity and redundancy. The Alaskan Satellite Telecommunications Infrastructure (ASTI) program was initiated to modernize the legacy ANICS network. ASTI Modernization Contract was awarded in August 2011.

System availability has fallen below required availability and continues to decline. Outages are increasing in both frequency and duration. Many system components have either reached the end of their useful life or are no longer supportable. In addition, the arctic climate degrades the ground equipment due to cold cycling, corrosion and wind damage. Recently, aggressive technical service efforts have been required to maintain overall system availability and reliability. Conditions have led to a loss of performance capability, increased maintenance and higher costs of ownership. Much of the Network Management and Control System (NMCS) equipment has reached its capacity as the number of ASTI sites has risen to the current 64 sites. In addition, the NMCS does not provide the level of security assurance that current Federal standards demand.

The ASTI Program will restore system availability through this Modernization program. It will achieve this objective by awarding contracts to acquire and provide Commercial off-the-Shelf (COTS) equipment and associated support services. The modernization efforts will yield several important benefits:

- Improvements in network availability to required levels (.9999 for Phase I sites and .999 for Phase II sites)
- Improved information system security to meet Federal standards;
- Reduced frequency and duration of outages;
- More efficient use of satellite transponder bandwidth;
- Containment of Operations and Maintenance (O&M) costs; and
- Improved life cycle support (i.e., training, second level engineering support, radome maintenance and depot level supply support).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 3 – There is a reduction the general aviation fatal accident rate.*
- *FAA Performance Metric 1 – Reduce general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Development test and evaluation (DT&E) completed at Test and Training Facility by September 30, 2013.
- Conduct radome maintenance at 4 ASTI locations by September 30, 2013.

Program Plans FY 2014 – Performance Output Goals

- Complete ASTI Modernization installation (Contractor Acceptance Inspection) at key site by September 30, 2014.
- Complete ASTI Modernization installation at Limited Deployment Sites by September 2014.

Program Plans FY 2015 – Performance Output Goals

- Complete modernization of additional ASTI locations to include installation and testing for modems, multiplexers, RF equipment and NMCS.
- Complete Installation (CAI) at 37th site (APB milestone).

Program Plans FY 2016 – Performance Output Goals

- Complete modernization of additional ASTI locations to include installation and testing for modems, multiplexers, RF equipment and NMCS.
- Complete Installation at (CAI) at 64th site (APB milestone).

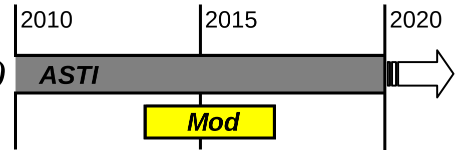
Program Plans FY 2017 – Performance Output Goals

- None.

System Implementation Schedule

Alaskan Satellite Telecommunications Infrastructure (ASTI)

Key site IOC: September 2013 -- Last site IOC: September 2016



2E06, FACILITIES DECOMMISSIONING

FY 2013 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

This project directly supports improving management of FAA's real property assets by optimizing maintenance costs and disposing of excess assets. Cost avoidance is derived from eliminating lease and maintenance costs following the disposition of legacy real properties, which are no longer required.

Program Plans FY 2013 – Performance Output Goals

- Complete 175 Real Property Disposal Projects, approximately 60 per Service Area. 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).
- Dispose of 6 Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.

Program Plans FY 2014 – Performance Output Goals

- Complete approximately 175 Real Property Disposal Projects, approximately 60 per Service Area. 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).
- Dispose of 6 Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.

Program Plans FY 2015 – Performance Output Goals

- Complete approximately 175 Real Property Disposal Projects, approximately 60 per Service Area. 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).
- Dispose of 6 Radio Communications Link Repeater (RCLR) /Radio Communications Link Terminal (RCLT) Tower sites.

Program Plans FY 2016-2017 – Performance Output Goals

- None, future activities will depend upon approval of funding by FAA management.

2E07, ELECTRICAL POWER SYSTEMS – SUSTAIN/SUPPORT

FY 2013 Request $85.0M

- Power Systems Sustained Support, F11.01-01

Program Description

The Electrical Power Systems Sustain Support (PS3) (Power) program funds the 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, are placed in airborne holding patterns, or are re-routed to other airports. Reliable backup power systems are installed so air traffic control electronics can maintain required availability and capability and prevent disruptions. 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 to ensure the continuity of air traffic control by preventing power disruptions to NAS 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 21 Air Route Traffic Control Centers (ARTCCs) 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. On July 18, 2006, the ARTCC Critical and Essential Power System (ACEPS) Critical

Power Distribution System (CPDS) supporting Los Angeles En Route Center failed for two hours due to a loss of two Uninterruptible Power Modules (UPM). The failure caused a complete loss of critical power at the center to include surveillance and communication services resulting in 424 flights being delayed. Each ARTCC requires $8,000,000 to correct this situation. The delivery of this correction will take several years to complete. ACEPS have 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. As an illustrative example, the average ARTCC during the period, April 10 through March 11, 2011, experienced 25 hours of commercial power failure. 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 CPDS program funds the replacement of existing CPDS systems, excluding the acquisition of engine-generators, UPS and batteries. However, as a special case the ACEPS CPDS program, see item 4, directly funds replacement engine-generators and UPS. 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 while optimizing acquisition, and logistic, and training costs.

9. PS3 and Project Support System Engineering: PS3 and 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, sustainment of established alternative energy generation systems, and system life-cycle.

10. Alternative Energy Systems (AES): AES Program integrates and sustains a broad range of clean energy technologies to meet NAS operational demands. Utilization of AES technologies reduces the Agency carbon footprint and helps to achieve Executive goals for reduction of fossil fuel dependencies. Alternative energy generation systems include any of the following: Biomass; Waste to Energy; Landfill Gas; Geothermal Energy; Solar Energy; Ocean Energy; Hydropower; Hydrokinetic; Wind Energy; and Fuel Cell.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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. PS3 supports the sustainment of the operational availability at 99.7% for reportable power system facilities that support the 30 Core airports. 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 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 (60 Sets).
  2. Power Conditioning Systems (UPS) (13 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 (89 Sets).
  8. Critical Power Distribution Systems (2 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (8 Sets).
  10. Alternative Energy Sustainment (7 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 (2 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (100 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).
  10. Alternative Energy Sustainment (7 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 (2 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (100 Sets).
  8. Critical Power Distribution Systems (6 Sets).

9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).
10. Alternative Energy Sustainment (7 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 (2 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (100 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).
  10. Alternative Energy Sustainment (7 Sets).

Program Plans FY 2017 – 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 (2 Sets).
  5. Lightning Ground Bonding Protect Systems (5 Sets).
  6. Airport Power Cable Replacements (8 Sets).
  7. Engine Generators Replacement (100 Sets).
  8. Critical Power Distribution Systems (6 Sets).
  9. Power System Sustain Support (PS3) and project support system engineering (10 Sets).
  10. Alternative Energy Sustainment (7 Sets).

2E08, AIRCRAFT FLEET MODERNIZATION

FY 2013 Request $2.1M

- Flight Standards Inspector Aircraft Replacement – Segment 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 allow the aircraft to 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) new aircraft in FY 2009 with a more modern avionics and cockpit configuration than the current fleet of aircraft. 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) new aircraft with the same avionics and cockpit configuration as the six (6) aircraft purchased above. Two (2) aircraft will be procured in FY 2012 using FY 2012 funds and the remaining aircraft will be procured in FY 2013 using both FY 2012 funds and FY 2013 funds.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Procure one (1) additional aircraft.
- 1st Aircraft achieve Full Operational Capability (FOC), February 2013.
- 2nd Aircraft achieve FOC, March 2013.
- 3rd Aircraft achieve FOC, August 2013.

Program Plans FY 2014-2017 – Performance Output Goals
- None, program ended in FY 2013

2E09, FAA Employee Housing and Life Safety Shelter System Services
FY 2013 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. Primary locations are Alaska, Grand Canyon and American Samoa. Other housing and shelters are located throughout the United States, including the U.S. Virgin Islands. Because there are relatively few roadway systems in Alaska, barge and heavy-lift aircraft are the primary methods for delivering cargo, resulting in high costs for logistics and construction.

1. Roofs: The FAA housing was built between the middle 1940s and the 1980s. Roofs, fascia, and soffits 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, Outcome, and Performance Metric

- *FAA Strategic Goal 2 – Workplace of Choice.*
- *FAA Outcome 2 – FAA is widely recognized as an employer of choice.*
- *FAA Performance Metric 1 – The FAA is rated in the top 25 percent of places to work in the federal government by employees.*

Relationship to Performance Metric

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. This project will provide safe, healthy and habitable employee housing and shelters to support the metric for top 25 percent of places to work.

Program Plans FY 2013 – 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).
- Develop a plan to consolidate federal housing with other agencies to achieve cost-effective solutions and to leverage all available federal resources while examine commercially-managed housing and shelter facilities management solutions. Due September 30, 2013.
- Develop lifecycle management plan of condition assessments for life-cycle management of FAA employee housing and life-safety shelters, including study of facility management tools. Due September 30, 2013.

Program Plans FY 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 2015-2017 – 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 2013 Request $20.0M

- Environmental Cleanup/HAZMAT, F13.02-00

Program Description

The FAA has identified approximately 730 contaminated sites at approximately 120 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 (FY 2011) ER Liability is estimated at approximately $400M un-inflated, and with contingency the un-inflated ER Liability is estimated at approximately $550M. 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 2010 ESCR to the FY 2011 ESCR the total number of identified sites has decreased from approximately 750 to 730.

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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The HAZMAT program supports the FAA's Delivering Aviation Access through Innovation 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 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.

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.

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.

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.

Program Plans FY 2017 – Performance Output Goals
- Complete activities at five percent (5%) of the total sites listed in the FY 2016 Environmental Site Cleanup Report, resulting in no further resources being needed to be applied to these sites.

3A02, AVIATION SAFETY ANALYSIS SYSTEM (ASAS)
FY 2013 Request $15.8M

- Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 2, A17.01-02
- X, Regulation and Certification for Infrastructure System Safety (RCISS) – Segment 3, A17.01-03

Program Description

RCISS is an existing technology refreshment program within Aviation Safety (AVS) to upgrade and maintain the AVS Information Technology (IT) enterprise infrastructure that includes the automation hardware, software, and communication components which support the safety data and applications utilized by the FAA AVS safety workforce. All current and planned AVS capital investment initiatives rely on the IT infrastructure being deployed by RCISS, including the Aviation Safety Knowledge Management Environment (ASKME) and System Approach for Safety Oversight (SASO) programs.

The RCISS Segment 2 business approach and scope remain unchanged from Segment 1. During Segment 1, RCISS successfully maintained and enhanced the legacy AVS IT infrastructure, deployed mobile toolkits to the safety workforce, developed and implemented a disaster recovery capability, and deployed a Service Oriented Architecture (SOA) infrastructure.

RCISS Segment 2 is a continuation of Segment 1, performing on-going technology refresh deployments throughout the program's remaining 10-year lifecycle (through FY 2021) to maintain and continue the modernization of the AVS IT infrastructure. Technology refresh of the AVS IT infrastructure is necessary to keep pace with the growing and changing demands of the aviation industry, as well as to provide the safety workforce with the level of services and systems required for the continual promotion and support of aviation safety.

Segment 2 will upgrade and improve the hardware and software that helps safety and aircraft certification 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 advances in mobile computing technologies. 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.

Segment 2 program activities include technology refresh of the following IT infrastructure components supporting AVS's Safety Workforce of over 6,000 people: mobile toolkits (consisting of mobile tablet personnel computers and peripherals); 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. Technology refreshes are based on the service life of individual components and incrementally performed each year. For example, mobile toolkits deployed to the safety workforce have a service life of four years and approximately 25% of mobile toolkits are replaced each year.

RCISS Segment 3 will perform technology refresh on the AVS IT infrastructure established by Segments 1 and 2.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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. RCISS enables the realization of the quantifiable safety benefits claimed by the SASO and ASKME investments by providing the IT infrastructure on which these AVS business applications reside. Approximately 20% of the combined SASO and ASKME benefits are attributed to RCISS.

Program Plans FY 2013 – Performance Output Goals

Segment 2:

- 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.
- Complete contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.
- Develop strategy and plan for the physical consolidation of the two existing data centers.
- Deploy Service Oriented Architecture services to support the SASO and ASKME business application programs.

Program Plans FY 2014 – Performance Output Goals

Segment 2:

- 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.
- Complete contract award for annual technology refresh of safety workforce mobile toolkits.

- Complete contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.
- Complete the physical consolidation of the two existing data centers.

Program Plans FY 2015 – Performance Output Goals

<u>Segment 2:</u>

- 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.
- Complete contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.

Program Plans FY 2016 – Performance Output Goals

<u>Segment 2:</u>

- 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.
- Complete contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.

Program Plans FY 2017 – Performance Output Goals

<u>Segment 3:</u>

- Continue the second technology refresh of safety workforce mobile toolkits with enhanced telecommunications services and deploy these toolkits to the second 25% of the AVS safety workforce.
- Complete contract award for annual technology refresh of safety workforce mobile toolkits.
- Complete contract award for annual technology refresh of Enterprise Data Center centralized data storage and processing equipment.
- Complete contract award for annual technology refresh of disaster recovery equipment.

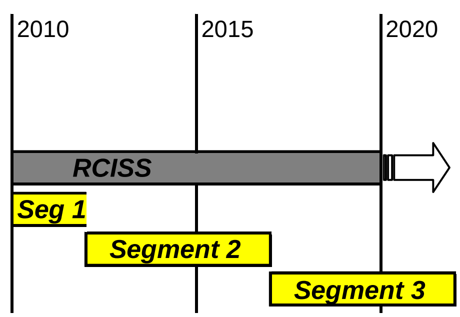
System Implementation Schedule

Aviation Safety Analysis System (ASAS) - Regulation and Certification for Infrastructure System Safety (RCISS)

Segment 1: First site Delivery: 2008 -- Last site Delivery: 2011

Segment 2: First site Delivery: 2012 -- Last site Delivery: 2016

Segment 3: First site Delivery: 2017 -- Last site Delivery: 2021



3A03, LOGISTICS SUPPORT SYSTEMS AND FACILITIES (LSSF)

FY 2013 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, services and supplies, and it tracks and accounts for Capital and Ops funded parts with a total value of $900 million. The current system used to manage these functions is 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.

The 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 management and replace the 20-year old Logistics Inventory System (LIS) in support of the Next Generation of air traffic control (NextGen) environment.

LCSS hardware and software shall be installed and maintained at the FAA Mike Monroney Aeronautical Center (MMAC) in Oklahoma City. The LCSS program will require a hardware refresh to maintain the installed equipment at the MMAC.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The LCSS program supports the Strategic Plan Delivering Aviation Access through Innovation 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 10.8 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 2013 – Performance Output Goals
- Complete Certification & Accreditation of LCSS (1/31/2013).
- Establish Disaster Recovery Site (5/31/2013).
- Complete successful Implementation of Early Production Options (7/31/2013).
- Identify impacted policies and complete End User Training (8/1/2013).
- Complete development of 95% of the interfaces and extensions for Full-Implementation (9/30/2013).

Program Plans FY 2014 – Performance Output Goals
- APB milestone: Operational Test & Evaluation (OT&E) completed (6/30/2014).
- APB milestone: LCSS Initial Operational Capability (IOC): decommission LIS (6/30/2014).

Program Plans FY 2015 – Performance Output Goals
- Hardware Technical Refresh Implemented (9/30/2015).

Program Plans FY 2016 – Performance Output Goals
- None.

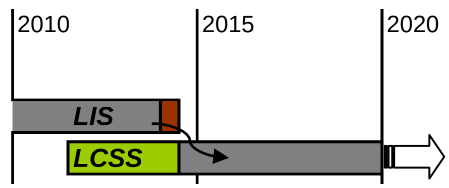
Program Plans FY 2017 – Performance Output Goals
- Hardware Technical Refresh Implemented (9/30/2017).

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 2013 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 Non-classified Internet Protocol Router Network (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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 4 – Exceed Federal Emergency Management Agency continuity readiness levels by 5 percent.*

Relationship to Performance Metric

The RCOM program contributes to the Next Level of Safety 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 2013 – Performance Output Goals

- Procure and install VHF/FM equipment for Jacksonville (ZJX) District.
- Engineer VHF/FM system requirements for Philadelphia District and ZBW District (Boston ARTCC).
- Start transition from STEs to VIPER secure phones. First phase will consist of 100 phones out of 350.
- Replace SIPRNet services with Homeland Security Data Network (HSDN).
- Secure a new NIPRNET Host Service.

Program Plans FY 2014 – Performance Output Goals

- Procure and install VHF/FM equipment for Philadelphia District (PHL) and ZBW District (Boston ARTCC).
- Complete VHF/FM system requirements documents for the D10 District (Dallas/FT Worth TRACON) and ZFW District (FT Worth ARTCC).
- Continue transition from STEs to VIPER secure phones. Second phase will consist of 200 phones
- Complete DMS Network Refresh at 40 sites.

Program Plans FY 2015 – Performance Output Goals

- Procure and install VHF/FM equipment for Dallas Fort Worth District (DFW) and ZFW District (FT Worth ARTCC).
- Complete VHF/FM system requirements documents for Denver OEP and Memphis District.
- Upgrade Microsoft SharePoint software from WSS 3.0 to 2010.
- Procure remaining 50 VIPER secure phones.

Program Plans FY 2016 – Performance Output Goals

- Procure and install VHF/FM equipment for ZME District (Memphis District) and DEN District (Denver OEP).
- Complete VHF/FM system requirements documents for ZDV District (Denver ARTCC) and ZLC District (Salt Lake City).

Program Plans FY 2017 – Performance Output Goals

- Procure and install VHF/FM equipment for ZDV District (Denver ARTCC) and ZLC District (Salt Lake City).
- Complete VHF/FM system requirements documents for ZMP District (Minneapolis ARTCC) and ZOB District (Cleveland ARTCC).

3A05, Facility Security Risk Management

FY 2013 Request $14.2M

- Facility Security Risk Management (FSRM) – Two, F24.01-02

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 approach control (TRACON) facilities. The program provides an integrated security system that includes access control, surveillance, x-ray machines, metal detection, and intrusion detection. Other upgrades include adding guardhouses, visitor parking, fencing, perimeter hardening, window blast protection, and lighting.

The FSRM Program also supports the FAA's response to HSPD-12, *Policy for a Common Identification Standard for Federal Employees and Contractors*; Public Law 106-528, *Airport Security Improvement Act of 2000.*

The objectives of the program are to comply with the mandates, directives, and orders of the President, Congress, DOT, and the FAA. This includes the installation and maintenance of physical security systems and guard services at designated FAA facilities. This is accomplished through the System Security Design and Integration (SSDI), Corrective Maintenance Contract (CMC) II, and National Security Officer Services (NSOS) contracts.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

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. FSRM activities to increase/improve physical security enable the FAA to comply with:

- U.S. Department of Justice Report #381 Vulnerability Assessment of Federal Facilities
- The Airport Security Improvement Act of 2000 (Title 49 USC § 44903. Air Transportation Security)
- Homeland Security Presidential Directive 7, Critical Infrastructure Identification, Prioritization, and Protection
- Homeland Security Presidential Directive 12, Policy for a Common Identification Standard for Federal Employees and Contractors
- FAA Order 1600.69, Facility Security Management Program, as revised.

Both the DOT IG and GAO continue to track our progress in meeting these requirements. As a result operational availability is maintained because enhanced security prevents loss of NAS service.

Program Plans FY 2013 – Performance Output Goals

- Commence full integration of SSDI equipment at Mike Monroney Aeronautical Center (MMAC).
- Complete the Joint Acceptance Inspection (JAI)/Contractor Acceptance Inspection (CAI) for SSDI equipment and non-SSDI work (fencing, etc.) at 20 Security Level 1 and Security Level 2 facilities per FAA Order 1600.69.

Program Plans FY 2014 – Performance Output Goals

- Commence full integration of SSDI equipment at approximately 10 sites (NOTE: Actual number of sites projected to complete full integration of SSDI equipment will be updated commencing at the beginning of the fiscal year.)
- Complete the Joint Acceptance Inspection (JAI)/Contractor Acceptance Inspection (CAI) for SSDI equipment and non-SSDI work (fencing, etc.) at 28 Security Level 1 and Security Level 2 facilities per FAA Order 1600.69.

Program Plans FY 2015 – Performance Output Goals

- Provide physical upgrades at 45 facilities as required to meet FAA security requirements for accreditation.
- Commence full integration of SSDI equipment at various sites and Accept SSDI equipment and non-SSDI work (fencing, etc.) at 45 Security Level 1 and Security Level 2 facilities per FAA Order 1600.69.

Program Plans FY 2016 – Performance Output Goals

- Complete installation of 2nd X-ray machines (30 sites) September/1/2016.
- Commence full integration of SSDI equipment at various sites.
- Complete the Joint Acceptance Inspection (JAI)/Contractor Acceptance Inspection (CAI) for SSDI equipment and non-SSDI work (fencing, etc.) at 20 Security Level 1 and Security Level 2 facilities per FAA Order 1600.69.

Program Plans FY 2017 – Performance Output Goals

- Complete Personal Identity Verification (PIV) retro-fit (405 sites).
- Commence full integration of SSDI equipment at various sites.
- Complete the Joint Acceptance Inspection (JAI)/Contractor Acceptance Inspection (CAI) for SSDI equipment and non-SSDI work (fencing, etc.) at 45 Security Level 1 and Security Level 2 facilities per FAA Order 1600.69.

3A06, INFORMATION SECURITY

FY 2013 Request $14.0M

- A, Information Systems Security, M31.00-00
- B, Enterprise Information System Security (EISS), M31.03-01
- C, FAA Identity and Access Management (FIAM), M31.04-01

A, 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.

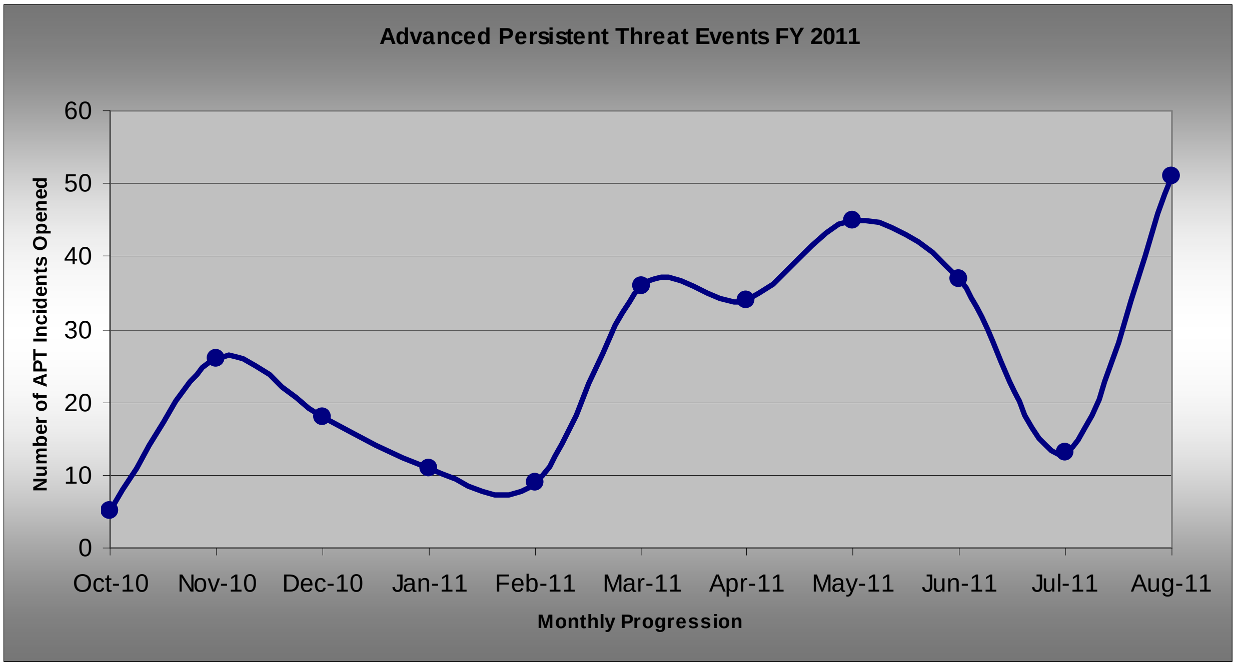
The FAA Information Systems Security (ISS) program is a partnership between the FAA Chief Information Officer (CIO) organization and FAA lines of business and staff offices (LOBs/SOs) with a focus on protecting our information technology (IT) infrastructure. The program is comprised of the following areas:

- Cyber Security Management Center (CSMC);
- IT and Information Systems Security (ISS) awareness and training;
- IT development;
- enterprise architecture;
- policy, standards, and requirements;
- program evaluations; and
- system certification and compliance.

This comprehensive Cyber Security effort offers information security awareness training for 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. The Cyber Security Management Center (CSMC) is the operational branch of the FAA ISS Program. It is comprised of facilities, technologies, as well as FAA and contract personnel working as a unified entity to provide extremely effective, enterprise-focused cyber security services to its clients. The CSMC is a 24x7x365 day operation supporting the entire FAA and the Department of Transportation (DOT). In executing the CSMC mission of cyber security for the FAA, the CSMC is the central reporting point for all cyber incidents occurring within the FAA and DOT. Along these lines, the CSMC also represents the entire DOT as the single source provider of the cyber “big picture” when reporting to the Department of Homeland Security (DHS).

The office of the Chief Information Officer (AIO’s) work continues with 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 sophisticated cyber attacks. The chart below shows the monthly Advanced Persistent Threat event trend for October 2010 through August 2011.



Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

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 2013– Performance Output Goals

- 12 out of 12 months of operations incur zero cyber security events that disable or significantly degrade FAA mission critical systems.
- Implement cyber security sensing and reporting systems for two (2) component subsystems of the NAS.
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT).
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and Federal Desktop Core Configuration (FDCC)/The United States Government Configuration Baseline (USGCB) scanning of 50% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Privacy and sensitive information scanning software installed and monitored for all FAA egress points.
- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- Install wireless technologies that monitor for rogue wireless network threats and vulnerabilities in 41 Flight Standards District Offices (FSDOs).
- Conduct software code vulnerability security analysis on forty (40) legacy and development agency systems.

- Conduct at least two (2) Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop information architecture that can seamlessly share information between agencies participating in the NextGen architecture.
- Leverage existing technology and demonstrate its applicability to meet ongoing operational requirements through partnerships with DoD and other Federal, state agencies using Advanced Concept Technology Demonstrations (ACTD). Deliver an FAA Cloud Computing Strategy and FAA IPv6 Address Allocation Plan.
- Implement Information System Security requirements in the IPv6 transition.
- Conduct annual transitions within an actionable Enterprise Architecture.
- Enhance the FAA Enterprise Architecture regarding cyber security protection by developing cyber security requirements and reviewing certification and authorization work.

Program Plans FY 2014 – Performance Output Goals

- 12 out of 12 months of operations incur zero cyber security events that disable or significantly degrade FAA mission critical systems.
- Implement cyber security sensing and reporting systems for two (2) component subsystems of the National Airspace System (NAS).
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT)
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 60% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- Install wireless technologies that monitor for rogue wireless network threats and vulnerabilities in locations TBD.
- Conduct software code vulnerability security analysis on sixty (60) legacy and development agency systems.
- Conduct at least three (3) Webinar/ training sessions on software assurance to FAA employees and contractors.
- Enhance the FAA Enterprise Architecture regarding cyber security protection by developing cyber security requirements and reviewing certification and authorization work.
- 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

- 12 out of 12 months of operations incur zero cyber security events that disable or significantly degrade FAA mission critical systems.
- Implement cyber security sensing and reporting systems for two (2) component subsystems of the National Airspace System (NAS).
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT)
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 70% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- Install wireless technologies that monitor for wireless network threats and vulnerabilities in locations TBD.
- Conduct software code vulnerability security analysis on eighty (80) legacy and development agency systems.
- Conduct at least four (4) Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

Program Plans FY 2016– Performance Output Goals

- 12 out of 12 months of operations incur zero cyber security events that disable or significantly degrade FAA mission critical systems.

- Implement cyber security sensing and reporting systems for two (2) component subsystems of the National Airspace System (NAS).
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT)
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 80% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- Conduct software code vulnerability security analysis on one-hundred (100) legacy and development agency systems.
- Conduct at least five (5) Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

Program Plans FY 2017– Performance Output Goals
- 12 out of 12 months of operations incur zero cyber security events that disable or significantly degrade FAA mission critical systems.
- Implement cyber security sensing and reporting systems for two (2) component subsystems of the National Airspace System (NAS).
- Evaluate and deploy at least one new technology to combat Advanced Persistent Threat (APT)
- Deploy Full Packet Capture capability through Flexible Analysis System (FAS) at two new strategic network points.
- Implement routine vulnerability and FDCC/USGCB scanning of 90% of mission support networks.
- Evaluate three new technologies to address complex and rapidly changing cyber threats and vulnerabilities to include wireless technologies.
- Complete all "Digital Forensic Investigations" within 90 days and report to AIO-1.
- Conduct software code vulnerability security analysis on one hundred-twenty (120) legacy and development agency systems.
- Conduct at least six (6) Webinar/ training sessions on software assurance to FAA employees and contractors.
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems.

B, ENTERPRISE INFORMATION SYSTEM SECURITY (EISS), 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.

In the NextGen era, complying with the government mandates becomes more critical because NextGen introduces a complexity which, unprotected, can potentially lead to an unacceptable security posture. For example the introduction of extended networking of NAS systems and collaboration with NAS external entities without security controls would make NextGen nonviable assuming the current threat environment remains static or worsens. Accordingly, the Enterprise Information System Security (EISS) project will integrate a systematic risk-based and process-oriented approach to introduce and manage security into the enterprise-wide, service level, and program levels of NAS. Methods include changes to organizational structures, functional accountabilities, security policies and procedures. Core principles of Safety and Security Risk Management will be applied to NAS Security as we strive to meet the NextGen security challenge. This approach stresses compliance with policies, orders and technical standards, and increases the emphasis on how security is assessed and addressed, thereby enabling risk management and security assurance.

This project ensures that NAS information security solutions remain consistent with the enterprise level security capabilities identified and agreed upon in the Enterprise Architecture ISS Security Roadmap. The ISS roadmap collected and synthesized ISS safeguard shortfalls pervasive in the NAS. Mitigation strategies provided at the enterprise level will prove to be effective and economical. These identified security shortfalls are addressed by these five ISS capabilities:

- External Boundary Protection (EBP) – to prevent malware from entering the NAS,
- Internal Protection 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.

EISS will support the implementation of the Enterprise Architecture ISS Security Roadmap through the following activities:

- Develop enterprise ISS policy and guidance.
- Improve NAS security management practices for the different stages of the Acquisition Management System – Develop guidelines for the security risk assessment in the acquisition of new systems and risk mitigation using enterprise level security capabilities throughout the Systems' lifecycle.
- Work with programs and stakeholders to identify opportunities for collaboration in terms of planning, integration and implementation.
- Conduct security pilot projects for the Enterprise Architecture ISS Security Roadmap capabilities.
- Develop enterprise service guidance to assist program integration of the enterprise ISS capabilities.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

Each of the EISS activities will contribute to the FAA Strategic Plan Performance Metric "Ensure no cyber security event significantly degrades or disables a mission critical FAA system", and also contribute individually to the "Next Level of Safety" and "Reduce aviation risk through all phases of flight (gate-to-gate)" as follows:

- Enterprise ISS policy and guidance provides the means of ensuring NAS-wide adoption of enterprise security capabilities.
- NAS security management practices in the AMS process, such as security risk assessment in the acquisition of new systems, supports cost effective adoption of enterprise security capabilities.
- Collaboration in the planning of security capabilities fosters corporate learning and facilitates the implementation of such capabilities.
- Pilot projects for enterprise security capabilities allow the identification of effective options and solutions for the hard security problems specific to the NAS and find the best way to overcome them.

Program Plans FY 2013 – Performance Output Goals
- Support prototype development of the Internal Protection Enforcement capability. This includes a trade study report for the partition of the NAS into logical enclaves.
- Develop secure coding standards in support of Certified Software Management capability.
- Develop the Intrusion Detection System architecture for the NAS and implementation plan.

Program Plans FY 2014-2017 – Performance Output Goals
- None.

C, FAA IDENTITY AND ACCESS MANAGEMENT (FIAM), M31.04-01

Program Description

The FAA Identity and Access Management (FIAM) program will ensure all FAA federal employees and contractors who work for the agency will use the Personal Identity Verification (PIV) credentials to gain access to the agency's systems and networks using procedures compatible with existing automation systems. The agency will implement and integrate the identity and access management capability across the entire FAA network infrastructure. The FIAM program will phase in implementation using existing government owned software products that are capable of integrating PIV authentication and authorization on the FAA networks and information systems. The FAA program will either augment legacy security controls of existing systems or substitute its controls for those that otherwise would be designed and implemented in new or refreshed systems dependent on the cost/benefit results. Utilizing the PIV cards for facility access authentication and systems and applications access and authorization will create a uniform and consolidated security and access control environment. Implementing the identity and access management requirements provides the Agency with the opportunity to eliminate redundant, repetitive manual processes and to centralize access control, monitoring, alerts and auditing data while meeting FAA's performance, reliability and availability requirements. All hardware and software purchasing or configuration changes will be completed using the Agency's configuration management process. FIAM will achieve the goals and objectives of Homeland Security Presidential Directive-12 (HSPD-12), "Policies for a Common Identification Standard for Federal Employees and Contractors" and The Office of Management and Budget (OMB) Memorandum M-11-11, "Continued Implementation of Homeland Security Presidential Directive (HSPD) 12 – Policy for a Common Identification Standard for Federal Employees and Contractors". The Department of Homeland Security (DHS) has developed a plan of action for agencies that will expedite the Executive Branch's full use of the PIV credentials for access to federal facilities and information systems.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

Once implemented, a secure and interoperable PIV card will provide security, authentication, identity verification, trust, and privacy to the commonly accepted identification card for Federal employees and contractors. The PIV card is a core component in implementing and operating the "trust model" across the Federal enterprise. The implementation and integration of the FIAM program with the established FAA PIV Card infrastructure advances FAA towards the implementation of this "trust model." The FIAM program will create an automated service-oriented architecture (SOA) for the agency to provide automated provisioning and de-provisioning for identity and access management.

Program Plans FY 2013 – Performance Output Goals
- The FIAM program will establish a baseline configuration for a single source identity card and implement and integrate access management into the FAA enterprise infrastructure to eliminate passwords on one FAA network system and the agency email application logon.

Program Plans FY 2014-2017 – Performance Output Goals

- None, future output goals are contingent upon the Final Investment Decision.

3A07, System Approach for Safety Oversight (SASO)

FY 2013 Request $23.0M

- System Approach for Safety Oversight (SASO) – Phase II Alpha, A25.02-01
- 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 and internal FAA directives. The program is divided into three phases. SASO Phase I applied SASO standards to all Code of Federal Regulations (14 CFR Part 121) air carrier regulations and demonstrated the benefits of system safety to Flight Standards Service (AFS) and the aviation community. SASO Phase II develops and implements automation software, processes and procedures that enable the AFS workforce to perform their safety/regulatory oversight responsibilities in accordance with SMS guidance and directives. SASO Phase II is divided into two segments: Alpha and Beta.

SASO Phase II Alpha is the first segment and covers the years FY 2010 through FY 2013. Completion of this phase is projected to slide to FY 2014. A baseline change will be finalized in the third quarter, FY 2012. In this segment the AFS Safety Assurance System (SAS) is implemented fulfilling one of four components of SMS. The SAS functionality developed and launched in this phase will support AFS oversight of the 14 CFR Parts 121 (air carriers), 135 (commuter and on-demand operators) and 145 (repair stations).

SASO Phase II Beta is the second segment and covers FY 2014 through FY 2018. During this phase the remaining three components of the AFS's SMS (safety risk management, safety policy, and safety promotion) will be developed and implemented. Additionally, SAS functionality is further developed to accommodate the remaining 14 CFR Parts regulated by AFS. These include, but are not limited to, other air operators, pilot schools and training centers, aviation maintenance technical schools, other certificated operations such as helicopter external load, and agriculture/crop dusting.

The AFS SAS supports 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, analysis and 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 provide easier and quicker access to safety information for FAA employees that certificate and surveil the aviation industry.

Safety Risk Management (SRM) – SASO information technology improvements include specific enhancements to the Safety Assurance toolset to support SRM – particularly with respect to development and assessment of risk controls – and the implementation of functional and data interfaces. These interfaces will interconnect the AFS SRM functions with SRM functions of other AVS services and offices, most notably AIR. This will be done in conjunction with updating internal AFS policy and procedures in accordance with SMS constructs and requirements.

Safety Policy – Safety Policy improvements focus on integrating safety planning, organizational structure and responsibilities, and operational procedures and controls. SASO will put in place processes and procedures to facilitate development of plans to meet FAA, office of Aviation Safety (AVS) and AFS safety objectives, and the establishment of acceptable levels of safety for both individual certificate holders and applicable aviation industry segments viewed as a whole. SASO will develop methodology for establishing an acceptable level of risk for particular industry segments and types of operations, and procedures to continuously monitor aggregate, industry level risk. Finally, it will update references and process controls to support integration into the overall AVS SMS.

Safety Promotion – SASO Safety Promotion initiatives include five primary activities: development of a positive safety culture within AVS and AFS, and certificated and non-certificated entities; communication of ongoing SMS efforts and outputs to all employees; establishment of personnel competency requirements for SMS activities; capturing knowledge of safety issues and incorporating it into the air transportation system; and updating product/service provider SMS requirements.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

SASO Phase II Alpha will support the goal of reducing the air carrier fatal accident rate (Safety Performance Metric 1) by implementing the AFS SAS. SASO Phase II Beta will enhance this support by completing the implementation of the remaining three components of the AFS SMS.

Program Plans FY 2013 – Performance Output Goals
<u>SASO Phase II Alpha:</u>
- SASO Phase IIA Complete Key Site Test & Evaluation for Wave #3. Wave #3 is the final automation software package for Phase IIA.
- SASO Phase IIA Complete Product Decision.

<u>SASO Phase II Beta:</u>
- SASO Phase II Beta Software Development Intra-Agency Agreement awarded.

Program Plans FY 2014 – Performance Output Goals
<u>SASO Phase II Alpha:</u>
- SAS Phase II A automation software delivered (projected).
- SASO Phase IIA Complete First Site and Last Site IOC (projected).
- SAS Initial Operating Capability (IOC) (projected).

<u>SASO Phase II Beta:</u>
- SAS Phase II Beta 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
<u>SASO Phase II Beta:</u>
- SAS Phase II Beta 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

SASO Phase II Beta:

- SAS Phase II Beta automation software development.
- Safety Risk Management (SRM) software development.
- Safety Promotion (SPR) software development.
- Safety Policy (SPO) software development.

Program Plans FY 2017 – Performance Output Goals

SASO Phase II Beta:

- SAS Phase II Beta automation software integration and test.
- Safety Risk Management (SRM) software integration and test.
- Safety Promotion (SPR) software integration and test.
- Safety Policy (SPO) software integration and test.

System Implementation Schedule

System Approach for Safety Oversight (SASO)

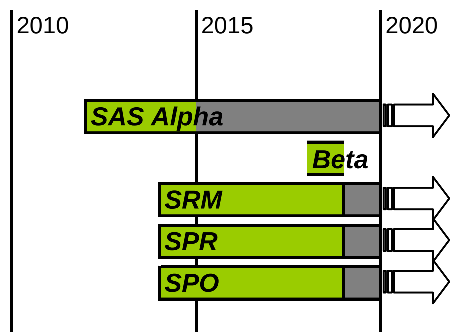
Safety Assurance System (SAS) Alpha - FOC 2012-2014

Safety Assurance System (SAS) Beta - FOC 2018

Safety Risk Management (SRM) - IOC 2014 -- FOC 2018

Safety Promotion (SPR) - IOC 2014 -- FOC 2018

Safety Policy (SPO) - IOC 2014 -- FOC 2018



3A08, AVIATION SAFETY KNOWLEDGE MANAGEMENT ENVIRONMENT (ASKME)

FY 2013 Request $12.8M

- 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 and airworthiness certification to help approve operating certificates, design or modification of aircraft and meet aircraft safety conditions; 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
- DTE-DDS Technical Evaluations- Aircraft Certification Audit Info System (ACAIS) Begin Design Phase

Phase 2 IT Application Deliverables Include:

- Electronic File Service (EFS) – Production Support and Maintenance
- Work Tracking Software – Budget Management (WTS-BMgmt)
- Engineering Design Approval (EDA) Development and Deploy
- DTE-DDS Technical Evaluations-ACAIS Development and Deploy
- 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, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 202.36 avoided fatalities and a total savings of $469.79M (then year dollars at 80% high confidence level).

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:
    - DTE-DDS Technical Evaluations (ACAIS) – 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.

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.

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.

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.

Program Plans FY 2017 – Performance Output Goals

- Complete requirements document identifying additional user needs.
- Conduct user in service training.

3A09, DATA CENTER OPTIMIZATION

FY 2013 Request $1.0M

- Data Center Optimization, F30.01-01

Program Description

The Data Center Consolidation Initiative (DCCI) program is responsible for managing and implementing an agency-level data center consolidation effort across all lines of business (LOBs) and staff offices (SOs). DCCI objectives are to:

1. Ensure all administrative and mission support applications and servers are hosted within enterprise-class data centers (“FAA magnet data centers”) and that application owners have access to state-of-the-art data center hosting services. Magnet data centers have sufficient power and cooling to support high availability service levels and are geographically separated to support disaster recovery (DR) requirements.
2. Reduce the overall data center footprint that the agency is required to maintain while ensuring that IT operations and services are not adversely impacted.
3. Reduce data center operational costs by leveraging economy of scale through consolidation of hardware, software and labor.
4. Leverage green technology by shifting IT investments to more efficient computing solutions.

5. Increase the agency's security posture by implementing standard security controls and reducing the agency's exposure to security risk by consolidating the physical data center footprint.

DCCI ensures FAA compliance with:

- Executive Order 13327 "Federal Real Property Asset Management"
- Executive Order 13423 "Strengthening Federal Environment, Energy, and Transportation Management"
- Executive Order 13514 "Federal Leadership in Environmental, Energy, and Economic Performance"
- October 2009 OMB Passback Guidance on Data Center Consolidation
- June 2010 Presidential Memorandum "Disposing of Unneeded Federal Real Estate"
- June 2011 Presidential Executive Order "Delivering an Efficient, Effective, and Accountable Government"
- February 2010 OMB Memorandum initiating the Federal Data Center Consolidation Initiative (FDCCI)

DCCI will be procuring:

- Virtualization solutions – hardware, software and services.
  Virtualization is a software technology that reduces the requirement for many physical servers by creating virtual servers that function like a physical server. Many virtual servers exist in one physical server and share the physical server resources such as memory, storage and processing power. Reducing the number of physical servers that the agency requires for application hosting results in reduced capacity requirements for physical data center space. This supports a data center consolidation capability (Program Objective 2). Virtualization also directly supports Program Objectives 3 and 4.
- DCCI program office support to strategize, plan, design and manage consolidation efforts.
- Consolidation engineering support to:
  - Migrate hardware and software from existing baseline data center spaces to magnet data centers
  - Implement virtualization
- Servers, virtual hosts, and associated equipment as needed dependent upon Alternatives Analysis.

DCCI Consolidation Strategy:
FAA will consolidate data center spaces that support business services and mission support applications to magnet data centers. Currently the agency maintains 162 data center spaces, which comprise 57,390 square feet of space; of these spaces, 19 are at least 1,000 square feet, and the largest is 7,600 square feet. DCCI will result in consolidation within two magnet data centers, which will drastically reduce the total number of total data center spaces the agency currently maintains as well as the total square feet of physical data center space the agency maintains. The FAA will consolidate most or all data spaces within two magnet data centers and achieve 70 percent virtualization FY 2014 and FY 2017.

Currently, the program is in Concept and Requirements Definition with the FAA's Acquisition Management System. Alternatives focus on options for delivering magnet data centers to the FAA and migration strategies to consolidate within those magnet data centers.

Constraints include:

- Availability of magnet data centers that can meet agency requirements as defined during Investment Analysis.
- Sufficient funding for DCCI solution implementation.
- Success in assisting Line of Business/ Staff Offices in reprioritizing program funding in order to pay monthly data center service fees.
- Dependency on bandwidth upgrades through the FAA's Federal Telecommunications Infrastructure (FTI) program.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 2 – Reduce aviation risk through all phases of flight (gate-to-gate).*
- *FAA Performance Metric 2 – Ensure no cyber security event significantly degrades or disables a mission critical FAA system.*

Relationship to Performance Metric

DCCI increases the FAA's security posture by reducing the number of physical entry points that an intruder can use to gain access to servers, applications and data by:

1) Virtualization – reducing the baseline number of physical servers (currently 2,743) by 70 percent.
2) Reduction of data center spaces by at least 50 percent by consolidating servers and relocating them to magnet data centers.

Program Plans FY 2013 – Performance Output Goals

- Reduce data center spaces by 5 percent (from 162 to 154).

Program Plans FY 2014-2017 – Performance Output Goals

- None, future output goals are contingent upon the Final Investment Decision.

3A10, AEROSPACE MEDICAL EQUIPMENT NEEDS (AMEN)

FY 2013 Request $3.0M

- Aerospace Medical Equipment Needs (AMEN) – Tech Refresh Phase 1, M53.01-01
- X, Aerospace Medical Equipment Needs (AMEN) – Tech Refresh Phase 2, M53.01-02

Program Description

The Aerospace Medical Equipment Needs (AMEN) program will replace 121 items of the Civil Aerospace Medical Institute (CAMI), Aerospace Medical Research Division's (AAM-600) laboratory equipment. This 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 2016 period. The program was approved with a 5-year baseline (FY 2012 – FY 2016). AMEN Tech Refresh Phase 1, M53.01-01, replaces the 121 items while AMEN Tech Refresh Phase 2, M53.01-02, replaces 23 items (category D: Scientific and Engineering Research Systems) that are acquired under AMEN Phase 1 and have four year life cycles.

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) within the FAA's Aviation Safety Organization (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 – 7 year life cycle.
B. 24 Biochemical Sample Preparation and Physiological Monitoring Systems e.g., centrifuges, plates, tonometer, oxymeters, extraction tools, balances – 10 year life cycle.
C. 38 Storage, Cleaning, Machining, and Laboratory Safety Systems e.g., refrigerators, freezers, fume hoods, filing cabinets, locker, washer, dryer, drills – 20 year life cycle.
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 - 4 year life cycle. (These items will be replaced by AMEN Tech Refresh at the end of their life cycle)
E. 7 Mechanical and Engineering Monitoring Systems e.g., environmental monitoring (includes Altitude Chamber), anthropometric dummies, calibration systems, transducers – 15 year life cycle.

F. 2 Evacuation and Impact Testing Systems e.g., Impact Sled and Aircraft Cabin Environment Facility (ACEF) – 25 year life cycle.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
<u>AMEN Tech Refresh Phase 1:</u>
- Contract Awards - Purchase 40 of 121 Items by 7/1/13 (of type A: 12, B: 9, C: 10, D: 7, E: 2, and F: 0).
  - APB milestone: Award contract for Altitude Chamber Control System, July 2013.

Program Plans FY 2014 – Performance Output Goals
<u>AMEN Tech Refresh Phase 1:</u>
- Contract Awards - Purchase 58 of 121 Items by 7/1/14 (of type A: 4, B: 13, C: 24, D: 13, E: 4, and F: 0).
  - APB milestone: Award contract for Altitude Chamber Air Handling System, July 2014.
- All 23 items acquired in FY 2012 in service by 4/2/14 including disposition of old equipment:
  - APB milestone: Complete In-Service for Impact Sled System.
  - APB milestone: Complete In-Service for Aircraft Cabin Evacuation Research Facility, April 2014.

Program Plans FY 2015 – Performance Output Goals
<u>AMEN Tech Refresh Phase 1:</u>
- All 40 items acquired in FY 2013 in service by 2/3/15 including disposition of old equipment:
  - APB Milestone: Complete In-Service for Altitude Chamber Control System, February 2015.

Program Plans FY 2016 – Performance Output Goals (Funded by prior year
<u>AMEN Tech Refresh Phase 1:</u>
- All 58 items acquired in FY 2014 in service by 9/4/16 including disposition of old equipment:
  - APB milestone: In-Service Altitude Chamber Air Handling System, April 2016.

<u>AMEN Tech Refresh Phase 2:</u>
- Contract Award: All 23 items in Category D: Scientific and Engineering Research Systems

Program Plans FY 2017 – Performance Output Goals
AMEN Tech Refresh Phase 2:

- Complete In-Service for all items acquired in FY 2016 including disposition of old equipment.

3A11, AVIATION SAFETY INFORMATION ANALYSIS AND SHARING (ASIAS)
FY 2013 Request $15.0M

- Safety, Security, Environment – Aviation Safety Information Analysis and Sharing (ASIAS), G07A.02-01

Program Description

The ASIAS program is an information safety analysis and data sharing collaboration involving industry and government to proactively analyze broad and 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. ASIAS fuses these data sources in order to identify safety trends in the National Airspace System (NAS), leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. ASIAS has initiated the process of proactively analyzing, identifying and monitoring the data for 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 which will provide new insights about potential safety risks in both the current NAS and as the NAS evolves to NextGen. Analyses, using these advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. Safety information discovered through ASIAS analytic activities will be used across the FAA and industry to drive improvements and support Safety Management Systems (SMS). ASIAS supports both the safety risk management and safety assurance functions of SMS by providing the data, technology and actionable results to enable the FAA and ASIAS users to optimize SMS safety risk management performance.

The activities in the program include:

1. The research will develop ASIAS capabilities that build upon and extend existing capabilities for managing and processing aviation performance data,
2. The development of tools that convert both textural and numeric data into information, and
3. The creation of visualization capabilities that aid causal/contributing factor analyses and risk assessment.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

ASIAS is a vital component needed to achieve this goal. The initiative supports promotion and expansion of safety information efforts, particularly as a FAA-industry partnership and data-driven safety program to identify, prioritize and address risks and/or vulnerabilities before they lead to accidents. Data will be shared and aggregated among ASIAS users to more clearly see precursors to accidents. ASIAS will aggregate disparate aviation safety data sources in a central repository, increasing its potential value for analysis-based insight and providing insights that would not be available if data is not shared. Analyses, using advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. These advanced safety capabilities will support analysis of comprehensive data which will unlock new insight about potential safety risks in both the current NAS and as the NAS evolves to NextGen. Safety insights from ASIAS analysis will be communicated to the ASIAS users. Stakeholders will leverage insight to identify risk-reducing alternatives or changes to operations or processes. Implemented changes will prevent accidents.

Program Plans FY 2013 – Performance Output Goals
- Demonstrate the capability to query multiple databases with one search directive to retrieve information of interest to safety analysts in an efficient manner.
- Expand ASIAS data sources to include the integration of National Airspace System facility performance data and demonstrate the "fusion" or integration of Traffic Management or ATC Sector Complexity data for the purpose of providing context to safety events and risks.
- Expand ASIAS to include General Aviation (GA) digital flight data and demonstrate the use of GA data to identify, measure, and track GA-related safety risks.

Program Plans FY 2014 – Performance Output Goals
- Convert existing distributed nodes to the centralized ASIAS node to achieve operational cost efficiencies.
- Demonstrate the use of the ASIAS web portal as a collaboration tool among stakeholders, including access to selected aggregated fused data sets and expanded analytical capabilities by ASIAS participants for their internal analysis.
- Develop and implement, through limited application for select fleets, a new data standard for Flight Operational Quality Assurance (FOQA) data.

Program Plans FY 2015 – Performance Output Goals
- Demonstrate the use of ASIAS capabilities to measure safety risks that may evolve through the implementation of NextGen capabilities.
- Expand data fusion to include the integration of voluntarily submitted text safety reports from both FAA and ASIAS participants with digital flight data and FAA surveillance data.

Program Plans FY 2016 – Performance Output Goals
- Complete the evolution of the ASIAS architecture to one where all proprietary data are available on a secure centralized network where such data can be efficiently integrated with other non-proprietary data.
- Expand ASIAS analytical capabilities to include the storage, retrieval, and analysis of ATC voice archives; demonstrate the application of these capabilities through one of the ASIAS Directed Studies .
- Introduce a methodology for automated vulnerability assessment capability into ASIAS.

Program Plans FY 2017 – Performance Output Goals
- Through the ASIAS Portal, enable full 3-D visualization of selected safety events using aggregate fused data for ASIAS participants use in their internal analysis.
- Align Directed Studies and analytical techniques with NextGen system changes (e.g., ATM procedures, airspace redesign) and community changes (e.g., fleet changes, avionics).
- Expand ASIAS studies beyond those affecting commercial aviation in the NAS through assessment of issues that impact multiple segments of the aviation community (e.g. interaction of GA and commercial aviation) as well as targeted studies for specific communities such as rotorcraft or GA fixed wing.
- Develop automated capabilities to alert atypical flight and system behavior using fused digital and textual data.

3A12, NATIONAL TEST EQUIPMENT PROGRAM
FY 2013 Request $2.0M

- National Test Equipment Program, M17.01-01

Program Description

The National Test Equipment Program (NTEP) is responsible for the purchase, calibration, maintenance, and management of FAA test equipment at over 41,000 sites. NTEP ensures that the NAS equipment operates within technical and safety specifications. The test equipment is used by technicians to troubleshoot, repair, and certify new and legacy systems. Operational NAS systems must be certified by this test equipment before being returned to service.

Analysis conducted during the Service Analysis and CRD phases indicates that between 19%-25% of the 77,000 pieces of Test Equipment (TE) require replacement, with an estimated cost of approximately $320M. Some existing test equipment is more than 30 years old and spare parts for this old equipment are no longer manufactured, so it must be replaced. Replacement of the current analog test equipment must be forward compatible with the advanced digital technology being deployed through NextGen. Current requirements reflect critical need for Transmission (TS), Comm Service Monitors, Signal Generators, and Oscilloscopes. In addition, the NTEP will seek to improve the safety of certain procedures as technology enhancements reduce the need to perform certain functions, such as climbing high towers.

Within the Acquisition Management System process, the program is currently executing the Concept and Requirements Development phase with the Investment Analysis Readiness Decision (IARD) due by March 2012. Following a successful IARD, the Final Investment Decision (FID) is expected in March 2013. These milestones have been incorporated on the FAA's Enterprise Architecture (EA) Roadmap for Facilities. If approved at the FID, the program's spend plan has prioritized satisfying the TE shortfall at the FAA's Core 30 airports.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.
- FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.
- FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.

Relationship to Performance Metric

The NTEP will reduce aircraft delays related to equipment failures by reducing the mean-time between outages and provide a return on investment through greater efficiencies in maintaining the NAS. Representative systems that are impacted by the program include: Communication, Automation, Surveillance, Power, Navigational, and Weather.

Program Plans FY 2013 – Performance Output Goals
- Complete update of Spend Plan – to focus on immediate replacement of non-sustainable test equipment.
- Complete the following deliverables: Final Program Requirements Document, Implementation Strategy and Planning Document (including the acquisition strategy), and Analysis of Alternatives (Cost, Schedule, Performance, and Risk parameters).
- Achieve Final Investment Decision (FID) March 2013.

Program Plans FY2014 – Performance Output Goals
- Complete prioritization of TE need on a per-facility and TE-type basis.

Program Plans FY2015-2017- Performance Output Goals
- Future activities will be developed once the program is approved by FAA management.

3A13, MOBILE ASSET MANAGEMENT PROGRAM
FY 2013 Request $1.7M

- Mobile Asset Management Program, F31.01-01

Program Description

The Mobile Asset Management Program (MAMP) provides easily moveable NAS equipment to restore certain operations during periods of extended equipment outages, to ensure continuity of NAS operations. Mobile NAS equipment provides for the continuity or restoral of air traffic control when an air traffic control tower (ATCT) or other NAS system is out of service due to a disaster or extensive repair/modernization/upgrade and to augment air traffic control functions during major public events which may impact air traffic safety. The MAMP provides mobile assets that function as ATCTs, terminal radar approach control (TRACON) facilities, remote transmitter/receiver (RTR) sites, remote communications air/ground (RCAG) sites, and other systems that experience unexpected outages or planned system downtime for non-routine maintenance, modernization, or upgrade.

The FAA's mobile assets are in a serious state of disrepair and are often incapable of providing their intended service without first undergoing significant maintenance or repair. The inventory consists of 124 assets that range from 10 kW Mobile Engine Generators (MX) to four-position, mobile ATCTs (MATCTs). The near term need is to replace eight obsolete large four-position MATCTs and restore the remaining assets to a full operational capability. The eight large, 4 station MATCTs which were acquired in the 1990s and are experiencing serious material failures and must be replaced. Currently, there is no centralized management or logistics support oversight of these assets to keep them in a fully operational condition. As a result of these deficiencies, the FAA is experiencing significant difficulty in providing functional mobile assets when emergency conditions warrant their use. MAMP will provide the mobile assets and the means to manage those assets.

Efforts are underway to develop a set of requirements for all mobile assets. These requirements will be the basis for building an inventory of mobile assets that will enable the FAA to respond to planned and unplanned outages in the NAS.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation,*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 2 – Maintain operational availability of the National Airspace System (NAS) at 99.7 percent.*

Relationship to Performance Metric

The MAMP program supports NAS operational availability by providing backup service for radars, control towers, and communications systems. Hurricane Katrina and the Haiti earthquake revealed that the FAA is not well prepared to handle disasters. Also, each year there are 10-15 ATCT modernization efforts in progress which require mobile assets to maintain operations, but the assets are not always available necessitating the development of "work around" procedures resulting in extending the duration of the projects. Additionally, the majority of the ATCTs are over 50 years old resulting in an increasing number of unforeseen outages requiring mobile assets to maintain operations.

Program Plans FY 2013 – Performance Output Goals
- Develop mobile asset architecture
- Finalize requirements document for initial MATCT purchase.
- Develop on-line inventory of mobile assets.
- Conduct asset utilization study to determine inventory needs for FAA mobile assets.
- Repair and modernize six Silver Streak MATCTs to support NAS operations

Program Plans FY 2014 – Performance Output Goals
- Award national IDIQ Mobile Towers Contract.
- Repair and modernize six two-position MATCTs.
- Develop prototype modular MATCT
- Establish a National Deployment Center(s).

Program Plans FY 2015 – Performance Output Goals
- Complete test and evaluation activities on new MATCTs.
- Complete test and evaluation of modular MATCT
- Award contract for the acquisition of mobile 50kw generators to serve as hot assets.
- Complete the initial outfitting of the National Deployment Center.

Program Plans FY 2016-2017 – Performance Output Goals

- None, future year activities will depend on FAA management approved program.

3A14, AEROSPACE MEDICINE SAFETY INFORMATION SYSTEM (AMSIS)

FY 2013 Request $3.0M

- Aerospace Medicine Safety Information System, A35.01-01

Program Description

The Office of Aerospace Medicine (AAM) is responsible for:

- the Medical Certification of Airmen;
- Medical Clearance of Air Traffic Control Specialists (ATCSs);
- Oversight of the Aviation Industry's Drug and Alcohol Testing Programs; Designation,
- Training, Oversight and Surveillance of Aviation Medical Examiners;
- FAA Employee Substance Abuse Testing;
- Airmen Aviation Physiology and Survival Training and Education;
- FAA Employee Health Awareness; and
- Aerospace Medicine and Human Factors Research.

These programs are carried out by AAM at FAA Headquarters, the Civil Aerospace Medical Institute, in the nine Regional Aerospace Medicine Divisions and at the three Industry Drug Abatement Compliance and Enforcement Centers. AAM processes the medical certification applications of approximately 400,000 pilots each year and maintains millions of medical records as part of AAM's role in the oversight of three quarters of a million airmen and nearly 17,000 ATCSs.

The information systems currently in use today were developed in the 1990's. These information systems are becoming obsolete. The business processes that support the medical certification of airmen, and the other aviation safety programs, need to be re-engineered. The information technology must be refreshed and aligned with OMB/DOT/FAA information systems architecture and security standards. Additionally, because these are medical information systems AAM must also align these systems with the national health information technology standards and security requirements for medical information systems developed by the Federal government, private sector and voluntary standards organizations, including the International Organization for Standardization (ISO). The systems must also successfully and securely interface with approximately 3,500 health care providers designated by the FAA, known as Aviation Medical Examiners, who perform pilot and ATCS medical examinations. The systems must advance from their current client-server platform, some of which are accessible through the internet, to web-based applications.

Phase 1 will begin with an evaluation of current AAM core business processes to determine if the processes are producing desired products and services in the most efficient and effective way. Processes will be analyzed to determine if any improvements can be made and will be reviewed using a LEAN technique to determine if any steps can be eliminated or streamlined. Next, AAM information systems will need to be evaluated based on proposed changes to AAM core business processes.

In addition, Phase 1 will also include an evaluation of the architecture of AAM subsystems. A gap analysis will be conducted to determine the current architecture of AAM subsystems and compare it to agency standards for architecture. Assessments must also be conducted to develop a roadmap to align with national electronic healthcare records and other information systems architectures.

Phase 2 will begin a risk-based approach to an iterative development cycle. The highest priority core components of functionality will be delivered in shortened cycle times of 6 to 9 months. Initial operational capability will occur early in the life cycle. A transitional roadmap will be developed to retire legacy components (reducing legacy operational costs) and to integrate into the targeted Enterprise Architecture. An aggressive strategy of artifact reuse such as external standards, business process models, architectural structures and coded configuration items will be applied to manage risk associated with cost, schedule and technological issues.

For example, AAM has a business need to allow the cross referencing of pilot's medical information through multiple government databases which will identify persons who are not suitable for piloting. AMSIS will meet Congressional and DOT OIG mandates to establish a capability to match airmen medical records with the electronic health records of other government agencies and departments. We will leverage external efforts such as the National Health Information Network (NHIN), Health Information Exchange (HIE) system medical records and the National Information Exchange Model (NIEM) thus meeting our mandated goals of information exchange and reducing the costs and to achieve them.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

Over the past 5 years, approximately 5,000 pilots have been denied a medical certificate each year. AMSIS will provide better data accessibility and a greater ability to analyze medical information and denial data to identify safety trends that could impact system safety.

Specifically, AMSIS will reduce accidents and improve safety by:

- Reducing falsification of health records and preventing pilots or ATCSs from operating in the NAS when they have medical conditions hazardous to aviation safety;
- Improving the ability to analyze medical data and identify and mitigate hazards related to specific and/or systemic airmen and ATCS health issues;
- Improving the ability to match airmen and ATCS medical records with the electronic health records of other government agencies and departments;
- Ensuring the accuracy and integrity of airmen and ATCS medical data;
- Leveraging the National Health Information Network (NHIN), Health Information Exchange (HIE) system medical records, and Ad Hoc, Regional, Multi-Regional HIEs, to improve the accuracy of airmen and ATCS medical data and
- Improving the surveillance and oversight of designees and aviation industry substance abuse programs.

Program Plans FY 2013 – Performance Output Goals

- Complete requirements document and alternative analysis.
- Request Final Investment Decision.
- Complete development of implementation plan for Phase 1.

Program Plans FY 2014 – Performance Output Goals

- Award contract for Phase 1.
- Conduct AAM core business process evaluation.
- Conduct IT gap analysis based on BPR results.
- Conduct an Architectural review for support of technology requirements.

Program Plans FY 2015 – Performance Output Goals

- Complete development of implementation plan for Phase 2.
- Award contract for Phase 2.
- Initiate business process modeling of core AAM processes.
- Conduct a risk based approach to incremental solution prototyping.
- Complete prioritization of automation of core AAM IT capabilities for rapid deployment.
- Develop modular components of functionality for incremental deployment for initial operational capability.

Program Plans FY 2016 – Performance Output Goals

- Update implementation plan for Phase 2.
- Complete pilot of segments of core functionality internal to AAM.
- Complete a pilot of interagency information exchanges of airmen certification criteria.
- Complete a limited deployment of diverse web-enabled mobile interface options.

Program Plans FY 2017 – Performance Output Goals

- Update implementation plan for Phase 2.
- Revisit Enterprise Architecture and technology constraints.
- Identify optimal implementation strategy (TBD).
- Complete development of full operational capability.

B. TRAINING, EQUIPMENT AND FACILITIES

3B01, AERONAUTICAL CENTER INFRASTRUCTURE MODERNIZATION

FY 2013 Request $12.5M

- 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 at the Aeronautical Center in Oklahoma City to 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.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 2013 – Performance Output Goals
- Award contracts to remove obsolete building systems and install new systems, such as: boilers, chillers, air handlers, electrical, plumbing, and other building systems, and contracts to replace temporary buildings and perform site improvements, June 2013.
- Award contract for Phase 2 (of 3) to consolidate FAA telecommunication systems at the Aeronautical Center and Technical Center, May 2013.
- Award contracts for 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). Includes Security assessments, upgrades, disaster recovery testing and installation of East campus fiber for redundancy on network routers. Contract award(s) July, 2013.
- Complete Systems Training Building renovation construction (Phase 1 of 3), May 2013.
- Complete Phase 2 of 4 storm sewer renovation construction, August 2013.
- Complete installation of building system replacements from contracts awarded in prior year, June 2013.
- Complete tech refresh/migration of Call Center services (ATO, Flight Inspection, AirMen Certification/Aircraft Registration, NAS Logistics Call Centers) to new technology, September 2013.

Program Plans FY 2014 – Performance Output Goals
- Award design contract to relocate ARSR-1 and ARSR-3 radars to campus radar area, Nov 2013.
- Award construction contract to relocate ARSR-1 and ARSR-3, August 2014.
- Award Type A design contract for renovation of Multi-Purpose Building (Bldg 24), a 40 year old building in need of major system replacement, June 2014.
- Award contracts to remove obsolete building systems and install new systems; such as: boilers, chillers, air handlers, electrical, plumbing, and other building systems, and award contracts to replace temporary buildings, and perform site improvements, June 2014.
- Award contracts for 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). Includes security assessments, upgrades, disaster recovery testing on North campus fiber for redundancy on network routers, July 2014.
- Complete Phase 3 of 4 storm sewer renovation construction, August 2014.
- Complete installation of building system replacements from contracts awarded in prior year, June 2014.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and East campus duct banks/fiber installation, September 2014.

Program Plans FY 2015 – Performance Output Goals
- Award design contract for renovation of special purpose buildings 201, 172, and National Airway Systems Engineering (AJW) buildings, Nov 2014.
- Award construction contract for renovation special purpose buildings 201, 172, and National Airway Systems Engineering (AJW) buildings, August 2015.
- Award Type B renovation construction design contract for phased renovation of Multi-Purpose Building #24 to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting, insulation, and new windows, June 2015.
- Award contracts to remove obsolete building systems and install new systems; such as boilers, chillers, air handlers, electrical, plumbing, and other building systems, and award contracts to replace temporary buildings and to perform site improvements, June 2015.
- Award contracts for 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). Includes Security assessments, upgrades, disaster recovery testing, West campus fiber for redundancy on network routers and upgrades Mike Monroney Aeronautical Center (MMAC) network to support redundancy, reliability, security and availability, July 2015.
- Complete relocation construction of ARSR-1 and ARSR-3 radars, August 2015.
- Complete installation of building system replacements from contracts awarded in prior year, June 2015.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and North campus duct banks/fiber installation, September 2015.

Program Plans FY 2016 – Performance Output Goals
- Award contracts to remove obsolete building systems and install new systems; such as: boilers, chillers, air handlers, electrical, plumbing, and other building systems, and award contracts to replace temporary buildings and perform site improvements, June 2016.
- Award renovation construction contract for Phase 1 renovation of Multi-Purpose Building #24, to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting, insulation, and new windows, June 2016.
- Award contracts for 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). Includes security assessments, upgrades, disaster recovery testing and fiber/copper cable for Bldg 214 support to network, July 2016.
- Complete Systems Training building renovation construction, November 2015.
- Complete renovation construction of special purpose buildings 201, 172, and National Airway Systems Engineering (AJW) buildings, August 2016.
- Complete Phase 4 of 4 storm sewer renovation construction, August 2016.
- Complete installation of building system replacements from contracts awarded in prior year, June 2016.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and North campus duct banks/fiber installation, September 2016.

Program Plans FY 2017 – Performance Output Goals
- Award contracts to remove obsolete building systems and install new systems; such as: boilers, chillers, air handlers, electrical, plumbing, other building systems, and award contracts to replace temporary buildings and perform site improvements, June 2017.
- Award renovation construction contract for Phase 2 renovation of Multi-Purpose Building #24 to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting, insulation, and new windows, June 2017.
- Award contracts for Phase 1 (of 5) telecom network design, test, reconfigure network for redundancy, reliability, security in buildings 1, 14, 10, 6, 109, 113, 161, 187, 195 (10 of 61 buildings). Includes security assessments, firewall upgrades, disaster recovery testing and fiber/copper cable for Bldg 215 support to network, July 2017.
- Complete installation of building system replacements from contracts awarded in prior year, June 2017.
- Complete network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and Bldg 214 duct banks/fiber installation, September 2017.

3B02, DISTANCE LEARNING
FY 2013 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 1,100 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 2013 technology refresh will complete the current refresh cycle (FY 2009 - FY 2013). A new technology refresh cycle will begin in FY 2014 and will run through FY 2017.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*

- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

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 Aviation Training Network (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 $16.8M savings in travel and per diem each year. These efficiencies combine to produce a better prepared, better trained, and safer diverse workforce.

Program Plans FY 2013 – Performance Output Goals

- Award contract to provide for the technology refresh of 400 out of 2275 (100%; finish current refresh cycle FY09-FY13) CBI Platforms at ATO Tech Ops (ATO-TO) and Federal Contract Tower's (FCT's) CBI Learning Centers by Sept-2013.
- Provide updates to courseware and application via network and/or DVD's to CBI Platforms by Sept-2013.

Program Plans FY 2014 – Performance Output Goals

- Award Contract to provide for the technology refresh of 750 out of 2275 (32.9%) CBI Platforms at En Route Air Traffic Facilities (ARTCC, TRACONs) and FCT CBI Learning Centers by Sept-2014.
- Provide updates to courseware and application via network and/or DVD's to CBI Platforms by Sept-2014.

Program Plans FY 2015 – Performance Output Goals

- Award contract to provide for the technology refresh of 725 out of 2275 (64.8%) CBI Platforms at ATO-TO CBI Learning Centers by Sept-2015.
- Provide updates to courseware and application via network and/or DVD's to CBI Platforms by Sept-2015.

Program Plans FY 2016 – Performance Output Goals

- Award contract to provide for the technology refresh of 400 out of 2275 (82.4%) CBI Platforms at ATO-TO and FCT learning centers by Sept-2016.
- Provide updates to courseware and application via network and/or DVD's to CBI Platforms by Sept-2016.

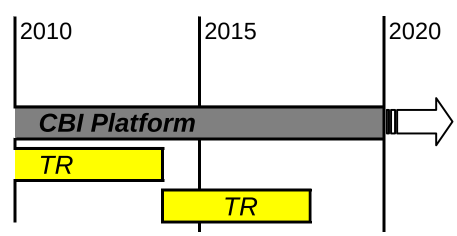
Program Plans FY 2017 – Performance Output Goals

- Award contract to provide for technology refresh of 400 out of 2275 (100%; end of refresh cycle FY14-FY17) CBI Platforms at ATO-TO FCT learning centers by Sept-2017.
- Provide updates to courseware and applications via network and/or DVD's to CBI Platforms by Sept-2017.

System Implementation Schedule

Computer-Based Instruction (CBI) Platform

Technology Refresh Phased Implementation: 2009 -- 2013
Technology Refresh Phased Implementation: 2014 -- 2017



ACTIVITY 4. FACILITIES AND EQUIPMENT MISSION SUPPORT

A. SYSTEM SUPPORT AND SUPPORT SERVICES

4A01, SYSTEM ENGINEERING AND DEVELOPMENT SUPPORT
FY 2013 Request $35.0M

- A, CIP Systems Engineering and Development Support – SE2020, M03.03-01
- B, Provide ANF/ATC Support (Quick Response), M08.01-00

A, CIP 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. It provides access to research, technical, engineering and programmatic resources that support the FAA's transformational programs and further improves the NAS. The portfolio of contracts was awarded in two major categories: Screening Information Request 1 (SIR 1), Research and Mission Analysis and Screening Information Request 2 (SIR 2), Systems Engineering.

SIR 1 Research and Mission Analysis supports the full range of NextGen Research & Mission Analysis support services in one or more functional task areas related to NextGen and activities necessary to reach the Investment Analysis Readiness Decision (IARD) phase in the Acquisition Management System (AMS) Lifecycle. SIR 1 Research and Mission Analysis includes the following service support activities:

- Concept and Requirements Definition Planning
- Early Life Cycle Concepts and Prototyping
- Early Life Cycle Human Factors Research
- Early Life Cycle Concepts of Operations Research
- Early Life Cycle Human Performance Analysis
- Proof of Concept Research
- Pre-Operational Concept Demonstration Trials
- Cost Benefit Analysis
- Operational Demonstration Trials
- Concept Integration
- Rapid Prototyping/Fast-Time Modeling
- Real-Time Simulations
- Real-Time Human In-the-Loop Simulations
- Full-Scale Concept Demonstrations
- Cognitive Task Analysis Methods
- Conceptual Operations Verification and Validation

SIR 2 Systems Engineering supports systems engineering activities that occur throughout the AMS Lifecycle for both NextGen and non-NextGen service activities. Note that SIR 2 Systems Engineering 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 Systems Engineering activities are expected to occur after the AMS Lifecycle Acquisition Management phase, "Concept and Requirements Definition" (CRD). In addition, SIR 2 Systems Engineering supports pre-IARD activities related to the technical refresh of current NAS systems before the "Solution Implementation" phase of the AMS lifecycle. SIR 2 Systems Engineering supports the following activities:

- Concept and Requirements Definition
- Final Investment Analysis
- Final Requirements Documents, Enterprise Architectural Products
- Safety and Regulatory
- Business Continuity Planning
- Portfolio Analyses
- Maintenance, Operation and Enhancements of Financial Systems
- Acquisition Support
- Schedules
- Human Factors
- Concepts of Operations
- Human Performance Analysis
- Proof of Concept Validation
- Pre-Operational Trials and Operational Trials
- System Integration
- Rapid Prototyping/Fast-Time Modeling
- Pre-Development Real-Time Simulations
- Real-Time Human In-the-Loop Simulations
- Full-Scale Prototype Demonstrations
- Verification and Validation
- Cognitive Task Analysis Methods
- Cost Benefit Analysis

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The SE2020 program contributes to the performance metric for cost efficiency 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 efficiently and 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 unforeseen issues that arise during the budget year. These issues may be related to immediate needs for corrective action in information technology such as installing a communications link for a new facility or service and accommodating new requirements that require, adjusting financial management systems to create new cost accounting reports. It also covers responding to emergency unforeseen regional problems such as relocating an antenna for a remote communication facility. These projects are unexpected and must be done to maintain efficient services and operations.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

This project supports cost efficiency initiatives by providing the ability to respond quickly to unforeseen needs, issues or situations that, if left unresolved, could result in higher operating or future replacement costs.

4A02, PROGRAM SUPPORT LEASES
FY 2013 Request $40.9M

- Program Support Leases, M08.06-00

Program Description

Since the majority of its facilities reside either on leased land or in leased building space, FAA requires real property rights for more than 3,100 rentable real estate leases to operate the NAS. Leases for building space include those for planned, constructed and newly finished Air Traffic Control Towers that were constructed by airport authorities and are leased back to FAA with rent reflecting the recovery of the construction costs. The FAA must also obtain clear zones to prevent interference with electronic signals at certain facilities, such as very high frequency omni-directional 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, inflationary pressures, and the renegotiation of expired leases nearly always resulting in higher rents.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

In support of the Agency Strategic Goal 3, Delivering Aviation Access through Innovation, this program is improving management of the FAA's real property assets; thus, contributing to the cost effectiveness of air navigation infrastructure and associate systems. 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 2013 Request $11.5M

- 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The LSSC program directly supports the FAA Strategic Plan Goal of Delivering Aviation Access through Innovation and Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. The program will support FAA objectives by improving 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 80% 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. .
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 2013 Request $17.5M

- Aeronautical Center Lease, F19.00-00

Program Description

The Aeronautical Center is the FAA's centralized location that supports FAA National Airspace Systems (NAS) Air Operations/flight checks, engineering, system testing, training (Radar/Navaids), NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research, and Business Services in Oklahoma City.

The Center provides facilities that support the work of 7,100 employees, students, and contractors on a daily basis; and 10,000 to 11,000 visitors annually; the largest concentration of FAA personnel outside of Washington D.C.

The Aeronautical Center lease provides annual rent for leased land/building rent and insurance that comprise approximately 80 percent of Aeronautical Center space: 2.8M sq ft of leased space and 1,100 acres of land, having a replacement value of $710M.

The lease is comprised of:

- Master Lease land/building rent, sustainment and insurance
- Airmen and Aircraft Registry Lease land/building rent, sustainment and insurance
- Thomas Road warehouse lease
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators
- Grounds Maintenance Building

The Aeronautical 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. It 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 assures continuity of the Aeronautical Center facility and that it remains viable for current and future generations of FAA employees by providing for annual lease costs specified in the lease agreement. The lease will expire in 2028.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of target savings.*

Relationship to Performance Metric

The Mike Monroney Aeronautical Center Lease sustains a cost effective workplace for Air Operations, Engineering, and Training.. Eighty percent (80%) of Aeronautical Center space is used for direct support of the ATO by Engineering Organizations, Aviation System Standards (AVN) operations and flight check, the Logistics Center, Air Traffic Control training, ATO Technical Operations Training and Certification, and system testing of radar and navaids. An additional 13% of Aeronautical Center space provides business service facilities for DOT/DELPHI/Prism/Castle Data Center Operations, consolidated Accounting Operations services, Acquisition, ATO Data Center Operations, and Aviation Safety (AVS/Civil Aeromedical Institute (CAMI)). The current lease is very cost efficient ($19.22 per sq ft compared to the $25.22 GSA rate for Oklahoma City). Leasing is more cost effective than investing in the $710M replacement cost of the leased facilities. No FAA personnel work stoppages have occurred due to unsafe or unusable facilities. The average age of leased buildings is 46 years.

4A05, TRANSITION ENGINEERING SUPPORT

FY 2013 Request $14.0M

- A, NAS Integration Support Contract (NISC), M22.00-00
- B, Configuration Management Automation (CMA), M03.01-02

A, NAS INTEGRATION 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 program will provide more than 1000 Full Time Equivalent (FTE) technical support.

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 associated 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 Delivering Aviation Access through Innovation 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, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

The FAA's transition engineering support contract provides experienced personnel at a current average cost of $65 per hour. This cost effective rate supports the ATO service centers and headquarters offices with the planning and coordination of NAS programs. It also provides support to key FAA program management functions. This support assists the FAA in the financial management of a variety of F&E NAS modernization programs and projects.

B, CONFIGURATION MANAGEMENT AUTOMATION (CMA), M03.01-02

Program Description

The Configuration Management Automation (CMA) systems will be designed to support NAS and Non-NAS Information Technology (IT) data and assets, as mandated by FAA Order 1800.66, Change 2 "Configuration Management Policy." CM is a disciplined approach for establishing processes; identifying and documenting the functional and physical characteristics of a system configuration item; controlling changes to the characteristics of that configuration item; and recording and reporting current and historical information on that item.

CMA is a vital component of the FAA's lifecycle management effort to proficiently manage the complexity of today's physical and virtualized IT environments. Properly managed CM is also critical to the ongoing effective success of the Agency's transition to the Next Generation Air Transportation System (NextGen).

In order to meet future demands on CM, the Agency needs a comprehensive system that provides the appropriate structure and toolsets to allow the FAA to fundamentally change and move from a CM process that relies heavily on CM practitioners' institutional knowledge to a scalable, network-centric architecture that ensures effective CM of NAS and Non-NAS IT assets by providing the infrastructure necessary to leverage process–to-process integration, minimize redundancy and cluster processes around a single integration point. Also the lack of a closed-loop CM system and the fact that information is not integrated into a single system requires multiple manual processes. This leads to duplication of effort, time-consuming activities, and may lead to inaccurate results.

An efficient CM program is critical to the cost effective management of FAA systems and programs throughout their lifecycle. CMA will provide FAA the ability to lower CM costs, reduce CM-related errors and delays and provide real-time CM information to support reporting and enterprise-level decision making.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 Target: 90 percent of targeted savings.*

Relationship to Performance Metric

CMA maps to the Agency goal of Delivering Aviation Access through Innovation by: a) reducing risk associated with the implementation of new systems and technology in the NAS and Non-NAS; b) reducing NAS and Non-NAS equipment acquisition and maintenance costs through a coordinated systems approach; c) providing seamless enterprise-wide access to a repository of validated, real-time CM data; d) standardizing CM processes and more effective management of NAS and Non-NAS change process; and e) integrating CM requirements across the Agency.

Program Plans FY 2013 – Performance Output Goals

- Complete system requirements and architectural framework documents.
- Request Initial Investment Decision (IID).

Program Plans FY 2014 – Performance Output Goals

- Award CMA Contract for Solution Implementation.
- Begin Development of Phase 1.

Program Plans FY 2015 – Performance Output Goals
- Implement CMA Phase 1 Solution.
- Decommission WebCM and RepCON (Legacy Systems).

Program Plans FY 2015-2017 – Performance Output Goals
- Future activities will be developed once the program is approved by FAA management.

4A06, TECHNICAL SUPPORT SERVICES CONTRACT (TSSC)
FY 2013 Request $23.0M

- 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. TSSC will provide approximately 512 Full Time Equivalent (FTE) level of support and $74M in non labor costs such as site preparation construction. The total number of FTEs provided depends upon the amount of funding available from other programs (CIPs) that use TSSC support (since those programs must pay for the contractor effort).

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 3 – Air navigation infrastructure and associate systems are flexible, reliable, cost effective and secure.*
- *FAA Performance Metric 3 – Organizations throughout the agency will continue to implement cost efficiency initiatives. FY 2013 target: 90 percent of targeted savings.*

Relationship to Performance Metric

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) satisfaction ratings earned by the contractor during the bi-annual award fee process. The contractor has consistently been rated higher than 90 percent. Award fee ratings are based on metrics and feedback from customers for cost, schedule, management and technical performance by TSSC.

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. The TSSC Program Office collaborates with the NAS Integration Support Contract (NISC) Program Office to share development of a common contract tracking program and program office support contracts to reduce management costs.

Another cost savings by the TSSC Program is to move its regional management counterparts into vacant, unused FAA space when available, 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 2013 Request $4.0M

- Resource Tracking Program (RTP), M08.14-00

Program Description

The RTP/Corporate Work Plan (CWP) is a computer management system (including hardware, software, development, training, and support) used by the FAA Service Units, 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 CWP 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.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 –Delivering Aviation Access through Innovation.*
- *FAA Outcome 4 – NextGen capabilities are fully implemented and utilized in how US aviation community system needs are met.*
- *FAA Performance Metric 1 – Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.*

Relationship to Performance Metric

The RTP/CWP contributes to FAA performance metric to maintain 90% of major system investments within 10% variance 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 2013 Request $70.0M

- CIP Systems Engineering & Technical Assistance – MITRE, M03.02-00

Program Description

The CAASD is an FAA-sponsored Federally Funded Research and Development Center (FFRDC) operated under a 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 goals and outcomes of FAA's Destination 2025, NextGen Implementation Plan, National Aviation Research Plan (NARP), NAS Enterprise Architecture and other Agency long range plans. CAASD provides a high level of technical expertise to support the Federal workforce.

The CAASD Product Based Work Plan (PBWP) is aligned with Agency goals, outcomes and activities with particular emphasis on Destination 2025 Goal 3, "Delivering Aviation Access through Innovation" and is consistent with CAASD's Long Range Plan (FY 2012-2016). 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 activities.

Benefits of CAASD work are detailed in the CAASD Long Range Plan for each program Outcome. Individual 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 ensure an integrated evolution and align agencies' enterprise architectures. Analyze NAS-wide strategic issues and ensure their alignment with the evolving NextGen architecture. Conduct research to gain better understanding of late mid-term NextGen operational concept elements and how to transition to them.

Communications Modernization. Conduct engineering analysis, communications network definition, and transition strategy studies for the FAA's Voice Communications and System-Wide Information Management (SWIM) programs; conduct spectrum analysis focusing on strategic issues related to the availability of adequate spectrum resources to support aeronautical communications for NextGen operational concepts. Contribute to the development of integrated communications portfolios that support late mid-term NAS-wide communications services. Develop strategies and plans for the evolution of the SWIM architecture to support NextGen net-centric services in consideration of NextGen Implementation Plan Segment Alpha (2010-2015) and Bravo (2016-2018).

Performance-Based NAS. Conduct analyses that enable FAA to meet the Performance-Based Navigation (PBN) goals, milestones, and benefits identified in Destination 2025, Aviation Safety Work Plan for NextGen, and the NextGen Implementation Plan. Perform technical and operational analysis, research, and concept exploration that advance FAA's PBN implementation for Integrated Airspace and Procedures and Metroplex applications. Contribute to 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 and Oceanic Evolution. Perform system engineering analyses for new technologies, capabilities and procedures for the En Route and Oceanic system architectures 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. Perform Analyses of NextGen capabilities for the late mid-term and far-term timeframes that are expected to change the role and responsibilities of the controller to enable them to handle increased traffic levels defined under the NextGen Concept of Operations (CONOPS). Define requirements and assess benefits of key NextGen operational capabilities for the far-end that may be candidates for application to En Route design and implementation.

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. Conduct technical analyses of automation capabilities targeted for NextGen Segment Bravo to identify integration issues that will need to be addresses by the Terminal domain. Conduct analyses of Segment Bravo Terminal concepts and capabilities to assess the technology transfer potential of applying Intelligent Training Systems to NextGen training requirements and capabilities.

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. Provide analyses to evaluate the operational issues associated with Unmanned Aircraft Systems (UAS) including safety, efficiencies, and integration of airspace security capabilities.

NAS System Operations. Assess system operations 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. Analyze commercial space flight and Unmanned Aircraft Systems identified issues and their potential operational impacts on NAS performance.

Traffic Flow Management (TFM) Operational Evolution. Conduct activities supporting the technology transfer of TFM mid-term concepts and capabilities to NextGen. Provide detailed assessments of concept maturity, operational feasibility and implementation risks, including identification of cross-domain dependencies. Model and prototype the flight day analysis environment and flow contingency management processes to develop and refine flow strategy tool requirements.

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. Extend technical analyses and system engineering efforts to the development of standards and policy for integration of UAS operations into the NAS.

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 (ISS) 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. Update the NAS ISS Enterprise Architecture and develop recommendations for a Far-term NAS Enterprise ISS Architecture strategy, controls and security practices.

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. Develop and sustain the Aviation Integrated Demonstration & Experimentation for Aeronautics (IDEA) laboratory infrastructure for expanded cross-domain scenario generation tools to support real-time Human-in-the-Loop as well as enable fast-time capabilities.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 3 – Delivering Aviation Access through Innovation.*
- *FAA Outcome 1 – System capacity and user demands are matched to ensure reliable, predictable and cost effective air navigation and airport services.*
- *FAA Performance Metric 5 – Achieve a NAS on-time arrival rate of 88.0 percent at Core airports and maintain through FY 2013.*

Relationship to Performance Metric

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 Destination 2025 and the NextGen Implementation Plan. 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 2013 Total Request $2.0M

- Collaborative Air Traffic Management – Flight & State Data Mgmt – 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 near real-time processing of data to improve access to and quality of airport and special activity airspace information supporting better decision-making by NAS operators. 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. It improves on present information systems because it is an 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 communication of Special Activity Airspace (SAA) relevant information among stakeholders. Digital management of SAAs will also facilitate calculation of airspace usage and availability metrics in support of efficiency of air traffic management, 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 – June 2011 (Completed);
- Work Breakdown Structure (WBS) and WBS Dictionary – August 2011 (Completed);
- Acquisition Strategy and Stakeholder Management Plan – October 2011 (Deferred pending AIM Modernization Segment 1 decisions);
- Risk-Adjusted Cost Model – February 2012;
- Business Case Analysis Report (BCAR), Implementation Strategy and Planning Document (ISPD), Final Requirements Document (FRD) – May 2012;
- Release of SIR for software development contract supporting AIM Modernization Segment 2 – May 2012; and
- FID – December 2012.

Relationship of Program to FAA Strategic Goal, Outcome, and Performance Metric

- *FAA Strategic Goal 1 – Next Level of Safety.*
- *FAA Outcome 1 – No accident-related fatalities occur on commercial service aircraft in the US.*
- *FAA Performance Metric 1 – Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9 year period (2010-2018). No more than 6.2 in FY 2018.*

Relationship to Performance Metric

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 2013 – Performance Output Goals

- Complete software release of Aeronautical Information (AI) Data Store Enhancements for SAA management and airport data.
- Complete software release of Aeronautical Information Exchange Model (AIXM) Enhancements for SAA management and airport data.

Program Plans FY 2014 – Performance Output Goals

- Conduct trials at key sites distributing Web Services for SAA management and airport data.
- Complete release of SAA editing software to select group of users for test and evaluation.
- Develop business process/workflow for SAA management and airport data.

Program Plans FY 2015 – Performance Output Goals

- Develop performance metrics for SAA management.
- Complete software release of Enterprise-Level Services for distributing airport data including airport airspace data.
- Complete hardware and software integration, assembly, test, and checkout.
- Achieve Initial Operational Capability for AIM Modernization Segment 2.

Program Plans FY 2016 – Performance Output Goals

- Achieve Final Operating Capability for AIM Modernization Segment 2.

Program Plans FY 2017 – Performance Output Goals

- None.

Federal Aviation Administration

National Airspace System

Capital Investment Plan

Appendix C

Fiscal Years 2013 – 2017

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Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2013 Budget Total	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.
	Activity 1: Engineering, Development, Test, and Evaluation	**$522.8**	**$489.1**	**$557.8**	**$607.0**	**$856.9**
1A01	Advanced Technology Development and Prototyping (ATDP)	$33.1	$26.7	$32.2	$29.4	$33.3
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$11.5	$12.0	$12.0	$12.0	$12.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$8.0	$6.0	$8.1	$9.2	$10.3
1A05	Data Communication in support of Next Generation Air Transportation System (NextGen)	$142.6	$120.1	$161.1	$134.8	$315.8
1A06	Next Generation Air Transportation System (NextGen) - Demonstrations and Infrastructure Development	$24.6	$24.6	$24.6	$24.6	$27.0
1A07	Next Generation Air Transportation System (NextGen) - System Development	$61.0	$61.5	$65.5	$65.5	$74.0
1A08	Next Generation Air Transportation System (NextGen) - Trajectory Based Operations (TBO)	$16.5	$18.0	$18.0	$33.0	$46.0
1A09	Next Generation Air Transportation System (NextGen) - Reduce Weather Impact	$16.6	$22.0	$22.0	$22.0	$36.0
1A10	Next Generation Air Transportation System (NextGen) - Arrivals/Departures at High Density Airports	$11.0	$8.0	$28.4	$42.4	$37.0
1A11	Next Generation Air Transportation System (NextGen) - Collaborative Air Traffic Management (CATM)	$24.2	$34.0	$36.0	$32.0	$34.0
1A12	Next Generation Air Transportation System (NextGen) - Flexible Terminal Environment	$30.5	$30.5	$25.5	$15.5	$30.5
1A13	Next Generation Air Transportation System (NextGen) - System Networked Facilities	$11.0	$11.0	$11.0	$11.0	$11.0
1A14	Next Generation Air Transportation System (NextGen) - Future Facilities	$95.0	$92.5	$95.7	$157.9	$172.3
1A15	Next Generation Air Transportation System (NextGen) - Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$36.2	$21.2	$16.7	$16.7	$16.7
	Activity 2: Air Traffic Control Facilities and Equipment	**$1,467.8**	**$1,545.0**	**$1,514.5**	**$1,513.7**	**$1,346.4**
	A. En Route Programs	**$668.7**	**$587.1**	**$567.5**	**$540.7**	**$585.0**
2A01	En Route Automation Modernization (ERAM)	$144.0	$25.6	$0.0	$0.0	$0.0
2A02	En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements	$10.0	$70.0	$204.0	$165.0	$220.0
2A03	En Route Communications Gateway (ECG)	$3.1	$4.8	$4.9	$5.1	$0.0
2A04	Next Generation Weather Radar (NEXRAD)	$3.3	$1.2	$1.3	$1.2	$1.3
2A05	ARTCC Building Improvements/Plant Improvements	$46.0	$52.4	$52.4	$62.4	$62.4
2A06	Air Traffic Management (ATM)	$21.7	$8.1	$1.9	$0.0	$0.0
2A07	Air/Ground Communications Infrastructure	$4.0	$3.0	$3.2	$3.2	$3.2
2A08	Air Traffic Control En Route Radar Facilities Improvements	$5.9	$5.9	$6.0	$0.0	$0.0
2A09	Voice Switching Control System (VSCS)	$15.0	$20.0	$20.0	$15.0	$0.0
2A10	Oceanic Automation System	$4.0	$4.8	$2.0	$0.0	$0.0
2A11	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$33.7	$22.0	$40.0	$40.0	$50.0

Estimated Funding
Organized by Budget Line Item
(Dollars in Millions)

BLI Number		Capital Budget Program	FY 2013 Budget Total	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.
2A12		System-Wide Information Management (SWIM)	$57.2	$53.0	$69.3	$71.7	$59.2
2A13		Automatic Dependant Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$271.6	$272.3	$157.3	$156.5	$160.6
2A14		Weather and Radar Processor (WARP)	$0.5	$0.7	$0.0	$0.0	$0.0
2A15		Collaborative Air Traffic Management Technologies (CATMT)	$34.4	$29.4	$3.3	$15.6	$25.0
2A16		Colorado ADS-B Wide Area Multilateration (WAM) Cost Share	$1.4	$3.4	$1.4	$1.4	$1.5
2A17		Tactical Flow Time Based Flow Management (TBFM)	$12.9	$10.5	$0.5	$3.6	$1.8
		B. Terminal Programs	**$432.6**	**$532.5**	**$552.9**	**$609.5**	**$468.8**
2B01		Airport Surface Detection Equipment - Model X (ASDE-X)	$7.4	$11.1	$13.4	$10.5	$0.0
2B02		Terminal Doppler Weather Radar (TDWR) - Provide	$2.5	$2.6	$0.0	$0.0	$0.0
2B03		Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$34.5	$42.5	$56.7	$82.3	$55.0
2B04		Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$153.0	$136.2	$143.6	$144.8	$25.7
2B05		Terminal Automation Program	$2.5	$2.6	$2.6	$2.7	$2.7
2B06		Terminal Air Traffic Control Facilities - Replace	$64.9	$108.0	$109.0	$110.0	$110.0
2B07		ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$25.2	$52.7	$52.7	$52.7	$52.7
2B08		Terminal Voice Switch Replacement (TVSR)	$4.0	$5.0	$0.0	$0.0	$0.0
2B09		NAS Facilities OSHA and Environmental Standards Compliance	$26.0	$26.0	$26.0	$26.0	$26.0
2B10		Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$6.4	$13.3	$14.5	$13.4	$20.0
2B11		Terminal Digital Radar (ASR-11) Technology Refresh	$8.2	$9.4	$6.3	$4.4	$4.4
2B12		Runway Status Lights (RWSL)	$35.3	$32.6	$26.2	$23.0	$0.0
2B13		National Airspace System Voice System (NVS)	$10.3	$30.0	$30.0	$30.0	$30.0
2B14		Integrated Display System (IDS)	$4.2	$8.2	$6.9	$2.3	$1.3
2B15		Remote Monitoring and Logging System (RMLS) Technology Refresh	$4.7	$1.0	$2.2	$1.1	$1.9
2B16		Mode S Service Life Extension Program (SLEP)	$4.0	$9.9	$11.0	$17.1	$20.0
2B17		Surveillance Interface Modernization (SIM)	$2.0	$0.0	$0.0	$0.0	$0.0
2B18		Terminal Flight Data Manager (TFDM)	$37.6	$40.0	$42.0	$83.3	$117.1
2B19X		Integrated Terminal Weather System (ITWS)*	$0.0	$1.3	$9.7	$5.9	$2.0
		C. Flight Service Programs	**$15.3**	**$29.1**	**$33.1**	**$39.1**	**$10.2**
2C01		Future Flight Services Program (FFSP) - formerly referred to as Flight Service Automation Modernization (FSAM)	$8.0	$25.0	$30.0	$37.0	$8.0
2C02		Alaska Flight Service Facility Modernization (AFSFM)	$2.9	$2.9	$2.9	$2.0	$2.0
2C03		Weather Camera Program	$4.4	$1.2	$0.2	$0.1	$0.2

(Dollars in Millions)

BLI Number	Capital Budget Program	FY 2013 Budget Total	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.
	D. Landing and Navigation Aids Programs	**$210.1**	**$219.7**	**$187.4**	**$153.2**	**$124.4**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$2.5	$2.5	$2.5	$2.5	$2.5
2D02	Instrument Landing Systems (ILS) - Establish	$7.0	$7.0	$7.0	$7.0	$7.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$96.0	$115.7	$121.4	$105.7	$97.9
2D04	Runway Visual Range (RVR)	$4.0	$4.0	$4.0	$4.0	$4.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$3.0	$3.0	$3.0	$3.0
2D06	Distance Measuring Equipment (DME)	$5.0	$0.0	$0.0	$0.0	$0.0
2D07	Visual Navaids - Establish/Expand	$3.5	$0.0	$0.0	$0.0	$0.0
2D08	Instrument Flight Procedures Automation (IFPA)	$7.1	$4.5	$2.4	$3.0	$2.0
2D09	Navigation and Landing Aids - Service Life Extension Program (SLEP)	$8.0	$3.0	$3.0	$3.0	$3.0
2D10	VASI Replacement - Replace with Precision Approach Path Indicator	$4.0	$5.0	$5.0	$5.0	$5.0
2D11	Global Positioning System (GPS) Civil Requirements	$40.0	$40.0	$9.1	$0.0	$0.0
2D12	Runway Safety Areas - Navigation Mitigation	$30.0	$35.0	$30.0	$20.0	$0.0
	E. Other ATC Facilities Programs	**$141.1**	**$176.7**	**$173.6**	**$171.1**	**$157.9**
2E01	Fuel Storage Tank Replacement and Monitoring	$6.6	$6.7	$6.8	$6.8	$6.0
2E02	Unstaffed Infrastructure Sustainment	$18.0	$32.6	$32.9	$33.3	$34.4
2E03	Aircraft Related Equipment Program	$10.1	$10.4	$9.0	$11.4	$9.0
2E04	Airport Cable Loop Systems - Sustained Support	$5.0	$5.0	$5.0	$5.0	$5.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$6.8	$11.0	$11.4	$11.1	$0.0
2E06	Facilities Decommissioning	$5.0	$5.0	$5.0	$0.0	$0.0
2E07	Electrical Power Systems - Sustain/Support	$85.0	$100.0	$100.0	$100.0	$100.0
2E08	Aircraft Fleet Modernization	$2.1	$0.0	$0.0	$0.0	$0.0
2E09	FAA Employee Housing and Life Safety Shelter System Services	$2.5	$2.5	$0.0	$0.0	$0.0
2E10X	Independent Operational Test/Evaluation*	$0.0	$3.5	$3.5	$3.5	$3.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$161.5**	**$145.7**	**$130.0**	**$133.8**	**$118.3**
	A. Support Equipment	**$147.5**	**$132.3**	**$115.9**	**$118.7**	**$103.3**
3A01	Hazardous Materials Management	$20.0	$20.0	$20.0	$20.0	$20.0
3A02	Aviation Safety Analysis System (ASAS)	$15.8	$12.7	$11.9	$20.2	$11.3
3A03	Logistics Support Systems and Facilities (LSSF)	$10.0	$10.0	$0.2	$0.0	$1.1
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$14.2	$15.0	$15.1	$15.0	$15.1
3A06	Information Security	$14.0	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$23.0	$11.5	$10.5	$9.5	$9.5
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$12.8	$12.2	$10.2	$7.5	$4.2

(Dollars in Millions)

BLI Number		Capital Budget Program	FY 2013 Budget Total	FY 2014 Est.	FY 2015 Est.	FY 2016 Est.	FY 2017 Est.
3A09		Data Center Optimization	$1.0	$0.0	$0.0	$0.0	$0.0
3A10		Aerospace Medical Equipment Needs (AMEN)	$3.0	$5.0	$0.0	$2.5	$0.0
3A11		Aviation Safety Information Analysis and Sharing (ASIAS)	$15.0	$15.0	$15.0	$15.0	$15.0
3A12		National Test Equipment Program	$2.0	$2.0	$2.0	$2.0	$0.0
3A13		Mobile Assets Management Program	$1.7	$3.0	$4.0	$0.0	$0.0
3A14		Aerospace Medicine Safety Information System (AMSIS)	$3.0	$1.9	$3.0	$3.0	$3.1
		B. Training, Equipment, and Facilities	**$14.0**	**$13.3**	**$14.1**	**$15.1**	**$15.0**
3B01		Aeronautical Center Infrastructure Modernization	$12.5	$12.3	$13.1	$14.1	$14.0
3B02		Distance Learning	$1.5	$1.0	$1.0	$1.0	$1.0
		Activity 4: Facilities and Equipment Mission Support	**$217.9**	**$234.3**	**$256.8**	**$251.5**	**$238.5**
4A01		System Engineering and Development Support	$35.0	$35.6	$36.2	$35.0	$35.0
4A02		Program Support Leases	$40.9	$42.1	$55.2	$56.7	$58.2
4A03		Logistics Support Services (LSS)	$11.5	$11.5	$11.5	$11.0	$11.0
4A04		Mike Monroney Aeronautical Center Leases	$17.5	$17.9	$18.4	$18.8	$19.3
4A05		Transition Engineering Support	$14.0	$16.5	$16.5	$15.0	$15.0
4A06		Technical Support Services Contract (TSSC)	$23.0	$25.0	$25.0	$25.0	$25.0
4A07		Resource Tracking Program (RTP)	$4.0	$4.0	$4.0	$0.0	$0.0
4A08		Center for Advanced Aviation System Development (CAASD)	$70.0	$75.0	$75.0	$75.0	$75.0
4A09		Aeronautical Information Management Program	$2.0	$6.7	$15.0	$15.0	$0.0
		Activity 5: Personnel Compensation, Benefits, and Travel	**$480.0**	**$489.0**	**$498.0**	**$507.0**	**$519.0**
5A01		Personnel and Related Expenses	$480.0	$489.0	$498.0	$507.0	$519.0
		* BLI numbers with X represent outyear programs not requested in the FY 2013 President's Budget.					
		Out-year funding amounts are estimates.					
		Total Year Funding	**$2,850.0**	**$2,903.0**	**$2,957.0**	**$3,013.0**	**$3,079.0**
		Targets	**$2,850.0**	**$2,903.0**	**$2,957.0**	**$3,013.0**	**$3,079.0**

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Appendix D

Fiscal Years 2013 – 2017

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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			Current Baseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2 ACAT 1	Aug-07	Sep-14	$1,681.5	Mar-11	Sep-14	$1,695.1	Sep-14	$1,726.2	Current Baseline vs Original Baseline: In Mar-11 the Investment Decision Authority (IDA) approved a baseline schedule replan and strategic decision to incorporate the Colorado WAM, Phase II into the ADS-B baseline. Note: Colorado WAM, Phase II was previously baselined in Dec-09 Current Estimate vs Current Baseline: The increase of $31.1M to the current baseline (-1.8% 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

	Original Baseline			Current Baseline			Current Estimate		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
En Route Automation Modernization (ERAM) ACAT 1	Jun-03	Dec-10	$2,154.6	Jun-11	Aug-14	$2,484.6	Aug-14	$2,528.5	Current Baseline vs Original Baseline: The completion date for ERAM has slipped to Aug-14 resulting in a 44 month schedule variance (-49%) to the original baseline. The budget has increased by $330M (-15.3% variance). 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. Current Estimate vs Current Baseline: The increase of $43.9M to the current estimate (-1.8% variance) is due to including additional 2nd level engineering costs in the F&E budget for FY12 and FY13 (versus Ops budget).
Flight Standards Inspector Aircraft Replacement (FSIAR), Segment 2 ACAT 2	Sep-11	Aug-13	$11.1	Sep-11	Aug-13	$11.1	Aug-13	$11.1	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Sept-11.
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

	Original Baseline			Current Baseline			Current Estimate		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
Instrument Flight Procedures Automation (IFPA) ACAT 2	Sep-06	Sep-11	$50.8	Apr-10	Sep-12	$50.8	Sep-12	$50.8	Current Baseline vs Original Baseline: The schedule extension was due to expanded technical requirements and criteria changes. These additional requirements for geodetic modeling (full ellipsoidal) and change in criteria affected the Instrument Procedure Development System (IPDS), Instrument Flight Procedures (IFP), and Automated Process Tracking System (APTS) components of IFPA. In Apr-10, the JRC approved the schedule rebaseline associated with the TERPS Criteria Changes.
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	

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
Runway Status Lights (RWSL) ACAT 1	Jan-10	Oct-15	$327.4	Jan-10	Oct-15	$327.4	Jun-16	$352.4	Current Estimate vs Current Baseline: The completion date for RWSL has slipped from Oct-15 to Jun-16 resulting in an 8 month schedule delay (-9% variance). The slip in schedule is associated with delays in the start of construction at four airports due to a funding deferral of $20M beyond FY13. The budget has been projected to increase by $25M (-7.6% variance) due to changes in construction methods, revised airport requirements, requests for additional light arrays, and construction re-mobilization associated with the FAA furlough (2 week period from Jul-11 to Aug-11).
System Approach for Safety Oversight (SASO) Phase IIa ACAT 3	Sep-08	Sep-13	$88.0	Sep-08	Sep-13	$88.0	Sep-14	$88.0	Current Estimate vs Current Baseline: The completion date for SASO IIA is projected to slip 12 months. The schedule variance is associated with the initial development of the prototype.
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	
Terminal Automation Modernization and Replacement, Phase 3, Segment 1 (TAMR3, S1) ACAT 1	Dec-11	Oct-17	$438.0	Dec-11	Oct-17	$438.0	Oct-17	$438.0	NOTE: New addition to Appendix D. Final Investment Decision (FID) approved by JRC in Dec-11.
Time Based Flow Management (TBFM) ACAT 3	Apr-10	Nov-14	$115.0	Apr-10	Nov-14	$115.0	Nov-14	$115.0	
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 Surface Detection Equipment - Model X (ASDE-X) ACAT 1	Sep-01	Jan-07	$505.2	Sep-05	May-11	$550.1	Jul-11	$550.1	The program completed in Jul-11 with the ORD at Memphis, the 35th airport. The two month increase in schedule duration (-1.6% variance) was entirely due to a delay in commissioning of the new ATCT at Memphis International Airport. The IOC and subsequent ORD of the ASDE-X system at Memphis was delayed until the new ATCT was commissioned on Jun-11 and the air traffic controllers moved into the facility. NOTE: 18 out of the 21 systems that were part of Administrators "Call to Action" to accelerate the ASDE-X deployment which was agreed to by the JRC in Oct-07 achieved IOC either at or before the planned accelerated date.
Air Traffic Control Beacon Interrogator Replacement (ATCBI-6) ACAT 3	Aug-97	Sep-04	$282.9	May-08	Sep-11	255.1	Nov-11	255.1	Santa Fe (SAF) the 138th site in the ATCBI-6 program waterfall schedule achieved ORD in Nov-11. The two month increase (-1.3% schedule variance) to the Sep-11 baseline completion date is primarily due to the FAA furlough (Two week period, Jul-11 to Aug-11), key personnel were made unavailable before the ATCBI-6 systems electronics installation was complete.
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	Jun-11	$398.1	TFMS Release 5, which contained the last segment of new TFM functionality developed by CATMT WP1, was deployed on June 4, 2011.

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Appendix E

Fiscal Years 2013 – 2017

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--	
AAES	airborne access to SWIM
AAM	office of aerospace medicine
ABAAS	architectural barriers act accessibility standards
ABRR	airborne reroute execution
ACAIS	aircraft certification and audit information system
ACAS	airborne collision avoidance system
ACAT	acquisition category
ACEF	aircraft cabin environment facility
ACE-IDS	automated surface observing system controller equipment-information display system
ACEPS	ARTCC critical and essential power systems
ACTD	advanced concept technology demonstration
AEB	acquisition executive board
ADA	American Disabilities Act
ADAS	automated weather observation data acquisition system
ADD	airworthiness directives development
ADM	add drop multiplexer
ADS-B	automatic dependent surveillance-broadcast
ADS-C	automatic dependent surveillance-contract
ADS-R	automatic dependent surveillance-rebroadcast
AEDT	aviation environmental design tool
AEFS	advanced electronic flight strip
AeroMACS	aeronautical mobile airport communications system
AES	alternative energy systems
AFIS	automatic flight inspection system
AFSFM	Alaskan flight service facility 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
AIRE	atlantic interoperability initiative to reduce emissions
AIRMET	airmen meteorological advisory system
AirNav	airports and navigations aids
AISR	aeronautical information system replacement
AIXM	aeronautical information exchange model
ALDARS	automated lightning detection and reporting system
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
AMASS	airport movement area safety system
AMEN	aerospace medical equipment needs
AMHS	automated message handling system
AMMS	automated maintenance management system
AMP	airspace management program
AMRS	aeronautical mobile (R) service
AMS	acquisition management system
AMSIS	aerospace medicine safety information system
ANF	air navigation facilities
ANICS	Alaskan national airspace system interfacility communications system
ANS	automation notification system
ANSP	air navigation service provider
ANT	automated NextGen tower
AOC	airline operational control
AOCC	Atlantic operations control center
APB	acquisition program baseline
APMT	aviation portfolio management tool
APNT	alternate positioning navigation and timing system
APT	advanced persistent threat
APTS	AVN process tracking system
ARC	aviation rulemaking committee
ARE	aircraft and related equipment
ARINC	Aeronautical Radio Incorporated
ARMT	airport resource management tool
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ARTS IE/IIE/IIIE	automated radar terminal system model IE/ IIE /IIIE
ASAS	aviation safety analysis system
ASBU	aviation system block upgrade
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-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
ATAG	aerospace transportation advisory group
ATC	air traffic control
ATCBI-4, 5, and 6	air traffic control beacon interrogator model 4, 5, and 6
ATCRBS	air traffic control radar beacon system
ATCS	air traffic control specialist
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
ATOP	advanced technologies and oceanic procedures
ATSS	airway transportation system specialist
ATPA	automatic terminal proximity alert
ATS	air traffic services
AUM	arrival uncertainty management
AUTODIN	automatic digital network
AWOS	automated weather observing system
AWSS	automated weather sensor systems
AXSL	ASDE-X safety logic
--B--	
BCAR	business case analysis report
BCD	baseline change decision
BLI	budget line item
BPM	business process management
BUEC	back up emergency communication
BW	bandwidth
BWM	bandwidth manager
--C--	
C3	command and control communications
CAASD	Center for Advanced Aviation System Development
CAC	central air conditioning
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
CANSO	civil air navigation service organization
CAS	commercially available software
CAS	collision avoidance system
CAST	commercial aviation safety team
CAT	category
CATM	collaborative air traffic management
CATMT	collaborative air traffic management technologies
CBI	computer-based instruction
CCS	conference control switch
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
CIM	collaborative information management
CIO	chief information officer
CIP/FIP	current icing product/future icing product
CIWS	corridor integrated weather system
CIX	collaborative information exchange
CLEEN	continuous low energy, emissions and noise
CMA	configuration management automation
CMC	corrective maintenance contract
CMTD	concept maturity technology development
CNS	communications, navigation and surveillance
CONOPS	concept of operations
CONUS	continental United States
COS	continuity of service
COSPA	consolidated storm prediction for aviation
COTS	commercial off-the-shelf
CPDLC	controller-pilot data link communications
CPDS	critical power distribution system
CRA	conflict resolution advisory
CRD	concept and requirements document
CRDR	concept requirements development readiness
CREWS	CTAS remote weather system
CSM	certified software management
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
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
DBRITE	digital bright radar indicator tower equipment
DCCI	data center consolidation initiative
DCIS	data communications integrated services
DCL	departure clearance
DCNS	data communication air/ground network service
DDN	direct entry digital NOTAM
DDS	delegation option authorization/designated alteration station/special federal aviation regulation
DELPHI	DOT accounting system
DEN	domestic events network
DESIREE	distributed environment for simulation rapid engineering and experimentation
DF	direction finder
DHS	Department of Homeland Security
DME	distance measuring equipment

DMN	data multiplexing network
DMS	defense messaging system
DNS	domain name service
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
D-OTIS	digital operational terminal information service
DOTS+	dynamic ocean tracking system plus
DR	disaster recovery
DRC	disaster recovery center
DREN	defense research and engineering network
DRSR	digital remote surveillance communication interface processor replacement
D position	data controller position
DSP	departure spacing program
DS/PP	designee supervision/past performance
DSR	display system replacement
DST	decision support tool
DT&E	development test and evaluation
DUATS	direct user access terminal system
DVD	digital virtual disc
DVOR	doppler VOR
DVRS	digital voice recorder system
--E--	
EA	enterprise architecture
EBUS	enhanced backup surveillance
ECG	en route communication gateway
ECP	engineering change proposal
EDA	engineering design approval
EES	ERAM evaluation system
e-FAROS	enhanced final approach runway occupancy signal
eFAST	electronic FAA accelerated and simplified task
EFS	electronic flight strip
EFS	electronic file service
EFSTS	electronic flight strip transfer system
EFVS	enhanced flight vision systems
EISS	enterprise information system security
ELVO	enhanced low visibility operations
EMB	enterprise messaging bus
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
ER	environmental remediation
ERAM	en route automation modernization
ERAU	Embry Riddle Aeronautical University
ERIDS	en route information display system
ES	extended squitter
E-Scan	electronic scan

ESCR	environmental site cleanup report
ESD	electrostatic discharge
ESRL	Earth Sciences Research Laboratory
ESV	expanded service volume
ETA	estimated time of arrival
ETR	emergency transmitter replacement
ETVS	enhanced terminal voice switch
EUROCAE	European Organization for Civil Aviation Equipment
EUROCONTROL	European ANSP
EVM	earned value management
EVS	enhanced vision system
--F--	
FAALC	FAA logistics center
FAC	NextGen activities for transforming facilities
FACT	future airport capacity task
FAF	final approach fix
FANS	future air navigation system
FAROS	final approach runway occupancy signal
FAS	flexible analysis system
FBW	fly by wire
FBWTG	FAA bulk weather telecommunications gateway
FCI	facility condition index
FCT	federal contract tower
FDCC	federal desktop core configuration
FDCCI	federal data center consolidation initiative
FDIO	flight data input/output
FDP2K	flight data processing 2000
FDPS	flight data publication service
F&E	facilities and equipment
FEAF	federal enterprise architecture framework
FFOV	forward field of view
FFRDC	federally funded research and development center
FFSP	future flight service program
FI	flight inspection
FIA	final investment analysis
FIAM	FAA identify and access management
FIAPA	flight inspection airborne processor application
FID	final investment decision
FIM-S	flight deck based interval management - spacing
FIS-B	flight information service – broadcast
FISMA	federal information security management act
FIXM	flight information exchange model
FLEX	flexible terminal environment
FM	frequency modulated
FMC	flight management computer
FMS	flight management system
FNS	federal NOTAM system
FOC	final operating capability
FOC	flight operations center
FOMS	flight operations management system
FOQA	flight operation quality assurance

FOTT	fiber optic tie trunk
FOWG	flight object working group
FPDS-NG	federal procurement data system- next generation
FPS	fixed position surveillance
FRD	final requirements document
FS21	flight service automation system
FSAM	federal segment architecture methodology
FSDO	flight standards district office
FSEP	facility service and equipment profile
FSRM	facility security risk management
FSS	flight service station
FST	fuel storage tank
FTB	Florida NextGen test bed
FTI	FAA telecommunications infrastructure
FTSN	flexible terminal sensor network
--G--	
GA	general aviation
GAO	Government Accountability Office
GAST-D	GBAS approach service type D
GBAS	ground-based augmentation system
GCCS	geo stationary communication and control segment
GEO	geosynchronous communication satellite
G/G	ground to ground
GIM-S	ground based interval management - spacing
GIS	geographic information system
GNSS	global navigation satellite system
GPS	global positioning system
GRIB	gridded binary (data format)
GSA	General Services Administration
GSD	global sciences division
GTGS	graphical turbulence guidance version 3
GUI	graphical user interface
--H--	
HADDS	HOST ATM data distribution system
HAZMAT	hazardous materials
HCS	HOST computer system
HD	arrivals/departures at high density airports
HF	high frequency
HF	human factors
HIE	health information exchange
HITL	human-in-the-loop
HLA	high level architecture
HOST	enroute computer system
HRJ	Hydro-treated renewable jet (fuel)
HSD	Homeland Security data network
HSI	human system integration
HSPD	Homeland Security Presidential Directive
HUD	heads-up-display
HUR	high update radar

HVAC	heating, ventilating and air conditioning
--I--	
I2I	idea to in-service
IA	investment analysis
IAPA	instrument approach procedures automation
IARD	investment analysis readiness decision
IATI	international air traffic interoperability
ICAO	International Civil Aviation Organization
ICF	integrated control facility
ICMS	integrated control and management system
ICSS	integrated communications switching system
IDA	investment decision authority
IDAC	integrated departure arrival capability
IDIQ	indefinite delivery/indefinite quantity
IDLM	interference detection, location and mitigation
IDR	incident detection and response
IDS	information display system
IDS	integrated display system
IEEE	Institute of Electrical and Electronic Engineers
IFI	in flight icing
IFP	instrument flight procedures
IFPA	instrument flight procedures automation
IFR	instrument flight rule
IGCE	independent government cost estimate
IID	initial investment decision
IKM	identity and key management
ILS	instrument landing system
IMC	instrument meteorological conditions
IOA	independent operational assessment
IOC	initial operating capability
IOT&E	independent operational test and evaluation
IP	internet protocol
IPDS	instrument procedure development system
IPE	internal policy enforcement
IRD	interface requirement document
IRIS	integrated reporting information system
IRU	inertial reference unit
ISAM	integrated safety assessment model
ISAT	implementation service acceptance testing
ISD	in service decision
ISO	International Standards Organization
ISPD	implementation strategy and planning document
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
IWP	integrated work plan

--J--	
JAI	joint acceptance inspection
JAWS	Juneau airport wind system
JPALS	joint precision approach and landing system
JPDO	joint planning and development
JPE	joint planning environment
JRC	joint resources council
--K--	
--L--	
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
LDIN	lead in light 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
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
MAMP	mobile asset management program
MASR	mobile/transportable airport surveillance radar
MASS	maintenance automation system software
MATCT	mobile air traffic control tower
MB	marker beacon
MDR	multimode digital radio
MEARTS	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
MOC	mid term operational capability

MOCC	midstates operations control center
Mode S	mode select
MOIE	mission oriented investigation and experimentation
MOPS	minimum operational performance standards
MPS	maintenance processor subsystem
MPT	meter point time
MSAD	monitor safety and analyzed data
MSRD	monitor safety related data
MTSR	maintenance test system replacements
MWS	maintenance work station
MX	mobile engine generator
--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
NCO	national coordination office
NCP	noise compatibility program
NCP	NAS change proposal
NCR	NAS common reference
NDB	non-directional beacon
NEMC	NAS enterprise management centers
NEMS	NAS enterprise messaging service
NEPA	National Environmental Policy Act
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
NHIN	national health information network
NIEC	NextGen integration and evaluation capability
NIPRNET	non classified internet protocol router network
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
NOP	national offload program
NORDO	no radio
NOTAM	notice to airmen
NPI	NEXRAD product improvement

NRCS	national radio communications system
NRN	national remote maintenance monitoring network
NSIP	NextGen system implementation plan
NSOS	national security officer service
NSPD	National Security Presidential Directives
NTEP	national test equipment program
NTML	national traffic management log
NTP/PTP	network time protocol/precision time protocol
NTSB	National Transportation Safety Board
NVS	national airspace system voice system
NWP	NextGen weather processor
NWS	National Weather Service
--O--	
OAPM	optimization of airspace and procedures in the metroplex
OASIS	operational and supportability implementation system
OCAT	oceanic conflict advisory tool
OCS	operational control segment
OCX	modernized operational control segment
ODALS	omni-directional airport lighting system
ODNI	Office of the Director of National Intelligence
OEAAA	obstruction evaluation/airport airspace analysis
OEM	original equipment manufacturer
OEP	operational evolution partnership
OFDPS	offshore flight data processing system
OI	operational improvement
OLS	operational land switch
O&M	operation and maintenance
OMB	Office of Management and Budget
OPS	operations
ORD	operational readiness demonstration
OSA	operational safety assessment
OSD	operational suitability demonstration
OSF	operational support facilities
OSHA	Occupational Safety and Health Administration
OSPe	oversee system performance - external
OSPi	oversee system performance - internal
OST	Office of the Secretary of Transportation
OSTP	Office of Science and Technology Policy
OTA	other transactions agreements
OT&E	operation test and evaluation
OTM	oceanic trajectory management
OTW	out the window
--P--	
P3I	pre-planed product improvement
PA&I	predictive analysis and intervention
PANYNJ	Port Authority of New York and New Jersey
PAPI	precision approach path indicator
PBN	performance based navigation
PBWP	product based work plan

PCB	polychlorinated biphenyl
PCB	protocol converter box
PCPS	purchase card purchasing system
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
PIV	personal identification verification
PLM	programming language for microcomputers
PNT	position, navigation and timing
POCC	pacific operations control center
PPS	precise positioning service
PR	procurement request
PRISM	FAA purchasing management system
PRM-R	precision runway monitor replacement
PS3	power systems sustain support
PTR	problem trouble report
PX	prime generators
--Q--	
QA	quality assurance
QMS	quality management system
QoS	quality of service
--R--	
RA	resolution advisory
RAIM	reliability and integrity monitor
RAPCON	radar approach control
RAPPI	random access planned position indicator
RAPT	route availability planning tool
RASP	regional ADAS service processor
RBRT	risk based resource targeting
RCAG	remote communication air to ground
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
RDHFL	research and development human factors lab
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
RFW	router firewall
RI	runway incursion
RID	runway incursion device
RIL	runway intersection lights
RIRP	runway incursion reduction program
RMA	reliability maintainability availability
RMLS	remote monitoring and logging system
RMLS NRN	remote monitoring and logging system national RMM network
RMM	remote maintenance monitoring
RMMC	remote maintenance monitoring and control
RMMS	remote maintenance and monitoring system
RMSET	remote maintenance system engineering team
RMT	resource management tool
RNAV	area navigation
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
RTCA	Radio Technical Commission for Aeronautics
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--	
SA	special authorization
SAA	special activities airspaces
SAAR	special aircraft and aircrew authorization required
SAIDS	system atlanta information display system
SAMS	special use airspace management system
SAPA	simplified aircraft-based paired approach
SAR	search and rescue
SARA	Superfund Amendment and Reauthorization Act
SARPS	standards and recommended practices
SAS	safety assurance system
SAS	single authoritative source
SASO	system approach for safety oversight
SAWS	standalone weather sensors
SBAS	satellite based augmentation system
SBS	surveillance and broadcast services
SCM	surface conformance monitoring
SCS	secure conference system
SDA	system design approval
SDAT	sector design and analysis tool
SDO	super density operations
SDP	signal data processor

SDR	system design review
SE2020	system engineering 2020 contract
SecFac	secure facsimile
SESAR	Single European Sky ATM Research
SFA	special flight authorizations
SGS-T	signal generator subsystem - type
SID	standard instrument departure
SIM	surveillance interface modernization
SIP	SWIM implementing programs
SIPRNET	secret internet protocol router network
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-SMA	staffed NextGen tower – small and medium airports
SOA	service oriented architecture
SOP/LOA	standard operating procedure/letters of agreement
SOW	scope of work
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
SSA	system safety assessment
SSB	single sideband
SSDI	system security design and integration
SSE	safety security and environment
SSM	support modification
SSMIMO	subscriber station multi-input multi-output
SSMT	system safety management transformation
STAR	standard terminal arrival routes
STARS	standard terminal automation replacement system
STARS/SL	STARS Lite
STBO	surface trajectory based operation
STE	satellite telephone equipment
StdAC	standard airworthiness certifications
STEM	science technology engineering math initiation
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
SVS	synthetic vision system
SWIM	system-wide information management
SWS	support work station
SX	standby generator

--T--	
TACAN	tactical air navigation antenna
TAMR	terminal automation modernization replacement
TBFM	time-based flow management
TBM	time based metering
TBO	trajectory based operations
TCAS	traffic alert and collision avoidance system
TCM	taxi conformance monitoring
TCS	terrestrial communication subsystem
TCWF	terminal convective weather forecast
TDDS	terminal data distribution system
TDLS	tower data link service
TDWR	terminal Doppler weather radar
TE	test equipment
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
TGF	target generator facility
THL	takeoff hold lights
TIS-B	traffic information service-broadcast
TMA	traffic management advisor
TMI	traffic management initiative
TMU	traffic management unit
TOPA	TCAS operational performance assessment
TPC	TFM processing center
TR	technical refresh
TRACON	terminal radar approach control
TRAMS	TCAS resolution advisory (RA) monitoring system
TRS-R	TFM remote site – reengineering
TSA w/A (TSSA)	traffic situation awareness with alerts
TSD	traffic situation display
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
UCS	unified contracting system
UFPF	unified flight planning and filing
UHF	ultra high frequency
UIS	unstaffed infrastructure sustainment
UPM	uninterruptable power module
UPS	uninterruptible power source
URET	user request evaluation tool
USGCB	U.S. government configuration baseline
USNS	U.S. Notices to Airmen system

--V--	
VASI	visual approach slope indicator
VDL	VHF data link
VDMR	VSCS display module replacement
VEM	VSCS electronics module
VFR	visual flight rules
VHF	very high frequency
VIL	vertical integrated liquid
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
VOT	VOR test range
VSCS	voice switching and control system
VSPB	voice switch bypass system
VTABS	VSCS training and backup switch
VTCR	VTABS test controller replacement
--W--	
WAAS	wide-area augmentation system
WAM	wide are multilateration
WARP	weather and radar processor
WAT	work activity tracking
WBS	work breakdown structure
WE-CTP	web enabled - collaborative trajectory planning
WiMAX	worldwide interoperability for microwave access
WINS	weather information network server
WIT	workplace inspection tool
WJHTC	William J. Hughes Technical Center
WME	wind measuring equipment
WMSCR	weather message switching center replacement
WMSS	WARP maintenance and sustainment services
WOCC	Washington operations center complex
WP	work package
WRR	weather radar replacement
WSDS	wind shear detection services
WSP	weather systems processor
WTMA	wake turbulence mitigation for arrivals
WTMD	wake turbulence mitigation for departures
WTS-BMgmt	work tracking software - budget management
Wx	weather