Federal Aviation Administration

National Airspace System

Capital Investment Plan

Fiscal Years 2001 - 2005

Internet Version

Contents

Prepared by the Office of System Architecture and Investment Analysis, ASD-1, as directed in Public Law 106-69, the FY 2000 appropriations.

NAS Modernization

Economic Vitality Linked to Aviation

America's aviation industry is soaring into the 21st century, with projected increases in business, recreational, and personal travel. U.S. airlines alone expect that they will carry twice as many passengers by the year 2015 as they do today.[1]

In order to manage this increased load on the National Airspace System **(**NAS), the air traffic control system and supporting services must be state-of-the-art, led by a coordinated long-term modernization effort. NAS users — general aviation, airlines, and the military — must also make a significant investment in avionics to take advantage of new capabilities.

This report documents a capital investment performance plan linked to Office of Management and Budget (OMB) future year funding levels over a 5-year window of FAA's long-range NAS modernization plan.

NAS Architecture

In January 1999 the FAA Administrator approved the NAS Architecture, representing the aviation community consensus on modernization. The Architecture's purpose is to provide a consistent view of changes in the NAS, planning for the transition to free flight. This document represents a snapshot in time of a larger architecture database used to maintain configuration control on modernization and infrastructure sustainment and to trace technical and programmatic interdependencies.

The NAS Architecture is based on life cycle cost estimates, which include costs for research, procurements and installation, as well as upgrades, maintenance, decommissioning, and associated personnel costs. Internet access to the NAS Architecture is available through http://www.nas-architecture.faa.gov/cats/

The NAS Architecture represented a long-term plan for the evolution of the NAS, both sustainment and enhancements, to 2015 and beyond. This Capital Investment Plan (CIP) aligns the architecture to the OMB 5-year budget planning guidance.

FAA CIP is a 5-Year Plan Within OMB Projections

This CIP reflects the next 5 years of the NAS Architecture. It is aligned with the fiscal year (FY) 2000 capital appropriations received from the Congress, with the President's FY 2001 budget submittal, and OMB funding projections for FY 2002 through FY 2005.

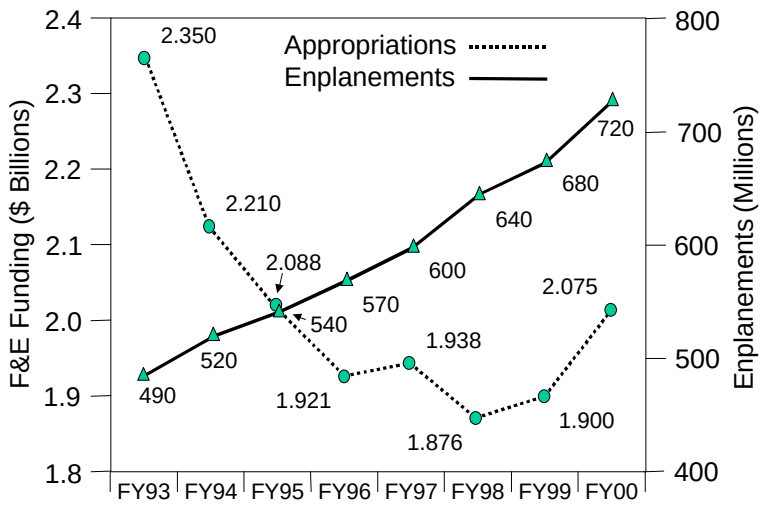
The CIP also reflects present understanding about what investments can or should be made given the complexity of some projects and the need to maintain sufficient managerial control to safeguard taxpayer resources. The CIP

[1] *Air Transport Association speech at the 1997 FAA Forecast Conference*
Economic Impact of Civil Aviation on the U.S. Economy – 2000, March 2000, presents impact based on 1998 data

represents a balanced portfolio of investments between safety, security, and efficiency. Safety and security will continue to have the highest priority for capital investment spending. Efficiency improvements must focus first on sustaining existing services necessary to provide separation, navigation, communications, and traffic flow management. New improvements in how services are provided to the users are provided where affordable. As funding increases over the 5 years, there is a balanced portfolio of sustained and improved NAS services tied to delivery of capabilities and benefits.

Significant Progress Has Been Made Towards NAS Modernization

- **Q** No Y2K impact
- **Q** All 20 en route centers and 3 oceanic centers have new central processors (HOCSR)
- **Q** All 20 en route centers have fully operational new controller displays
- **Q** Operational testing of the new terminal automation system (STARS) is under way at two terminal facilities
- **Q** New weather automation system is currently undergoing testing at initial operational site
- **Q** 442 of 569 automated weather sensor systems are operational
- **Q** New ASR-11 terminal radars are undergoing testing at initial operational sites
- **Q** The 44th ARSR-4 is commissioned
- **Q** ASDE-3 commissioned at 34 sites
- **Q** AMASS is installed at 23 total sites
- **Q** Last ASR-4 removed
- **Q** Last ASR-9 commissioned (134 total)
- **Q** 7 additional Mode-S systems commissioned (143 total/124 commissioned)



Capital Investment Appropriations Have Decreased As Air Travel Has Increased

Capital Investment Plan Highlights

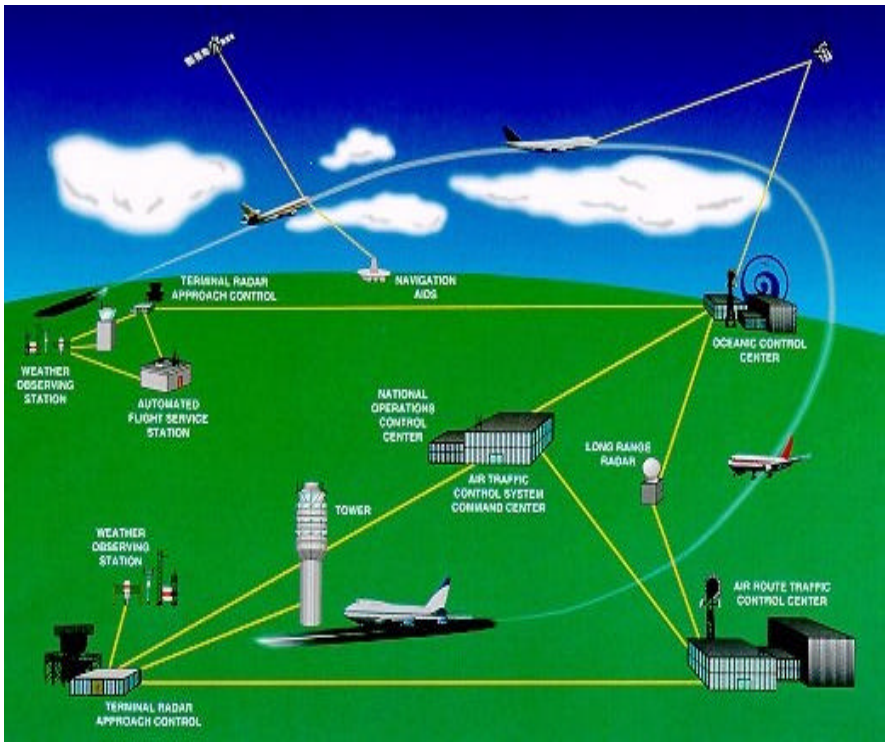
Previous versions of the FAA's CIP have contained summaries of needs beyond the capital funding level as budgeted. This alignment of the current CIP to the future year budget projections ties the modernization to the estimated and future year budgets.

The planned initial operational capability and full operational capability of capital investments are presented. These dates are based on the expected funding profiles for programs and indicate when investments begin providing benefits. The NAS Architecture continues to cover modernization through 2015. Some of the projected impacts of the funding guidance are included in this report.

This CIP focuses on services provided within the NAS, such as separation assurance, traffic synchronization, navigation, and strategic traffic flow management — and capabilities necessary to improve services. Capabilities are made up of specific programs tied to specific budget line items. Services and capabilities have been grouped by flight phase.

The NAS service providers include:

- FAA
- DoD
- Private services providing
  - Weather
  - Communications
  - Flight planning support



The National Airspace System (NAS) is comprised of the people, procedures, equipment, and airports that combined provide the NAS air traffic services

Objectives of the FAA 5-Year Plan (FY 2001 - FY 2005)

Ensure Availability of Existing Services while Modernizing the NAS to Accommodate Aviation Growth

The NAS Architecture's capital resource priorities are:

- **Q** Sustain current NAS services and the facilities necessary to deliver these services while ensuring safety
- **Q** Support safety initiatives that improve current safety services and reduce accident and incident rates as traffic grows
- **Q** Deploy security measures to reduce risk to the travelling public and our workforce
- **Q** Add new capabilities to improve efficiency, capacity, access, predictability, and flexibility in delivery of services

With the FY 2001 budget, the FAA will use capital resources to continue technological change, protect our investment in the infrastructure, and provide the levels of safety, security, and efficiency needed to operate the National Airspace System. Within this plan funding is provided for systems that support safety inspections and airport security detection equipment to enhance the safety and security to the flying public. Explosive detection equipment investment levels are set through FY 2005 so as to meet passenger and baggage screening equipment needs. Protection of the public must be a partnership with the FAA, airlines, and airports with possible sharing of capital costs to deploy these systems. In addition, information security is essential, the agency must protect sensitive information and prevent intrusion. This work is being accomplished within a broader information technology strategy.

Beyond 2001, our investments must expand to improve delivery of those services that support efficiency gains required for economic growth in the aviation sector. Aviation users and service providers agree that the need to modernize is urgent. The number of passengers has kept pace with the growth in the economy and is projected to increase by 25 percent between now and 2005; air carrier operations are forecast to increase 15 percent in the same time period. The FAA's long-range modernization plan must be implemented, backed by adequate and stable funding. To this end, the Administration's budget and out-year funding guidance provide for improvements necessary to support growing demand.

This capital investment profile for FY 2001-2005 takes the FAA from achieving marginal, site-specific, incremental gains in capacity and delay reduction, to necessary national changes that go to the heart of capacity and efficiency improvements. When combined with procedural and airspace changes, the capabilities and tools in this 5-year plan represent the funding profiles allowing the FAA to improve services commensurate with the projected growth in aviation. This plan represents an unprecedented partnership with the aviation users. Many of these users would prefer greater capitalization to produce benefits earlier, but this CIP balances the investments across three key categories:

- modernizing of the existing critical infrastructure to sustain services,
- providing new safety and security capabilities, and
- introducing new capabilities to improve efficiency.

These investments must be achieved within two guidelines: safety will not be compromised and will be improved, and the FAA must keep annual costs to the FAA and the users at a reasonable level through improved business practices.

Linking CIP Performance to Agency Goals

Appendix A, Goal Matrix, contains the DOT, FAA and program goals for capital programs. Not all agency goals are dependent upon a capital investment. Those goals supported by capital investments are provided. Safety, security, and efficiency goals are defined separately. Programs are grouped by their major emphasis. Many programs address multiple goals. For example, weather programs contribute both to safety and efficiency, but are presented within one or the other matrix. Program goals are expressed in terms of program accomplishments in 2000, 2001, and key events occurring between 2002 and 2005.

Program accomplishments for 2000 represent the activities to be completed for the funding provided by the Congress in this fiscal year. Program accomplishments for 2001 are dependent upon funding at the level of the Administration's capital budget request. Key events between 2002 and 2005 assume the 2001 funding level and the out-year profiles defined for these programs through 2005.

FAA intends to measure its performance in capital modernization against its program goals set forth in Appendix A. Any changes in funding profiles in the future will be assessed against these performance goals.

Throughout the balance of the CIP, program accomplishments are highlighted and tied to specific areas of modernization grouped by sustainment needs and flight domains.

Modernization By 2005

The FY 2001 budget and the balance of the CIP allow the FAA to continue working toward modernization focused on user benefits to be in place in 2005, while addressing the critical infrastructure needs for continuing delivery of service. Where practical, implementations have been phased to provide partial benefits prior to 2005. An example is Free Flight Phase 1 and Free Flight Phase 2. Free Flight Phase 1 provides early benefits to selected locations agreed to in partnership with the users, while Free Flight Phase 2 deploys the same capabilities at additional locations. Some long-range programs in the architecture will begin deployment, but will not be completed by 2005.

Significant Modernization Programs Completed and Services Being Delivered Before the End of 2005
Weather Systems
Integrated Terminal Weather Service (ITWS)
Next Generation Weather Radar (NEXRAD)
Weather and Radar Processor (WARP)
Terminal Doppler Weather Radar (TDWR)
Weather Systems Processor (WSP)
Automated Surface Observing System (ASOS)
Low-level Windshear Alerting System (LLWAS)
Communications
Tower Data Link System Upgrades (TDLS)
Graphical Weather Service/Flight Information Service (GWS/FIS)
Controller/Pilot Data Link Build 1/1A
Multi-sector Oceanic Data Link Services
Future Telecommunications Infrastructure (FTI)
Enhanced Terminal Voice Switches (ETVS)
Flight Service Station Voice Switches
Navigation
TACAN Antenna Upgrades
Distance Measuring Equipment (DME)
Non Directional Beacons (NDB)
GPS Local Area Augmentation (LAAS) Category I
GPS Wide Area Augmentation (WAAS) en route and VNAV/LNAV landing
Surveillance
Airport Surface Detection Equipment (ASDE-3)
Airport Movement Area Safety System (AMASS)
Airport Surface Detection Equipment (ASDE-x)
Precision Runway Monitor (PRM)
Air Traffic Control Beacon Interrogator (ATCBI-6)
Air-to-air Automatic Dependent Surveillance – Broadcast (ADS-B)
Air-to-ground ADS-B at Selected locations
Mode Select Surveillance Upgrades
Automation
Host Hardware Replacement (HOCSR)
En Route Display Replacement (DSR)
En Route Communications Gateway (ECG)
Terminal Early Display Configurations (EDC)
Free Flight Phase 1
Enhanced Traffic Management System (ETMS)
Advanced Technologies and Oceanic Procedures (ATOP)
Critical Systems Information Security Measures
Facilities
Power Systems Upgrades
Large TRACON Consolidations
Physical Security Measures

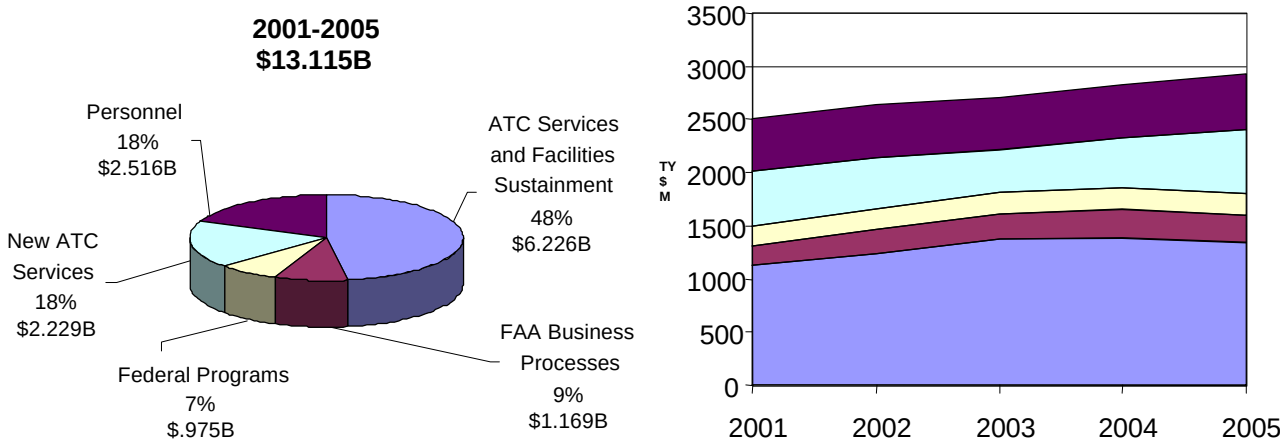
Some key modernization programs continue beyond 2005, but have deliveries and become operational at certain sites before 2005.

Significant Modernization Programs and Services Continuing Delivery Beyond 2005
Communications
Next Generation Air-Ground Communications – Digital Voice Communications (NEXCOM)
Controller/Pilot Data Link Communications Build 2 and 3
Navigation
GPS Wide Area Augmentation (WAAS) – Full Capabilities
GPS Local Area Augmentation (LAAS) Category I/II/III
Surveillance
Terminal Surveillance Radar (ASR-11)
Air-to-ground ADS-B
Automation
Standard Terminal Automation Replacement System (STARS)
En Route Automation Modernization (eRAM)

In addition to these modernization programs, there continues to be investment in sustainment and replacement of facilities, facility and equipment leases, communications upgrades, environmental and occupational health upgrades, and related support activities for safety, security, and efficiency improvements.

For FY 2001 through 2005, the FAA is proposing to spend a total of $13.115 billion on NAS sustainment and modernization. This does not include adjustments as a result of the Aviation Investment Reform Act for the 21st Century (AIR-21). These adjustments will be reflected in the FY 2002 through 2006 CIP. The allocation of this expenditure is depicted in the charts below. The categories can be summarized as follows.

- ATC Services and Facilities Sustainment: At almost 50 percent, this category represents the capital resources necessary to sustain services.
- Personnel: This includes FAA personnel and support contractors directly involved in the engineering, acquisition, and installation of systems and services.
- New ATC Services: Free Flight Phase 1, data link, and Safe Flight 21 are examples of the programs included in this category.
- Federal Programs: This category includes such programs as hazardous material cleanup, facility security risk management, airport explosive detection systems, and programs to enhance physical and information security.
- FAA Workplace: Automation support for safety inspectors, support of training and test facilities, NAS performance monitoring, and process improvements are included.



In FY 2001 through 2005, the FAA will spend a total of $13.115 billion on NAS sustainment and modernization

The Modernization Challenge

Aviation Industry Growth Exceeding NAS Capacity

The NAS is critical to the Nation's economy

- **Q** 4.7 percent of Gross Domestic Product
- **Q** $976 billion in economic activity
- **Q** 10.9 million jobs
- **Q** market for new aircraft in next 20 years - $1 trillion

There is an increasing demand for NAS services. More people want to fly and the number of flight operations is increasing. With this growth, the flying public and the flight provider share common expectations. The expectation is that a flight can be planned that meets arrival and departure time objectives, provides for a reasonable time en route, and is always safe and secure. Once begun, the expectation is that the flight will be safe and that each segment of the itinerary will be stable and not experience major delay. This is true for all classes of users including the general aviation pilots, who expect continued and expanded access to airspace and to services that are predictable, available, and affordable. The airline expects that airport delays will not disrupt the subsequent flight of that aircraft. It is this predictable dispatch reliability that sustains hubbing and allows passengers to meet their connections without excessive delay or missed connections. The Department of Defense expects to have access to the airspace for training and national defense, as well as be able to deploy in support of national foreign policy.

The FAA's role in meeting these expectations is:

- to efficiently and effectively keep individual aircraft safely separated,
- to provide for sustained flow of flights between the origination and destination airports, and
- assure that the flow does not become too complex or the instantaneous volume too large for the system to be managed safely.

NAS Air Traffic Services include:

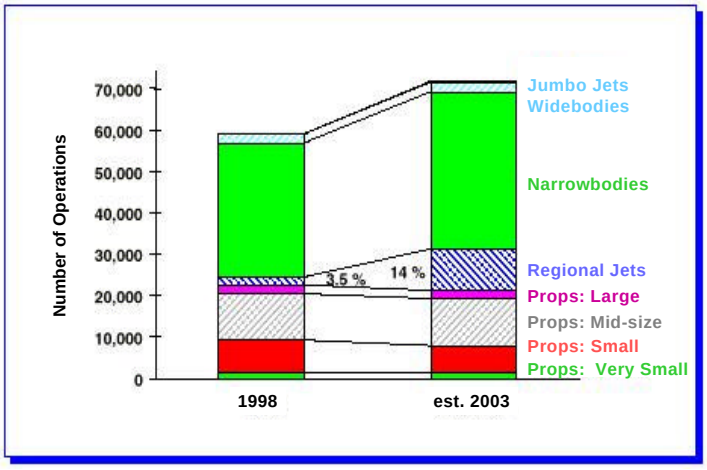
- **Q Separation Assurance** – ensures aircraft maintain a safe distance from other aircraft, terrain, obstacles, and certain airspace not designated for civil air travel
- **Q Navigation** – provides navigational guidance to enable NAS users with suitable avionics to operate their aircraft safely and efficiently under different weather conditions
- **Q Traffic Synchronization** – supports expeditious flight sequencing for the large number of aircraft using the NAS during any given period
- **Q Traffic Management – Strategic Flow** –provides for orderly flow of air traffic from a system perspective
- **Q Flight Planning** – provides both flight plan support and data processing
- **Q Advisory** – provides weather, traffic, and NAS status information to pilots
- **Q Emergency and Alerting** – monitors for distress or urgent situations (in-flight and on the ground) and provides appropriate response
- **Q Airspace Management** – provides design, allocation, and stewardship of the national airspace resource
- **Q Infrastructure/Information Management** – management and operation of the infrastructure and optimal use of NAS resources. includes systems such as surveillance, communication, navigation aids, automation, and the radio spectrum which supports these aeronautical services.

Air traffic control and management is supported by communications, navigation, surveillance, automation, procedures, airspace design, and flight inspection which provides the structure of sectors, routes, and instrument procedures. The complexity is managed through traffic restrictions and sector limits. The separation assurance so necessary for safety is implemented with procedures and separation standards and is protected by conflict alerts. In all cases the methods are based on the most common traffic case while seeking to avoid worse case delay outcomes.

The tools used to manage traffic flow today are generally static and based on an examination of historical traffic. Improvements to date have focussed on exploiting the marginal capacity left in the system to provide increased throughput and improved flight efficiency. These efforts have been effective, at current traffic levels, in managing flow and complexity and adding some flight-by-flight gains. But the forecasted growth in demand for aviation services can not be met by localized improvements to the system.

Delays are not just a problem for the major airports. The NAS has seen an increase in the use of regional jets, whose operations are expected to grow from 3.5 percent to 14 percent of air carrier operations by 2003, Regional jets are increasing service to smaller airports, extending the reach of carriers into hubs,

and providing increased alternatives. The increase in operations is reflected in increased demand in the altitudes at which jets fly - increasing the pressure on airspace above Flight Level 280 (28,000 feet). Delays caused by increasing demand for use of high-altitude airspace are putting pressure on the air traffic control system.



With Increase Usage of Regional Jets, Traffic Growth Also Affects Medium and Small Airports[2]

[2] *Growth in the Regional Jet Traffic in the U.S. Air Traffic Management System, Dr. W. W. Trigeiro, February 1999, MITRE Corporation, Center for Advanced Aviation System Development*

NAS Sustainment and Enhancements

Ensuring Existing Services Remain Available while Accommodating Aviation Growth

How are NAS enhancements determined?

The FAA and the aviation community have jointly developed a concept of operations on how the NAS should operate in the future. All the actions required to satisfy the operational concept have been defined. These actions include technology, facilities, procedures, rule changes, and people. The NAS Architecture documents all these actions and ensures they are considered in the FAA budget. The Congress authorizes and appropriates funds for NAS enhancement to support growth in air transportation.

There are two aspects of NAS Modernization. The first includes critical infrastructure to ensure continuity of air traffic control services. Critical infrastructure includes existing and replacement:

- Communications, navigation/landing, and surveillance systems,
- Weather detection and reporting systems,
- Air traffic control computers and displays for oceanic, en route, terminal, and tower controllers,
- Facilities, power generation, and back-up systems, and
- Flight inspection aircraft.

The second aspect includes providing new systems with enhanced capabilities to benefit the aviation community including:

- Increased accuracy and availability of position information to the pilot,
- Improved resolution of congestion throughout the NAS,
- Tools to help controllers manage traffic growth,
- Improved collaboration between the FAA and the users based on a common and shared situational awareness, and
- Improved weather information for general aviation pilots, the airlines, and controllers.

For several years, the FAA has taken an aggressive approach to NAS modernization. Based on OMB budget guidance and aviation community input, FAA has allocated a considerable portion of FAA's capital investment to the addition of new capabilities, services, and technologies. Examples include Wide Area Augmentation System (WAAS), Free Flight Phase One (FFP1), and Aeronautical Data Link.

Risk of service failure and associated delays increases as systems age. While high redundancy in the NAS and the elimination of most single points of failure through backup systems have helped keep system reliability high, the risk of a major outage is always present. The aviation system is highly interdependent and any major outage will have a ripple effect across the country. Recent system failures have significantly affected entire regions of the United States. A major outage causes increased delays, increased separation between aircraft, or diversion to neighboring airports - all focused on ensuring that safety is always maintained.

Highlighted in the following sections are examples of key sustainment and enhancement activities underway. These sections have been organized around the major services provided by the FAA. To reduce repetition, major air traffic control services are grouped together and the facilities, automation,

communications, navigation, and surveillance programs providing the services are discussed as a unit.

The following paragraphs describe the FAA 5-year plan. Programs critical to operation of the NAS and those of significant interest in the aviation community are addressed. A full listing of programs may be found in the 5-year budget spreadsheet. The four sections discussing air traffic control services are as follows.

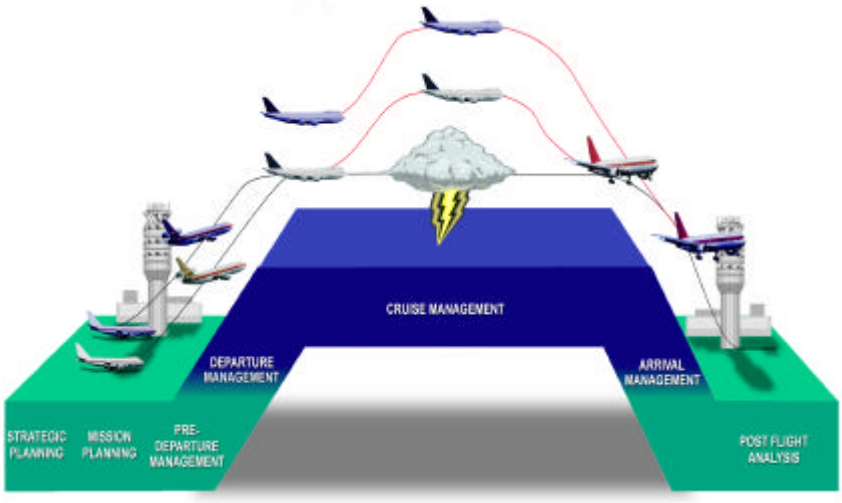
En Route/Oceanic: This section covers those capabilities needed while an aircraft traverses the airspace (cruise) between originating and destination airports. This section includes both the en route and oceanic domains.

Arrival/Departure: This section covers those capabilities needed while an aircraft is on the airport surface, while taking off, and while landing.

Navigation/Landing: This section covers navigation aids that provide point-to-point guidance information and position data to aircraft in flight.

NAS Information and Aeronautical Information: This section addresses programs that facilitate the sharing of information between the FAA and the aviation community.

An additional section, FAA Workplace, addresses activities intended to improve the way the FAA operates. These activities are focused on ways to sustain our working environment.



NAS Infrastructure Overview

The basic facilities, equipment, interconnecting networks, and operational software programs needed to operate the NAS are called the "infrastructure". These interconnected, interoperating, and interdependent sets of systems are located in approximately 1,800 facilities — airport towers, flight service stations, terminal facilities, en route centers, the Air Traffic Control System Command Center outside Washington DC, and in approximately 13,500 unstaffed facilities. The NAS interfaces with commercial, general aviation, and military aircraft, and airline operation centers, as well as external data sources, such as the National Weather Service, the U.S. Customs Service, the Department of Defense, and foreign civil aviation authorities. The NAS infrastructure includes several thousand pieces of maintainable equipment including radars, communications switches, ground-based navigation aids, computer displays, and radios used in NAS operations. NAS components represent billions of dollars in investment by the Government. Additionally, the aviation industry has made significant investments in ground facilities and avionics systems designed to use the NAS.

When a controller views an aircraft position on a display, the representation is the result of the interaction of more than 50 processing systems. Each of these systems provides information that is time-synchronized and geographically consistent with all processed information across the airspace system. To ensure flight safety, each of the systems must operate on a 24-hour, round-the-clock basis. To maintain system reliability, operations automatically switch to back-up components when there is a failure in a primary system. Data processed includes aircraft position, flight planning, surveillance, communications, and weather.

The FAA must maintain the NAS infrastructure to the standards, technology, and power requirements of commercial equipment and facilities found in other highly redundant systems like telecommunications, power production and distribution, banking, and health care. The challenge is that the safety expectations to which the general public holds aviation are significant higher than those for any other critical infrastructure services provided to our citizens.

En Route/Oceanic

Congestion at Merge Points Needs to Change Through Modernization

En Route and Oceanic services focus on control of aircraft after take-off and before landing. En route centers provide air traffic control services for domestic air traffic. The United States has been delegated responsibility for 80 percent of the world's controlled oceanic airspace by the International Civil Aviation Organization (ICAO). We provide this oceanic control at three oceanic centers (New York, Oakland, and Anchorage).

In the domestic airspace, the air traffic controller relies on radar for position information. Aircraft fly either direct routes or follow a fixed route structure, often preventing pilots from flying the most efficient route by taking advantage of favorable winds. Within this fixed route structure, merge points are created where major traffic flows cross or converge. Controllers use these merge points as references to maintain separation and manage the arrival flows to major airports. The merge points are also the airspace areas where increased volumes of traffic cause congestion.

Air traffic control over the ocean is substantially different from that provided over land, since there are few reliable surveillance systems that can provide exact aircraft position, and pilots are not in direct radio contact with controllers. Radio position reports from on-board aircraft navigational systems are transferred from the pilot to the controller through a private service provider. Due to the uncertainty in position report reliability, overseas flights are assigned to “tracks”, which have greater separation margins to ensure safety. These wider separations cause some flights to be assigned less than optimum altitude, and there is insufficient opportunity to adjust altitudes to conserve fuel. Additional tracks and access to optimum altitudes would reduce fuel consumption and costs substantially.

The implementation of improved aircraft navigational performance, automatic dependent surveillance in oceanic airspace, data link communications, and better automation tools are designed to overcome these current limitations in the Oceanic domain.

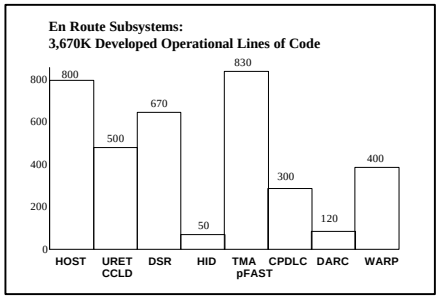
Old Technology Will Not Support Future Traffic Demands

En Route and Oceanic Automation programs provide the hardware, software, and interconnecting networks required to process and display the data used by en route and oceanic controllers to ensure safe separation of aircraft during the cruise phase of flight.

The evolution towards increased efficiency and flexibility under instrument flight rules requires significant improvements in en route and oceanic automation systems and controller decision support tools. Major steps have been completed towards the replacement of aging automation hardware infrastructure. But before new applications and improved services can be provided, the remaining hardware must be replaced and significant software changes are required. En route automation will accomplish this with a phased approach. Oceanic automation will use a more integrated systems approach. The size and scope of the specific automation systems dictate the different approaches.

Evolution of En Route automation (HOST) operating systems:

* Installed 1971, IBM real-time operating system firmware specially modified for FAA
* Rehosted in 1987
* Rehosted again in 1999
* Original 1971 software remains core of en route NAS



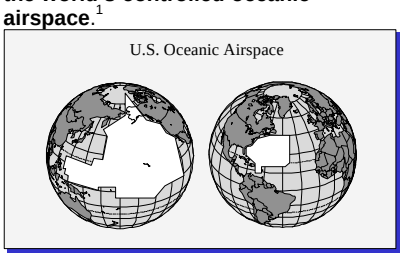
En route automation is in a sustainment mode

The en route NAS operational software provides the critical flight data processing (FDP) for filing and updating of flight plans for the total NAS. Flight service stations, terminal, and tower automation systems all access flight plan information through the en route centers, where all flight plans are processed. These processors also provide the radar processing (RDP) that feeds the controller displays serving the en route domain. The Direct Access Radar Channel (DARC) system provides back up for the en route controllers, but there is no back up for FDP, other than the redundancy built into the en route automation.

During the past several years significant progress has been made in modernizing the en route automation hardware systems. The Host/Oceanic Computer System Replacement (HOCSR) program re-hosted existing en route automation software on to new Y2K-compliant processors. This hardware replacement was completed in a record 18 months. New controller displays (Display System Replacement or DSR) are fully operational at all 20 en route centers, and were placed into operation ahead of schedule at 16 of the centers.

Even with all this progress, numerous studies have shown that current en route ATC capabilities are failing to keep pace with the growth in en route traffic and the resulting congestion. Much of the en route automation hardware has been recently replaced, but there are key components of the primary and back-up systems that still require immediate replacement and are supported in this CIP. While the FAA has made significant progress in replacing en route displays, computers, and other hardware, the en route software is 1970s vintage. The replacement of the en route software with maintainable, highly reliable computer code requires significant requirement definition and funding. Recent software failures point to the need to work both a sustainment and replacement strategy. A comprehensive strategy for en route automation modernization (eRAM) is currently under development and will be completed this calendar year. To complete replacement of the en route software successfully, significant planning and a long lead-time will be required. The program will be developed with a target completion date of 2008. That is the time frame where supportability concerns for both the software and hardware merge and new software can be ported onto new hardware at its next replacement cycle. Because of the complexity of this task, the current funding profile listed in this plan is for planning purposes only and is contained within the en route automation budget line item (2A01). Program estimates will be refined following more detailed analysis.

The United States currently manages and controls 21 million square miles of the world's controlled oceanic airspace.[1]



1. ICAO Oceanic Chart Data

Pressing issues exist in oceanic airspace

The pressing oceanic issues raised by the users are somewhat different in the Atlantic and Pacific oceanic airspace, but the need for modernization is clear in both domains.

In the Atlantic, capacity is the immediate focus. Air traffic routes are primarily in non-U.S. airspace. Much of the merging of traffic into the Atlantic route

structure is done in U.S. airspace, and we are approaching the point where existing capacity will be fully utilized.

In the Pacific, because of the more modern fleet equipage and often very long flights (14 to 20 hours), there are significant user benefits to be gained by modernizing the oceanic air traffic control system. Modernization will allow the fleet to take full advantage of modern avionics. Reducing aircraft separation standards and providing optimum cruise altitudes will allow aircraft to take increased advantage of winds aloft, resulting in increased fuel efficiencies, savings in fuel costs, and increased capacity. Modernization of today's obsolete system is necessary to provide these benefits. In fact, without modernization, with the current traffic growth projections, the increased traffic density could force increased separation standards, which will cause a reduction in current capabilities and less efficient oceanic operations for air carrier operations.

The proposed oceanic funding expects to implement the first system in 2002, with the last system implemented in 2006. Evaluations are currently underway to define the acquisition strategy and funding may need to be adjusted for FY 2002 and beyond.

Free Flight is defined as a safe and efficient operating capability under instrument flight rules in which the operators have the freedom to select their path and speed in real time. Air traffic restrictions are only imposed to ensure separation, to preclude exceeding airport capacity, to prevent unauthorized flight through special use airspace, and to ensure safety of flight. Restrictions are limited in extent and duration to correct the identified problem. Any activity which removes restrictions represents a move towards free flight."

From the RTCA Government/Industry Free Flight Action Plan, August 1996

Free Flight Phase 1 (FFP1) provides for the limited deployment of five initial core capabilities (URET, TMA, pFAST, CDM, SMA) to manage risk while incrementally providing early benefits to users. FFP1 is chartered to implement capabilities that provide early, measurable benefits to the aviation community and provide a vital start to the agency's evolution to free flight by 2002. For more information, visit the website at http://ffp1.faa.gov

User Request Evaluation Tool (URET) provides an automated conflict probe tool that will enable en route controllers to manage user requests for route and altitude changes by alerting controllers of potential traffic conflicts up to 20 minutes ahead. It also checks for conflicts between routes and special use airspace boundaries.

Need to Move More Aircraft Through Selected Airspace

Increasing efficiency during cruise is accomplished by:

- reducing bottlenecks at merge points, i.e., improving transition between en route and terminal airspace,
- improving ability to safely accommodate aircraft-requested flight plan changes, and
- improving availability of weather information.

The en route software architecture, implemented in 1971, was based on fixed routes and very structured flight planning processes. The future NAS concept of operations requires aircraft to be allowed to fly direct routes to their destination and to easily plan routes that take advantage of favorable winds or avoid hazardous weather. This requires fundamental changes in the way controllers deal with increased traffic loads, and new controller tools are essential to meet these traffic demands safely. These tools are included in a program called Free Flight Phase 1.

Controller productivity, in terms of the amount of traffic that individual controllers can safely handle, must increase and improved decision support capabilities are essential to improving productivity. En route tools, such as conflict probe and traffic management advisor, are being added external to en route software to expedite user benefits.

These tools are short-term solutions designed to address specific problems and provide user benefits. The long-term solution requires fundamental changes in the underlying en route software architecture to provide the necessary foundation for increased system-wide capacity, allowing controllers to work more aircraft in the airspace.

This CIP deploys URET's core capabilities at the initial seven en route centers to continue as planned, with the final system installed in 2002.

Traffic Management Advisor (TMA) provides controllers with the capability to develop arrival sequence plans for selected airports, including assignments to the runway that best use available airport capacity. TMA computes the aircraft's estimated arrival time at key arrival points to ensure aircraft meet flow constraints established by terminal management coordinators.

This CIP provides TMA's basic functions at the initial seven en route center/airport pairs to continue as planned, with the final system installed in 2002.

Free Flight Phase 1 has significant but limited objectives. Resources will have to be managed to sustain existing capabilities while expanding to additional sites agreed to by the FAA and the user community (Free Flight Phase 2). This CIP recommends $50 million in FY 2001for Free Flight Phase 2 to continue high-value work in traffic management and collaborative decision making and to start work needed to expand locations where the tools would be used. FY 2002-2005 funding continues tool deployment. Deployment of conflict probe to an additional nine en route centers will be completed by FY 2005. Deployment of TMA single-center to an additional four en route centers is planned to begin in FY2005.

En Route Weather Improvements

Weather And Radar Processor (WARP) system provides a mosaic of next generation weather radar (NEXRAD) images to the new en route color radar displays so that controllers can see a sophisticated weather depiction along with aircraft targets. Currently, the weather information provided to en route controllers comes from long-range surveillance radar systems, which are not well suited for this weather detection.

This CIP provides for continuing the development of WARP Stages 1 and 2. WARP is currently undergoing testing at its first operational site. Stage 3 FY 2000 activities will be delayed due to the need to use Stage 3 funds to offset Stage 1 and 2 telecommunication costs, completing Stage 3 in FY 2003. Stage 3 is necessary to provide national deployment of icing and turbulence forecasts, more cost-effective distribution of weather products from the NWS, improved weather products to the FFP1 tools, and to implement interface upgrades to remain compatible with NEXRAD weather radar upgrades

Improving Quality and Reliability through Integrated Digital Communication

How old are the NAS communication systems?

- **Q** 50,000 VHF/UHF radios, 20 years
- **Q** 701 remote center air/ground systems, 23 years
- **Q** 1,285 remote transmitter/receivers, 18 years

Air traffic management depends on timely and accurate transmission of information during flight planning, in flight, and for airport operations. With the projected growth in air traffic, today's communications systems must be modernized to handle the additional demand and the need for faster and clear transmission. Controller-pilot communication is currently limited by channel availability. The FAA is currently experiencing frequency shortages for new services in the Very-High Frequency spectrum at several locations within the NAS. The locations with shortages will increase over the next several years. This puts a premium on converting to digital communications to recover needed spectrum.

The next generation air-ground communications (NEXCOM) program began in 1998. The FAA is working through ICAO. On April 7 international standards were forwarded to the Air Navigation Commission for approval. A draft system specification has been developed. A test bed for evaluating prototypes, to define system interfaces, and conduct operational capability testing is under development. This CIP supports the NEXCOM multi-mode digital radio contract award in 2002. The radio will be capable of operating in the digital or analog modes. Initially, the radio will be deployed for use in the analog mode. A NEXCOM system development contract will be awarded in 2003 to develop

the components and provide the integration needed to operate the system in full digital mode in accordance with ICAO standards. The NEXCOM radios will operate in analog mode until 2008 when selected airspace will be converted to digital operations based on aircraft equipage. This transition will occur first in the high altitude airspace freeing up necessary spectrum to meet analog air-ground service requirements. The existing analog air-ground communications system will be maintained and augmented as necessary while NEXCOM radio implementation proceeds.

The Back-up Emergency Communication (BUEC) network provides the back up for the primary radio communications between the en route controllers and the aircraft. Four of the 20 required centers have been completed. This CIP enables the remaining centers to be completed by 2005.

How old are the NAS beacon systems?

243 ATCBIs with an average age of 23 years

Air Traffic Control Beacon Interrogator (ATCBI-6) is the new secondary surveillance radar that can selectively interrogate individual aircraft, and provide more precise tracking information to the Host en route automation system. The improved tracking data will be used by the new automation tools (User Request Evaluation Tool and Conflict Probe) designed to support Free Flight. The continued use of secondary surveillance radar will enable the NAS to maintain full service in en route domestic airspace during the introduction of automatic dependent surveillance.

Increase the Accuracy and Availability of Position Information

The current en route air traffic control beacon interrogator (ATCBI) radars will be replaced with new digital radar, the ATCBI-6. A study on ATCBI-4/5 obsolescence determined that approximately 70 percent of boards in those systems already contained obsolete parts. The funding profile completes commissioning of ATCBI-6 radars by 2005.

Arrival/Departure

Need to Use Existing Runways More Efficiently

Automated Radar Terminal System (ARTS) currently provides automation support for the terminal controller

- 131 ARTS IIA/E initially deployed in the early 1980s
- 59 ARTS IIIA/E initially deployed beginning in 1970
- 5 micro EARTS initially deployed in the late 1970s

Arriving and departing aircraft are sequenced in and out of the airport by air traffic controllers at the terminal radar approach control (TRACON) facilities. Maintaining a steady flow of aircraft, particularly during peak periods, can be improved by providing controllers with tools for sequencing and spacing aircraft more precisely. The objective is to reduce variability in arrival timing and optimize use of airspace to squeeze out remaining limited capacity from available runways.

Tower controllers manage and control the airspace within approximately 5 miles of an airport, including taxiways and runways on the ground. Tower controllers control ground operations on airport taxiways and runways and take-off and landing traffic. Towers are provided with flight planning information by the en route computer suite. Weather information is available from the weather processing and distribution communication network.

Terminal facilities provide air traffic control services for an airspace around an airport, usually below 10,000 feet above the ground. The terminal controller establishes and maintains the sequence and separation of aircraft taking off and landing, or operating within the terminal airspace. Terminals are connected with local towers and overlaying air route traffic control centers. Automation provides surveillance and position data on aircraft under terminal control to specialized displays within the tower. Selected terminal facilities are connected to traffic flow management systems at the Air Traffic System Command Center. Weather information is available from the weather processing and distribution communication network.

Standard Terminal Automation Replacement System (STARS) provides new color displays, new computer workstations, and new commercially-based software, customized to incorporate human factors concerns, allowing the FAA to move to a uniform system at all terminal facilities

STARS, in its early display configuration, has been delivered to El Paso, Texas and Syracuse, New York for initial key site testing.

Old Technology Will Not Support Future Traffic Demands

The FAA and the Department of Defense will replace all terminal automation systems in the NAS with the STARS. This is an all-digital system based on open-system architecture, with modern color displays and distributed processing networks. STARS will replace systems at 173 FAA and 199 Department of Defense radar approach control facilities and associated towers, over approximately 9 years. The sequence of deployment for STARS systems (by location) will be defined in August 2000. This schedule will then drive digital radar deployment schedules and facility upgrades. The current automation equipment and the military programmable indicator data processor will be decommissioned. STARS pre-planned product improvements will incrementally provide new functionality and enhancements.

passive Final Approach Spacing Tool (pFAST) is an automated tool that assists terminal controllers in sequencing aircraft that are approaching the airport from different directions and balancing aircraft flows to multiple runways. pFAST presents a recommended order for aircraft on arrival. In later developments, FAST becomes more "active" by using real-time aircraft performance data to generate speed and handling advisories to refine the recommended spacing and sequence.

Need to Accommodate Increased Demand for Flights and Better Ways to Use Existing Runways

Deployment and integration of the pFAST provides controllers with runway assignments and sequence numbers. This information allows controllers to assign runways according to user preference and local airport constraints.

With this tool, controllers are able to reduce the number and duration of in-flight delays caused by congestion at busy airports.

pFAST and Traffic Management Advisor tools, used in conjunction with airspace redesign and new procedures, increase the effective capacity of existing runways at airports that have multiple runways.

This CIP provides for the deployment of pFAST's core capabilities at the initial five airports to continue as planned in FFP1, with the final FFP1 system installed in FY 2002. To avoid a gap in support, additional funds will be allocated to provide maintenance support at these initial sites. Funding for additional deployments will begin in FY 2005.

Continue to Improve Airborne and Ground Safety and Efficiency - Provide Common Situational Awareness

Integrated terminal weather system (ITWS) integrates all relevant weather data available in the terminal area, including data downlinked from the aircraft, to automatically provide current weather situation and very accurate forecasts approximately 30 minutes into the future. Products generated by ITWS include windshear and microburst prediction, storm cell and lightning information, terminal area winds aloft, runway winds, short-term ceiling and visibility predictions.

By sharing more detailed terminal weather between controllers, airlines, and pilots better utilization of existing runways is possible.

Current terminal Doppler radar systems at the larger airports and the weather sensor capability at other airports provides weather information to air traffic controllers. The improved information from the terminal Doppler radar is only available on a separate weather display, not directly on the controller's display. The forecast from ITWS will improve safety by providing advance notice on severe weather, as well as improving efficiency in terminal operations.

The ITWS prototypes continue to be used in an operational setting. Operational test and evaluation for ITWS national deployment will be conducted during FY 2001. An increase of approximately $4-6 million in infrastructure costs is provided to prolong the support of the ITWS prototypes until full implementation in FY 2002. Product improvements begin in FY 2003.

Continue to Improve Safety on the Ground - Reduce Runway Incursions

One of the FAA's key safety initiatives is the reduction of runway incursions. This is any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in loss of separation with an aircraft taking off, intending to take off, landing, or intending to land. The FAA is working with the aviation community to identify various educational programs and technological advances through which incursions can be reduced.

Airport movement area safety system (AMASS) receives airborne aircraft target information from the airport surveillance radar, flight plan information from the terminal automation system, and ground surveillance data from the terminal automation system and ground traffic information from the Airport Surface Detection Equipment Model 3 (ASDE-3) surface radar. AMASS determines if there are existing or potential conflicts between aircraft taking off or landing and other aircraft on the surface and provides a conflict alert to the ground controllers.

AMASS combines information from airport terminal and surface surveillance systems to predict conflicts between arriving and departing aircraft and vehicles/aircraft on the airport surface. Audible and visual alerts of runway incursions are provided to assist controllers in taking actions to prevent an accident. Initially, AMASS will be deployed at approximately 34 high-activity airports. Due to production delays, modifications required resulting from development and operational testing, human factors modifications, and actions required to provide for system life cycle support, the commissioning of the first system is now scheduled for June 2001; the last system commissioning is

scheduled for November 2002. In FY 2002 and 2003 a third phase of human factors work begins that adds system improvements.

How old are the terminal radar systems?

- 31 ASR-7s are beyond useful life
- 64 ASR-8s are over 20 years old
- 134 ASR-9 are less than 15 years old

Airport Surveillance Radar (ASR-11) which consists of a primary radar paired with a new Air Traffic Control Beacon Interrogation (ATCBI) radar will provide improved aircraft and weather detection and aircraft tracking compared with the ASR-7 and ASR-8 radar it replaces, in a digital format needed for STARS.

Increase the Accuracy and Availability of Position Information

Three models of airport surveillance radar (ASR-7, -8, and -9) are in use to provide surveillance coverage of the terminal airspace. The analog ASR-7 and -8 radars, which have been in service since the 1970s, are incompatible with STARS and have reached the end of their useful lives. The ASR-7 and -8 radars are paired with ATCBI-4 and -5 secondary surveillance radars. The ASR-7 and -8 radar and their associated ATCBIs will be replaced with new ASR-11 radars beginning in 2002. Testing of the ASR-11 is underway for a production decision in August 2000, the same time as the deployment sequence for STARS is defined. The ASR-11 and STARS deployment schedules are to be coordinated by location so that ASR-8 digitizers will not be necessary and the ASR-11s can arrive and be commissioned before STARS is commissioned. Early ASR-11 deliveries are targeted toward replacement of the older ASR-7 radar systems.

Funding planned within this CIP will enable the first production ASR-11 to be commissioned October 2002. Two pre-production systems have been installed. Three production systems were procured with prior year funding. There are 14 systems to be procured in FY 2000 and 16 systems planned in FY 2001.

Navigation/Landing

Navigation Limited by Fixed Ground Locations

What is a Navaid?

A Navaid is any visual or electronic device, airborne or on the surface, that provides point-to-point guidance information and position data to aircraft in flight.

The FAA, the Department of Defense, and nonfederal agencies operate more than 4,300 ground-based electronic navigational aids that broadcast navigation signals within a limited area. This network of navaids enables users with suitable avionics to navigate en route and safely fly non-precision (course guidance only) and precision approaches (course and glide path guidance) in most meteorological conditions. The greatest reduction in airport capacity occurs when weather reduces the visibility and runways cannot be used for arrivals.

The advantages of satellite-based navigation are:

- **Q** availability of signals to determine one's position where ground-based navaids do not exist (i.e., in the ocean, in low altitude en route and at many general aviation airports)
- **Q** additional position accuracy required to allow all-weather usage of existing runways - increased NAS safety, predictability and capacity.

The FAA also provides a variety of approach lighting systems that enhance pilot transition from instrument reference to visual reference for landing. The instrument approach procedure published for a particular runway dictates how sophisticated the approach lighting system needs to be for that runway. A precision landing procedure to a 200-foot decision height with ¼ mile visibility requires a more complex approach lighting system than a procedure with a 400-foot minimum descent altitude and 1 mile visibility.

Global positioning system (GPS) is a U.S. satellite-based radio navigation system composed of 24 orbiting satellites that provides position, velocity, and measurement data. By picking up signals from four or more satellites, GPS receivers on the ground or in the aircraft can determine location within approximately 330 feet of the exact position. GPS alone does not meet the accuracy, availability, and integrity requirements critical to safety of flight. Signal augmentation is required for most landing operations.

The FAA and the user community are transitioning to satellite navigation to enhance safety, expand capacity and improve efficiency. With augmentation by WAAS and LAAS, the GPS system is expected to deliver en route/terminal navigation and all-weather precision approaches throughout the Nation's airspace. During the transition to satellite navigation, existing ground-based navigation aids will be sustained, allowing users to equip with suitable avionics. Some new instrument landing systems (ILS) that have already been purchased will be installed and additional units will be procured for new runway applications.

Increase the Accuracy and Availability of Position Information to the Pilots

Wide area augmentation system (WAAS) enhances GPS signals to provide more precise location information to an accuracy of approximately 9 feet. WAAS is designed to use ground receivers (reference stations) covering wide areas throughout the U.S. to cross check GPS signals and then relay integrity and correction information to aircraft via geostationary communication satellites. WAAS enhances availability by using these satellites to provide a GPS-like navigation signal.

Satellite-based navigation, augmented by WAAS and LAAS systems, will meet the demand for additional navigation and landing capabilities and improve safety while avoiding the cost of replacing, expanding, and maintaining many of today's ground-based navaids. The development of WAAS and LAAS systems will provide the basis for NAS-wide direct routing, provide guidance signals for precision approaches to most runways in the NAS, and reduce the variety of navigation avionics required aboard aircraft. Operational efficiency and safety will be improved by adding thousands of precision and non-precision approaches at many airports lacking such capabilities today. This effort directly addresses one of the major safety issues — controlled flight into terrain.

When safety is assured and initial operating capability (IOC) is achieved, WAAS will augment GPS to provide en route/terminal navigation as well as precision instrument approach capability in a limited coverage area.

In FY 2000, 50 precision approaches and 450 non-precision approaches will be developed. Some operational restrictions will be necessary until more wide-area reference stations and satellite-based communication systems are available. Through 2005, additional reference stations, master stations, and communications circuits, and equipment upgrades will be installed.

Some operational restrictions will continue until additional satellite-based communication systems are available. Communication services from one or two additional geostationary satellites (total of 3 or 4) are needed for WAAS to achieve its full operational capability. When additional communication satellites and reference stations are installed, WAAS will meet the performance requirements for system integrity. WAAS cannot reach full operational capability without the additional satellite-based communication services. The acquisition strategy to deliver these additional satellite-based communication services will be resolved in FY 2001.

FY 2001 funding provides for upgrades to the WAAS hardware, software development, the addition of information security capabilities, development of dual-frequency avionics standards, and certification. It also provides for aeronautical surveys for development of instrument approaches, flight inspection of the new instrument approaches, maintenance of a GPS database for private pilots, and deployment of mobile ground and airborne interference detection equipment. Funding will be used to develop the engineering data needed to support the acquisition or lease of additional geostationary satellites.

The user community has formed a Satellite Navigation Users Group (SNUG) that is working in conjunction with the FAA to define the transition to satellite navigation. The SNUG is defining the transition from ground-based navigational aids to the global positioning system. The users are supporting the implementation of WAAS and LAAS and will make recommendations to the FAA on the transition strategy in August 2000.

Local area augmentation system (LAAS) provides precise correction data to airborne and surface receivers that will result in navigation accuracy of less than 40 inches to distances of 20 miles or more from the airport. Such accuracy is beneficial for instrument landings in all weather conditions.

LAAS will be deployed at approximately 160 airports. LAAS will provide precision instrument approach capability to all suitably equipped runways and aircraft. LAAS also provides the airport surface navigation signals needed for precise taxiing in low-visibility conditions. LAAS will also be installed to provide basic approaches to airports outside WAAS coverage and in mountainous terrain.

FY 2001 funding planned in this CIP will allow FAA to test LAAS CAT I systems, develop the CATII/III specification, and develop the Request for Proposal for CAT III full-scale development. CIP funding will enable 60 LAAS CAT I systems to be purchased beginning in 2002. The CAT II/III systems will begin development in 2003 and will be purchased beginning in 2005. Previously acquired CAT I systems will be upgraded to CAT III.

Safe Flight 21 and *Capstone* Deliver New Cockpit Technology

Cockpit Display of Traffic Information (CDTI) is the avionics technology that enables the pilot to electronically "see and avoid" other aircraft. Using automatic dependent surveillance -broadcast (ADS-B), the aircraft emits a signal

Safe Flight 21

- ADS-B testing in Ohio Valley
- Operational Evaluation of free flight capabilities
- Air carrier avionics
- Efficiency focused

Capstone

- GPS approaches
- Weather in the cockpit
- ADS-B testing
- GPS routes
- Weather
- Data link
- Safety focused

Automatic dependent surveillance-broadcast (ADS-B) uses satellite navigation to enable aircraft to broadcast information such as identification, position, altitude, velocity and intent. This broadcast information may be received and processed by other aircraft or ground systems for use in improved situational awareness, conflict avoidance, surveillance, and airspace/surface management.

In FY 2001 combined efforts in Ohio Valley and Alaska will provide:

- improved terminal operations in low visibility
- final approach spacing
- enhanced see and avoid
- traffic situational awareness
- improved surface navigation for pilots
- airport surface situational awareness
- enhanced surface surveillance for the controller

The first three enhancements to begin validation in Alaska are:

- Flight Information Services (FIS)
- Cost Effective Controlled Flight Into Terrain (CFIT) Avoidance
- Enhanced See and Avoid

that tells its position to other ADS-B equipped aircraft in the area. This information is visually depicted on a CDTI display in the cockpit.

Safe Flight 21 is a government/industry initiative to evaluate and validate the capabilities of advanced communication, navigation, and surveillance technologies by means of operational demonstrations. Associated air traffic control and pilot procedures will be developed at the same time. Safe Flight 21 demonstrations and evaluations will involve validation of the following free flight operational enhancements:

- Delivery of weather and other information to the cockpit,
- Cost effective methods for reducing controlled flight into terrain,
- Improved terminal operations in low visibility,
- Enhanced see-and-avoid between pilots,
- Enhanced en route air-to-air operations,
- Improved surface surveillance and navigation for the pilot,
- Enhanced airport surface surveillance for the controller,
- ADS-B for surveillance in non-radar controlled airspace
- ADS-B improvements in surveillance in radar controlled airspace

The first operational demonstration and evaluation was successfully flown in the Ohio Valley region in July 1999. Link evaluation testing and data collection also began in 1999. FY 2000 and 2001 funding is being used to complete these demonstrations, and select a preferred ADS-B link technology in 2001.

The Alaskan Region's "**Capstone Program**" is an accelerated effort to improve aviation safety and efficiency through installation of government-furnished GPS-based avionics and data link communications in commercial aircraft serving the Yukon-Kuskokwim delta area. In addition to the avionics, Capstone will deploy a ground infrastructure to improve safety and enable eventual implementation of new procedures. Ground systems will be used beginning in January 2000 to validate three of the nine high-priority Free Flight operational enhancements. Validation of other operational enhancements will be undertaken in future years.

NAS Management & Aeronautical Information

Efficient Planning by the FAA and Airlines Requires Improved Data and a Greater Quantity of Shared Information

The NAS is a complex, highly interactive "system of systems" involving a large number of subsystems and components on the ground and in the aircraft, including facilities, equipment, and computer hardware and software as well as the people who enable hundreds of thousands of users to fly safely every day. The NAS must continue to evolve towards a more integrated information sharing system to support the collaborative decision process required for both tactical and strategic operations.

Airlines and FAA Working Jointly to Resolve Congestion Throughout the NAS

Air traffic management encompasses traffic flow management and air traffic control capabilities and is designed to minimize air traffic delays and congestion while maximizing overall NAS throughput, flexibility, and predictability.

Traffic flow management is the strategic planning and management of air traffic demand to ensure safe and efficient traffic flow through the FAA-controlled airspace. To support this mission, traffic management personnel use a combination of automation systems and procedures. Modernizing traffic flow decision support includes new capabilities that will provide:

- more timely and precise data exchange between traffic managers and airline operation centers,
- enhanced analytical and display capabilities to facilitate FAA and industry collaboration in response to temporarily reduced NAS capabilities,
- more precise tools to analyze flow control data, performance, and decision making, and
- improved awareness of the status of NAS resources.

Collaborative decision making (CDM) is the set of tools providing decision support services to the FAA and airlines as they work together to resolve NAS congestion conditions.

CDM enables the FAA and the airlines to negotiate ground delay impacts prior to implementation. These negotiations allow airlines to improve their ability to serve their customers.

The airlines are investing their own funds to participate in exchange of information for CDM.

While core Enhanced Traffic Management System (ETMS) operations are sustained, development and deployment of additional collaborative decision making tools will continue. Areas of improvement will include:

- maximizing common situational awareness by improving information exchange, implementing common display mechanisms, and upgrading the communication infrastructure,
- increasing data items and airports from which NAS status information is collected and shared with the aviation community,
- expanding the number of sites for initial collaborative routing, and
- enhancing the ground delay program to increase focus on ensuring equitable allocation of limited resources to balance demand density across the NAS.

The general focus on collaborative decision making tools is expansion of common situational awareness between the FAA and aviation community. The implementation of these additional functions are planned to begin in FY 2001 and continue beyond FY 2005.

FAA Shares Arrival information with Airlines to Expedite Gate Turn-around Time

Surface movement advisor (SMA) collects and shares ground movement information on the airport surface with the FAA, airline ramp control operations, and airport management. This will allow users to better coordinate ground support operations, allocating resources such as ramp and airport services in a more efficient manner.

The Surface Movement Advisor tool enhances information sharing at airports. Initially, the airport ramp towers will be provided with a one-way feed of current traffic information previously unavailable to them. The information provided to ramp control operators includes aircraft identification and aircraft position in the terminal airspace, which could be used to compute estimated touchdown time.

Sharing aircraft arrival data with the airlines enhances the airport's decision-making capability regarding the surface movement of aircraft, gate preparations, and other airport services.

To avoid a gap in SMA support, additional funds will first be allocated to provide maintenance support, additional funds will be allocated to provide maintenance support at the FFP1 sites.

Provide Flight Planning Support to the General Aviation Community

Operational and supportability implementation system (OASIS) is the improved automated flight service station system that integrates flight data processing with new weather graphics and interactive briefings. The modular design of OASIS will allow growth to support future requirements.

The Flight Service Specialists provide flight planning and weather briefing services to the general aviation community at 61 locations. The current system must be replaced both to resolve an increasingly difficult logistic supportability problem and to provide improved weather information to the general aviation community.

Studies on hardware supportability and spare parts availability have shown that several key components of the Flight Services Automation Systems (FSAS) are becoming unavailable and unsupportable. Suppliers who designed and built many of these components have left the business and there are limited replacement supply sources.

The OASIS program has been adjusted. Program restructuring has been initiated that will delay completion of software development, revise the deployment schedule, reduce the level of technical support, and revise the overall funding profile. The OASIS implementation plan has been restructured and the rate of deployment has been slowed. In FY 2000 a single system will be deployed and ready for initial daily use. In FY 2001 three systems will be procured, installed, and tested, with the first operating capability in FY 2002 and the last planned for FY 2005.

FAA Workplace

Many of the NAS buildings are approaching the end of their 30-40 year life cycle. Much of the plant equipment (air conditioning, electrical, etc.) has also exceeded its 20-year life cycle. This CIP provides funding for NAS facilities to sustain operations of these facilities, thereby ensuring an appropriate operating environment for FAA employees and equipment.

The NAS Needs Constant, Consistent Power

The FAA must provide a reliable standby power source for critical and essential air traffic control services. Currently, the FAA can neither control, nor ensure reliable commercial power service due to the aging power system infrastructure. To improve the quality of power, engine generators, uninterruptable power supplies, direct current power systems, battery replacements, battery monitoring systems, power distribution systems, lightning protection, and power cabling will need to be upgraded.

Ninety-three percent of engine generators currently operating have exceeded their 15-year economic service lives. The trend of the last 10 years shows a correlation between the number of standby backup power outages and the aging of the current supply of generators. The average age of an uninterruptable power supply is 15 years. There were 215 power-related delays in FY 1998 and 301 in FY 1999.

Many of the building electrical wiring distribution systems were constructed in the 1950's and 1960's to the standards of the time. The older codes and standards were sufficient for powering and protecting tube-type electronics and computers, but not the newer solid-state digital equipment. Improvements in bonding, shielding, and grounding, upgrades to power distribution, and safety are funded.

How safe are NAS facilities?

The advancing age of facilities also contributes to environmental and employee safety concerns. These issues interfere with NAS operations and with installation of new equipment into these facilities.

OSHA/HAZMAT

Environmental and employee safety issues affect ongoing NAS operations and construction/installation projects to modernize the NAS. Concerns include areas such as asbestos, climbing hazards, fire protection, hazardous chemicals, fuel storage tanks, and cleanup of waste sites. In 1998, there were over 200 outages and interruptions to operations. Funding is provided to continue modifications to address health and safety concerns.

Accessibility

Most FAA buildings are still inaccessible to the disabled, requiring modification to meet federal standards. The Facility Accessibility Work Group has documented a need for $79.5 million to remove barriers to people with disabilities in FAA facilities. This CIP includes funding to continue improvements.

Maintain Air Route Traffic Control Centers (ARTCC)

There are 20 ARTCC's and 3 combined en route radar approach control facilities (CERAP's). Ongoing facilities condition assessments of these

buildings have identified inadequate power, heating, ventilation, and general building and utility deficiencies. Deferred roofing projects, for example, have led to leaks that not only damage or disable NAS equipment, but also result in the release of asbestos and the shutdown of air traffic operations. This CIP includes funding for these activities in FY 2001, with continuing growth through FY 2005.

Maintain Airport Traffic Control Towers (ATCT) / Terminal Radar Approach Control (TRACON) Facilities

How old are the towers and TRACONs?

- **Q** 464 Towers* (269 FAA operated/195 contract towers)
- **Q** Average age 26.4 years
- **Q** 172 TRACONs*
- **Q** Average age 22.2 years
- **Q** Replacement value for FAA-owned facilities - $675M

* includes 160 Tower/TRACON combinations

In FY 2000 the FAA regional offices submitted project requests totaling over $97 million for terminal building upgrades and improvements, including replacing obsolete electronic equipment, rehabilitating administrative and equipment space due to local traffic growth, and building expansion. In FY 2000 the Congress appropriated $145.8 million for terminal and tower sustainment and modernization. This CIP increases funding for these activities in FY 2001, with continuing growth through FY 2005.

Maintain Flight Service Stations

Of the 75 Flight Service Station buildings in the FAA, 61 are Automated Flight Sevice Stations (AFSS), 11 owned by the FAA, 24 leased to the FAA at a nominal rate of $1 per year, and 26 leased below market rate.

Unstaffed Facilities Also Need Sustainment

NAS has a total of 13,485 unstaffed facilities

Navigation Facilities - 9,126
Communication Facilities - 3,877
Weather Facilities - 115
Surveillance Facilities - 367

Unstaffed buildings and structures house critical communication, surveillance, and navigation equipment. The facilities and buildings are deteriorating. These conditions are causing NAS equipment reliability problems with out-of-tolerance building temperatures.

In FY 2000 $4 million was identified for unstaffed facility sustainment. In FY 2001 this increases with modest growth through FY 2005.

Seismic Safety and Mitigation

The FAA, under a program administered by the Federal Emergency Management Agency (FEMA), has identified funding for seismic assessments of facility engineering requirements for FY 2002 through FY 2004 ($5.1 million total) to support FEMA funding of critical improvements at federal facilities beginning in FY 2005.

Maintain Airborne Mission Capabilities

A fleet of flight inspection aircraft must be properly equipped to perform approximately 9,800 facility inspections annually to ensure the integrity of the NAS. These consist of approximately 800 commissionings, 400 reconfigurations, 6,500 periodic inspections, and 2,100 special inspections. The aircraft must also perform worldwide flight inspection missions to fulfill commitments to 45 foreign governments on all continents under State Department agreements. Six of the nine international flight inspection aircraft have an emergency support role for the Department of Defense to enable military deployments.

Research aircraft must be maintained to perform airborne testing and evaluation to support advanced aviation technologies, NAS modernization, procedural development, and human performance.

General aviation aircraft must be maintained to provide Aviation Safety Inspection pilots with currency/proficiency training required for regulation and certification of the general aviation community and associated aircraft operations. The aircraft also provide proficiency flying while supporting the air transportation needs for the Department of Transportation and to the National Transportation Safety Board and Federal Emergency Management Agency in response to transportation safety events and national disasters.

Conclusion

The FAA and the aviation continue to increase collaboration on needed changes to modernize the NAS and recognize we are operating in a constrained fiscal environment. This CIP and the NAS Architecture are the documents that project the 5-year funding profile, with the NAS Architecture providing long term projections to 2015. The NAS Architecture can be reached on-line at http://www.nas-architecture.faa.gov/cats/.

While the FAA's goals focus on safety, security, and improved efficiency, the infrastructure necessary to deliver existing services must be supported. This Capital Investment Plan reflects that. Funds have also been allocated for new ATC services and for the tools necessary to deliver and improve air traffic services.

Since the NAS Architecture represents a longer overall view of NAS modernization than this 5-year plan, the architecture will continue to be the primary means of maintaining consensus on NAS modernization, preparing the capital budgets, tracking requirements, and measuring progress in modernization. It will be updated and used to drive decisions affecting delivery of services and capabilities to reflect the Administration’s priorities.

Appendix A links capital programs to agency goals.

Appendix A

Goal Matrix

This appendix contains program goals for capital programs. Safety, security, and efficiency goals are defined separately. Programs are listed by the goal they most directly impact. Many programs address multiple goals. For example, weather programs contribute both to safety and efficiency, but are presented within one or the other matrix. Program goals are expressed in terms of program accomplishments in calendar year 2000, 2001, and key events occurring between 2002 and 2005. The program descriptions and budget line items are provided.

Program accomplishments for 2000 represent the activities to be completed for the funding provided by the Congress in this fiscal year. Program accomplishments for 2001 are dependent upon funding at least to the level of the Administration's capital budget request. Key events between 2002 and 2005 assume the 2001 funding level and the out-year profiles for the programs based on current priorities.

DOT Goal: Safety - Promote the public health and safety by working toward the elimination of transportation-related deaths, injuries, and property damage.

FAA Goal: Safety – By 2007, reduce U.S. aviation fatal accident rates by 80 percent from 1996 levels.

FAA Achievement Performance Goals:

- **Fatal Aircraft Accident Rate –** By 2007, reduce the U.S. commercial aviation fatal accident rate per aircraft departure, as measured by the three-year moving average, by 80 percent from the three-year average for 1994-6.
- **Fatal Aircraft Rate –** Reduce the fatal aviation accident rate for commercial air carriers from a 1994-1996 baseline of 0.037 fatal accidents per 100,000 flight hours. The 2000 target is 0.033 per 100,000 – with the reduction to be achieved in 6 key areas outlined in the Safer Skies Agenda.
- **General Aviation Fatal Aircraft Rate –** Reduce the general aviation fatal accident rate from a 1994-96 average of 1.67 per 100,000 flight hours. Reduce the total number of general aviation fatal accidents to no more that 350 by the year 2007.
- **Dangerous Goods –** Decrease the rate of air shipment hazardous materials incidents by the year 2000 from a 1998 base.
- **Airport Accidents/Incidents –** By 2007, reduce (by X percent from baseline levels) the rate of airport accidents/incidents (i.e., accidents/incidents in which an aircraft leaves the pavement or in which Aircraft Rescue and Fire Fighting responds) that result in injury to persons or damage to aircraft. (Note: This is a new measure—data/baseline to be developed over 2000).
- **Operational Errors and Deviations (Air Traffic) –** Reduce the rate of operational errors and deviations by 10% from 1994 baselines. The 2000 targets are 0.486 errors and 0.097 deviations per 100,000 activities.
- **Commercial Space Transportation –** Experience no fatalities and injuries to the public and significant damage to property caused by U.S. commercial space transportation.
- **Systems Acquisition and Integration (Human Factors) –** Ensure human factors policies, process, and best practices are integrated in the research and acquisition of 100 percent of FAA aviation systems and policies.
- **Runway Incursions –** Reduce the number of runway incursions to a level 15% below a 1997 baseline of 292 incursions. The CY 2000 target is at or below 248 incursions.

FAA Achievement Focus Area, Accident Prevention: Prevent accidents before they happen through appropriate, targeted, systematic interventions in the aviation system.

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1A01 2A12	Aviation Weather Services Improvements - (ITWS) improves the detection, forecasting, processing, and delivery of aviation weather information to pilots, airline operations centers and controllers. It provides value-added, timely, and accurate weather forecasts and special products to users. The ITWS provides terminal aviation weather data and integrated products from other sensors including terminal Doppler weather radar (TDWR), NEXRAD, LLWAS and ASOS. ITWS will cover 45 high-activity airports that have significant convective weather	□ Conduct ITWS Test Readiness Review	□ Deliver 4 first article systems □ Complete algorithm testing □ Complete factory and site acceptance testing	□ ITWS First system available for operational use in 2002 □ ITWS Last system available for operational use in 2003 □ Beginning in 2003, develop and integrate new algorithms and/or upgrades such as dry microburst prediction/detection and terminal forecast products based on a maturing aviation weather research □ Deliver 24 systems in 2002; commission 11 systems □ Deliver 9 systems in 2003; commission 21 systems

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1D02	Wide Area Augmentation System (WAAS) – provide navigation and landing capability to make GPS fully usable for all phases of flight. Adds instrument approaches at general aviation airports and vertical guidance for safety.	□ Develop flight inspect WAAS instrument procedures □ Continue analysis on point to point optimal routing. □ Continue analysis on precision approach improvements □ Define safety algorithm problems and define changes	□ Complete program definition □ Perform final qualification test, evaluation, and contractor acceptance inspection □ Develop flight inspect WAAS instrument procedures □ Implement safety logic improvements □ Continue navigation and landing enhancements with emphasis on interference	□ Under Review
1F01	Automatic Dependent Surveillance Broadcast (ADS-B) - a surveillance system that will enable free flight capabilities, minimize runway incursions, increase runway safety and provide coverage in existing non-radar areas	□ Develop of ADS-B procedures and technology for enabling paired approach to closely spaced parallel runways, and RTCA and international ADS-B standards for use in surveillance	□ Develop standards/procedures for runway occupancy awareness and departure spacing □ Complete Phase 2 of Operational Safety Assessment □ Complete 1090 Minimum Operational Performance Standard (MOPS) □ Complete Cockpit Display of Traffic Information (CDTI) MOPS	□ Begin Universal Access Transceiver (UAT) MOPS development in 2002 □ Develop procedures/standards for applications involving Traffic Information Service (TIS-B) in 2002 □ Complete UAT MOPS development in 2003

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1F01 2B22	Runway Safety Program (formerly Runway Incursion) - initiates, promotes, and manages initiatives that prevent incidents and accidents attributable to runway incursions	□ Complete initial multilateration/ADS-B, data fusion, loop technology at Dallas, TX □ Complete Phase II of loop technology system at Long Beach, CA □ Develop procedures, education and training, and airport improvements	□ Develop data fusion technology and other primary surveillance systems, evaluation of new technologies □ Extend the Dallas Fort Worth (DFW) evaluation of Airport Surface Detection Equipment Next Generation (ASDE-X)	□ Complete system evaluation of DFW in 2002 □ Continue research on potential technology solutions for low-level airports including ADS-B and vehicle operations for investment decision in 2003 □ Develop procedures, education and training, and airport improvements
1F02	Safe Flight 21 - a government/industry cooperative effort to develop and demonstrate a set of enhancements that facilitate free flight capabilities, minimize runway incursions, and provide coverage in existing non-radar areas	□ Complete the Link Evaluation data analysis final report □ Install Bethel, Alaska ground stations □ Alaska Region certification of Micro-En Route Automated Radar Tracking system for use with ADS-B	□ Demonstrate, validate and analyze in a real world environment the capabilities of advanced communication, navigation and surveillance □ Complete air traffic procedure development for terminal and en route use	□ Complete installation of ground infrastructure beyond 2005 □ Site delivery for Ohio River Valley and Alaska in 2005 □ Develop and demonstrate a set of operational enhancements that facilitate free flight capabilities and use of ADS-B datalink
2A02	Next Generation Weather Radar (NEXRAD) - national network of weather radars currently in use that detects, processes, distributes, and displays hazardous and routine weather information	□ Begin development, test, production, and delivery of weather software and radar hardware upgrades; funding also supports site preparation, equipment transition and National Weather Service (NWS)/FAA services	□ 1of 118 NEXRAD Upgrade systems available for operational use	□ Last NEXRAD Upgrade system available for operational use in 2005

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
2A04	Weather and Radar Processor (WARP) - automated system that collects, processes, and disseminates NEXRAD data and other weather data to air route traffic control center (ARTCC) controllers, traffic management specialists, and ARTCC weather service unit meteorologists. WARP provides the most timely and accurate weather forecast products to other NAS systems.	Complete WARP Stage 1 /2 system testing e at the Fort Worth ARTCC Complete system requirements and design review for WARP Stage 3 weather information network server (WINS) to support FFP1	Complete deployment of WARP Stage 1 /2 systems Achieve last system available for operational use at 20 ARTCC's Implement WARP Stage 3 WINS to support FFP1 at 7 sites Begin development of other WARP Stage 3 critical operational changes, upgrades, and new interfaces	Interface with National Weather Service Aviation Weather Information system for pilots by 2002 Implementation of interface with Integrated Terminal Weather System by 2003
2B01	Terminal Doppler Weather Radar (TDWR) - detects windshear events such as microbursts, gust fronts, and related hazardous wind shear in the vicinity of airport approach and departure corridors for pilots and controllers	Complete 45th site system available for operational use and begin product improvements	Complete installation of last 2 of 47 systems (Midway and New York systems)	Implement technology upgrades including replacement of the main computer/processor in 2003
2B03	Airport Surface Detection Equipment (ASDE-3) - radar system installed at 34 high-activity airports that detects and displays aircraft and vehicle movement on the airport surface, allowing controllers to effectively manage airport surface operations during low-visibility conditions such as rain, fog, and night operations	Complete installations for 39 of 40 systems Complete the procurement of the transmitter modification	Complete delivery of the 40 systems Begin service life extension program to upgrade microprocessors	Complete last system available for operational use in 2002 Procure and install 40 new ASDE-3 displays in 2002

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
2B04	Airport Movement Area Safety System (AMASS) - enhances the function of the ASDE-3 radars installed at 34 high-activity airports by providing automated visual and aural alarm alerts and warnings to aid in the prevention of accidents from runway incursions and other hazards	Complete development, operational, and IOT&E testing Complete delivery of the 38 of 40 systems	Complete delivery of the 40th system First system available for operational use	Last system for operational use in 2002 All systems fully operational in 2003
2B16	Airport Surveillance Radar (ASR) Weather Systems Processor (WSP) – establishes terminal aviation weather capability at ASR equipped airports which do not receive the terminal Doppler weather radar, have high exposure to wind shear, and conduct medium to high amounts of air traffic operations	Deliver 5 first article systems and begin testing Award production option for 20 systems	Begin deployment and commissioning of 1st of 20 systems Award production option for remaining 12 systems	Complete deployment and commissioning of all 37 systems in 2002
2B21	Precision Runway Monitor (PRM) – provide capability to conduct simultaneous independent instrument flight rules (IFR) approaches to parallel runways spaced less than 4300 ft. apart, thus returning lost capacity, reducing delays, and improving fuel savings	Initiate installation at Philadelphia (PHL) and John F. Kennedy (JFK) airports	Commission PRM at PHL and JFK airports	Initiate contract to build system 5 for Atlanta (ATL) in 2002 Commission PRM at ATL in 2004

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2B22	Airport Surface Detection Equipment (ASDE-X) - provides seamless airport surface surveillance coverage at up to an additional 66 airports not covered by the ASDE-3 and AMASS	□ Develop system specification □ Award production contract for 1 system	□ Conduct IOT&E □ Perform human factors evaluation □ Incorporate required system modifications	□ Commission first unit in 2003 □ Exercise contract options for remaining systems in 2002
2C02	Automated Surface Observing System (ASOS) – automated weather data acquisition, processing, recording, display, and transmission of wind, temperature, dew point, atmospheric pressure, precipitation, visibility, and/or cloud height information	□ Deploy 1 of 34 ASOS automated weather sensor systems □ Deploy 6 of 9 ASOS Controller Equipment - Information Display System (ACE-IDS) □ Deploy 1 developmental and test Automated Observation for Visibility, Cloud Height and Cloud Coverage (AOVCC) system □ Deliver 1st Stand Alone Weather Sensors (SAWS) to keysite	□ Deploy remaining 33 ASOS automated weather sensor systems □ Deploy remaining 3 ACE-IDS □ Implement product improvements and upgrades to ASOS □ Deliver 59 operational and 3 support SAWS	□ Perform ASOS product improvements and upgrades □ Procure and implement New IDS, up to 400 sites □ Deliver 60 SAWS in 2002
2C04	Weather Message Switching Center Replacement (WMSCR) – collects, stores, and distributes weather data and notices to airmen (NOTAM) data	□ Sustain WMSCR hardware and software through 2005	□ Sustain WMSCR hardware and software through 2005	□ Sustain WMSCR hardware and software through 2005

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2D06	Low Level Wind Shear Alert System (LLWAS) – provides runway-oriented detection and warning of microburst and windshear conditions at nine sites collocated with terminal TDWR systems, in addition provides wind speed and direction information to TDWR	9 LLWAS Network Expansion(NE) sites are commissioned Complete the radio buy supporting DT&E testing	Commission 30 LLWAS sustainment systems	Commission 9 LLWAS sustainment systems in 2002 Upgrade the 9 LLWAS NE sites in 2002 Commission Daytona Beach LLWAS in 2002
2D07	Approach Lighting System Improvement Program (ALSIP) – procures and installs frangible approach lighting equipment, including approach lighting system with sequenced flashing lights (ALSF-2) and medium-intensity approach lighting system with runway alignment indicator lights (MALSR) lighting systems	Procure 12 of 80 ALSF-2 systems Deliver of 11 of 80 ALSF-2 systems Deliver 17 of 292 MALSR systems	Install 1 of 80 ALSF-2 systems Deliver 12 of 80 ALSF-2 systems	Perform regional installations for 4 MALSR and 2 ALSF-2 locations in 2002 Perform regional installations for 5 MALSR and 2 ALSF-2 locations in 2003 Perform regional installations for 5 MALSR and 2 ALSF-2 locations in 2004 Perform regional installations for 5 MALSR and 2 ALSF-2 locations in 2005
2D08	Runway Visual Range (RVR) – provides a standardized, instantaneous, and accurate method of measuring actual meteorological visibility on precision approach equipped runways	Procure 20 of 604 visibility sensors Procure 40 of 581 sensor interface cards	Install 10 of 264 RVR systems Install 53 of 544 sensor interface cards	Install 12 of 264 RVR systems in 2002 Install 13 of 264 RVR systems in 2003

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
2E05	Air Navigational Aids and ATC Facilities – a program to handle expeditiously unforeseen circumstances of various local emergencies in the course of daily operations	Respond to unplanned emergencies that demand immediate action and provide minor site specific adjustments	Respond to unplanned emergencies that demand immediate action and provide minor site specific adjustments	Respond to unplanned emergencies that demand immediate action and provide minor site specific adjustments

FAA Achievement Focus Area, Safety Information Sharing and Analysis: Develop partnerships with the aviation community to share data and information supporting safe, secure aviation.

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
2B08	NAS Facilities Occupational Safety and Health Administration (OSHA) & Environmental Standards Compliance - implements programs for OSHA and Environmental Compliance, Fire Life Safety and Energy Conservation	Implement OSHA/environmental/energy plans, actions and activities including fire life safety upgrades and training	Standardize required OSHA and environmental training courses, and fire life safety upgrades at towers	Implement a Lockout/Tagout program to protect FAA employees from injury or death in 2002 Implement energy efficient/conservation efforts in 2002 Support the FAA equipment and facilities decommissioning program in 2002
3A02	Hazardous Materials Management - ensures compliance with statutory mandates and identify appropriate procedures for proactively managing hazardous materials to prevent future environmental contamination and notices of violations	Perform site investigations, hazardous materials management, drilling of monitoring wells, remediation of ground water contamination, and physical removal of contaminated soils Implement air pollution controls	Identify undiscovered waste sites resulting from FAA operations	Perform remediation of environmentally contaminated sites through 2005

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
3A04	ASAS (Aviation Safety Analysis System)- provides the FAA safety and security workforce with automated tools that integrate safety related information in a common data base linked to the FAA's business process	□ Complete the Flight Standards Service (AFS) Enterprise-wide asset and resource baseline, definition and transformation strategy; and implement budget and resource configuration tracking and change management process	□ Begin automation integration activities and create Decision Support Databases	□ Deliver AFS information services
3A09	Safety Performance Analysis System (SPAS) – provides an automated capability to analyze safety-critical areas, using performance indicators designed for the needs of Aviation Safety Inspectors	□ Complete initial SPAS II training and deployment	□ Begin development of SPAS II software enhancements to support a larger inspector user population through a distributed client/server design and enhanced functionality	□ Analysis and Development of Upgrades and Enhancements SPAS releases and training
3A12	National Aviation Safety Data Analysis Center (NASDAC) - computer analysis system that integrates data from regulatory Aviation Safety Analysis System (ASAS) databases and from air traffic, airport, airway facilities and other government data sources for safety research	□ Joint development with National Aeronautical and Space Administration of a model international data registry □ Complete engineering support and migrate NASDAC services to FAA lines of business □ Implement Aviation Safety Data Encyclopedia System on internet and alpha test	□ Standardize critical aviation safety data elements □ Expand data and information sharing agreements to other US government agencies and university research community □ Prototype application of advanced analysis tools aviation safety data	□ Provide widespread availability and use of safety event precursor analysis tools in 2002 □ Expand data and information sharing agreements to international governmental agencies and some domestic aviation industry entities □ Prototype web-based application for the delivery of new analysis tools in 2002

FAA Achievement Focus Area, Certification and Surveillance: Develop new approaches to working with others on certification, inspection, and surveillance and target FAA resources.

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1F01	General Aviation Vertical Flight Program - develop guidance to FAA and industry on use of Global Positioning Satellite (GPS) -based routes to comply with Safer Skies agenda	□ Development of guidance to FAA and Industry on use of GPS-based routes.	□ Development of guidance to FAA and Industry on use of GPS-based routes.	□ Development of guidance to FAA and Industry on use of GPS-based routes.
3A04	Flight Standards System Safety – new automation tools for implementing the System Safety approach to oversight of air carriers and general aviation operators	□ Develop improved system safety-based surveillance job aids, provide assistance and direction to use the aids, and integrate them into the Aviation Transportation Oversight System (ATOS) data reporting module □ Develop and provide an ATOS standardization seminar	□ Implement new training programs and adjust staffing per new standards for new air carrier certification and surveillance process □ Develop Phase II inspector training and automation enhancements	□ Complete analysis to determine feasibility of expanding ATOS beyond FAR part 121 air carriers
3A08	Integrated Flight Quality Assurance (IFQA) - develop capability for collecting and analyzing digital data from flight data recorders.	□ Hardware, software, communication infrastructure, system design/development, installation and support, training.	□ Hardware, software, communication infrastructure, system design/development, installation and support, training.	□ Hardware, software, communication infrastructure, system design/development, installation and support, training

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
3A10	Performance Enhancement Management (PENS) – mobile electronic tools (hardware and software) for Aviation Safety Inspectors	□ Hardware: 1200 notebooks delivered □ Software: Interface applications	□ Hardware: 312 laptops delivered □ Software: Interface applications	□ Initiate development of software migration into palm computing applications
4A01	NAS Modernization Safety Assessment – identifies system requirements, potential safety hazards and develops mitigation strategies for those hazards that have either an unacceptable consequence or an unacceptable probability of occurring	□ Develop FAA System Safety handbook and training program on safety assessment methods □ Conduct training session for engineers	□ Complete and document analyses of at least 2 components (i.e. ADS-B, controller-pilot data link communications (CPDLC)) of NAS modernization and initiate a review of NAS systems data collection and storage needs □ Safety assessments institutionalized for NAS modernization in 2001	

DOT Goal: Security – Advance the nation's vital security interests by ensuring that the transportation system is secure and available for defense mobility, that our borders are safe from illegal intrusion, and by promoting worldwide economic growth and stability.

FAA Goal: Security - Prevent security incidents in the aviation system.

FAA Achievement Performance Goals:

- **No Security Incidents –** Security incidents means criminal or terrorist acts against commercial passenger air transportation that is subject to security regulation during which weapons, firearms, incendiary or explosive devices are used.
- **Explosive and Weapons Detection** – Increase the ability of screeners to detect improvised explosive devices and weapons in checked and carry-on baggage and on the person with no significant increase in operational impact by 2003.
- **Compliance with Security Requirements** – Increase as measured by compliance audits.
- **Risk and Vulnerability at Airports and Airway Facilities** – Reduce by 2005 as measured by risk assessments.
- **Aviation Security** –
  - X[1] percent improvement from a 1998 base by FY 2000 in detection of improvised explosive devices and weapons in carry-on baggage with no significant increase in operational impact.
  - X[1] percent improvement from a 1998 base by FY 2000 in detection of improvised explosive devices and weapons carried on the person with no significant increase in operational impact.
  - Increase the percentage of selected passengers' checked bags screened with explosives detection systems from a 1998 base by FY 2000 while achieving X[1] percent detection of improvised explosive devices.
  - Improve cargo security by an X[1] increase from a 1997 base in the detection of improvised explosive detection devices in small packages accepted from unknown shippers by air carriers for air transportation.

- **Aviation Security** – Convene voluntary consortia at 170 airports, and provide tools and assistance to airports that maintain consortia.
- **Access Controls** – Increase the aviation system' ability to sustain compliance with security requirements by X[1] percent by FY2000 from a 1998 base year.
- **FAA Security** - By 2000 fully implement security enhancement and accredit all FAA staffed facilities

[1] The percent improvement is security sensitive information and not provided in this plan.

FAA Achievement Focus Area: Security Baseline – Continue to improve the baseline security system for civil aviation and address vulnerabilities that may remain

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
3A11	Facility Security Risk Management (FSRM) – upgrade staffed facilities in accordance with security standards	□ Upgrade/ accredit 8 facilities □ Assess 200 Level I and II facilities □ Procure X-ray and metal detectors, closed circuit television, and intrusion detection devices	□ Facility upgrade and accreditation of 66 facilities □ Procure additional security systems	□ Continue upgrades and accreditation of 933 Level I, II, III, and IV facilities □ Procure additional security systems based on Congressional or National Security Council direction
3A14	Explosives Detection Technology – a multi year program to deploy explosive detection devices and advanced security equipment to U.S. airports	□ Deploy Threat Image Protection (TIP) ready screener assist x-ray devices □ Complete analysis of Notice of proposed Rulemaking for Computer-Assisted Passenger Prescreening System (CAPPS) □ Deploy 24 of 202 Explosive Detection Systems (EDS) □ Deploy 100 of 1153 explosive trace detection devices (ETD) □ Deploy an automated passenger profiling system	□ Deploy 422 of 581 TIP screener assist x-ray devices □ Deploy 30 of 30 threat containment units at airports □ Publish final rule requiring the use of CAPPS with bag match and EDS screening □ Deploy 24 of 202 EDS for screening of checked baggage □ Deploy 304 of 1153 ETD	□ Deploy 139 of 581 TIP ready screener assist x-ray devices in 2002 □ Deploy 62 of 202 EDS in 2002 □ Deploy 219 of 1153 ETD in 2002 □ Realize 100% screening of baggage and carry-on of selected passengers.

FAA Achievement Focus Area: FAA Information Systems Security Program: Develop and implement a comprehensive information security program to protect the National Airspace systems.

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
3A13	Information Systems Security (ISS) –implement a system to ensure the critical infrastructure computer and communication systems are protected from threat of attacks by terrorists or hackers	□ Ensure that the 9 mission critical systems are secure against unauthorized access and cyberattack □ Expand the computer security incident response capability □ Publish the information systems security architecture document □ Conduct vulnerability assessments on NAS systems	□ Implement countermeasures based on vulnerability assessment and incident report analyses □ Achieve a 20% increase of systems completing Vulnerability Assessments and a 10% increase of systems obtaining security certification and authorization	□ Begin implementation of critical infrastructure plan in 2002 □ Critical systems protected by 2003 □ Full compliance with FAA Order 1370.82 in 2005

DOT Goal: Mobility – Shape America's future by ensuring a transportation system that is accessible, seamless, and efficient, and offers flexibility of choices

FAA Goal: System Efficiency – Provide an aerospace transportation system that meets the needs of users and is efficient in the application of FAA and aerospace resources

FAA Achievement Performance Goals:

- **System Flexibility –** Reduce total number of published ATC preferential routes by 7 percent from the 1994 baseline by 1998.
- **User Access –** Reduce the average call waiting time for Automated Flight Service Stations (AFSS) by 20 percent from the 1994 baseline by 1999.
- **System Delays –** Reduce the rates of volume – and equipment-related delays by 20 percent from the 1994 baseline by the year 2000.
- **Aviation Delays –** Reduce the rate of air travel delays by 5.5% from a 1992-1996 baseline of 181 delays per 100,000 activities. The FY 2000 target is 171 per 100,000 activities.
- **System Capacity –** Increase system capacity attributable to runways at the 25 busiest airports by 1 percent annually in the year 2000 from the baseline year 1998.
- **Runway Pavement Condition –** Maintain in good or fair condition at least 93 percent of runways of all commercial service airports and reliever airports, as well as selected general aviation airports.
- **Flight Route Flexibility – Increase** the number of flight segments that aircraft are able to fly off ATC-preferred routes to 80% from a 1996 baseline of 75%. The 2000 goal is 80%.
- **GPS Landing Approaches –** Increase access to the nation's airports during adverse weather conditions by publishing 500 GPS/WAAS approaches per year for the next 2 years, from a prior year (FY 1995 – 1998) baseline of 1,453 approaches. The FY 2000 target is to complete at least 2,453 approaches total.
- **Airport Accessibility –** Assist in the planning and development of a national system of airports, as identified in the National Plan of Integrated Airport Systems (NPIAS), that are geographically accessible for at least 98 percent of U.S. residents.
- **Operation Availability of Key Services –** Improve service delivery by maintaining operational availability of equipment at current levels while minimizing the impact.
- **Develop and Deploy Integrated Systems –** Put into operational service 100 percent of the integrated systems necessary to delivery the capabilities required to modernize the NAS according to the JRC approved NAS architecture.
- **Aircraft Noise Exposure –** Reduce the number of people in the U.S. exposed to significant aircraft noise by at least 64 percent from the 1995 baseline of 1.7 million. The FY 2000 target is at or below 600,000.

FAA Achievement Focus Areas: Free Flight- Within safety and environmental considerations, work toward giving aircraft the opportunity to fly in a way that gives them the most benefit as they define it.

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1A06	Free Flight Phase 1 (FFP1) – a program that will incrementally deploy computer-based decision support tools by December 2002. The 5 core capabilities in FFP1 are: Surface Movement Advisor (SMA), Collaborative Decision Making (CDM), User Request Evaluation Tool (URET) Core Capability Limited Deployment CCLD), passive Final Approach Spacing Tool (pFAST), and Traffic Management Advisor Single Center (TMA/SC)	□ SMA available to 4 remaining airports □ Procure and deliver first 5 of 8 TMA systems □ TMA first Planned Capability Available (PCA) □ Procure and deliver first 5 of 6 pFAST systems □ PFAST first PCA □ SMA deploy at 3 locations □ Complete Initial Daily Use at Minneapolis □ Conduct IOT&E for TMA; □ Add military Special Use Airspace information to CDM □ Procure and deliver CDM NASSI communications and hardware elements □ CDM last PCA □ Develop a CDM collaborative routing capability and NAS status database	□ Complete URET CCLD Build 1 software □ Deliver 3 of 7 URET CCLD systems □ Deploy TMA to 3 of 7 sites □ TMA Initial Daily Use in 4 locations □ pFAST Initial Daily Use in 3 additional locations □ Conduct IOT&E for TMA □ Operate and maintain 6 SMA sites and Atlanta prototype	□ Deploy URET CCLD to last 4 of 7 sites in 2002 □ Deliver URET CCLD Build 2 software in 2002 □ URET CCLD PCA in 2002 □ Deploy TMA hardware to Chicago □ TMA last PCA in 2002 □ Deploy pFAST at last site 2002 □ pFAST PCA in 2002

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1A07	Free Flight Phase 2 (FFP2) – a geographic expansion of the FFP1 tools, deployment of controller/pilot data link communications (CPDLC) into the en route domain , extension of the CDM capabilities, and an acceleration of priority research projects	□ FFP2 has no Funding in 2000	□ Engineering for geographical expansion of TMA, pFAST and URET capabilities □ Implemented En route congestion management and routing analysis tools (CDM) □ Initiate training development for URET	□ Develop and begin deploying pFAST and TMA by 2005 □ Deploy URET Build 3 to 9 additional sites □ Continue deployment of CDM enhancements

FAA Achievement Strategy: NAS Modernization: Using the NAS Architecture as the guideline, continually refine and update the NAS to achieve efficient aerospace systems and operations

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
1A02	Oceanic Automation Systems (OAS) - develop, produce, and maintain a long term Advanced Oceanic Automation System (AOAS).	□ Complete Advanced Oceanic Automation System (AOAS) with the completion of Multi-Sector Oceanic Data Link New York Initial Operating Capability (IOC) and system available for operational use		
1A02	Advanced Technologies & Oceanic Procedures (ATOP) – new acquisition to address long term Oceanic automation requirements. This acquisition will provided new hardware and software with related NAS benefits, and provide the best value for the government. Oceanic modernization program will also provide improved controller pilot data link communications (CPDLC), Air Traffic Services Interfacility Communications (AIDC), automatic dependent surveillance addressable (ADS-A) and enhanced controller tools.	□ ATOP Joint Resources Council (JRC) and Screening Information Request (SIR) release	□ Award ATOP contract □ Complete IOT&E □ Perform Air Traffic Control facility oceanic modifications to NY, Oakland, and Anchorage □ Begin controller training on ATOP functionality	□ Deploy ATOP to New York, Oakland and Anchorage. □ Provide AIDC services □ Enhance controller tools and add automatic dependent surveillance addressable
1A03	Next Generation Air/Ground (A/G) Communications System (NEXCOM) – provide a new A/G communications system to satisfy	□ Approve Program Plan and Functional Specification for NEXCOM	□ Test and evaluate prototype NEXCOM equipment, including simulations □ NEXCOM release of Multi-	□ Contract award for NEXCOM MDR in 2002 □ Complete NEXCOM OT&E in 2002

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
	requirements that cannot be met using the current voice communications system		Mode digital radio (MDR) SIR	Complete NEXCOM MDR IOT&E in 2002 Deploy NEXCOM MDR beginning in 2002 NEXCOM System contract award in 2003 Begin deploying NEXCOM System in 2005
1A04/ 2A01	En Route Automation – replace en route automation infrastructure to increase system capacity and reduce equipment-related delays	Display System Replacement (DSR) acceptance at final site Complete DSR system available for operational use at final 12 sites Implement Host Oceanic Computer System Replacement (HOCSR) Phase 2 at 20 en route sites Complete development and testing of HOCSR Phase 2 for Oceanic sites Perform IOT&E Assessment of HOCSR Phase 2 En Route	Complete DSR transition to In-Service Management Develop and procure hardware/software for an En route Communications Gateway (ECG) to replace PAMRI functionality Replacement of HOCSR peripherals for al l air route traffic control centers (ARTCCs) Maintain en route software development support and implement upgrades Continue en route domain infrastructure (ERDI) efforts to sustain automation systems including Direct Access Radar Channel (DARC), Voice Switching and Control System (VSCS), HID/NAS LAN, and DSR	System Deployment of ECG to En Route Centers Deployment of HOCSR peripherals to En Route sites Begin design development of en route software (Host) re-engineering Continued sustainment of ERDI efforts to restore en route automation systems

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
			□ Procure and install Flight Data Input/Output hardware replacement	
1A05/ 2A05	En Route Controller Pilot Data Link Communications (CPDLC) – provides a two-way digital exchange of Aeronautical Telecommunication Network compliant air traffic control messages between ground and air	□ Contract award for Build 1 Data Link Applications Processor (DLAP) Integration □ CPDLC Build-1A Software contract award □ Host CPDLC Build 1 DLAP CDR □ Achieve flight Information Service (FIS) IOC	□ Complete Build 1 software development □ Conduct Build 1 OT&E	□ Implement limited CPDLC Build 1 capabilities at key site IOC (Miami Center) in 2002 □ Complete CPDLC Build 1 IOT&E Assessment in 2002 □ Complete OT&E of integrated HOST and DLAP components in 2002 □ National deployment of CPDLC Build 1A to all 20 en route ARTCCs
1A05/ 2A05	Tower Data link Services (TDLS) – provides data link capabilities and associated benefits to 58 high density airport traffic control towers	□ TDLS Technology Refreshment CDR and Final Design Review (FDR) □ Memorandum of agreement (MOA) execution with Port Authority of New York and New Jersey for TDLS system for Teterboro Airport	□ National deployment of the TDLS technology refreshment platform at a limited rate □ Continue establishment of data link capabilities within the NAS	□ Assume full FAA maintenance support of TDLS in 2002 □ Complete deployment of TDLS in 2003
1A05/ 2A05	Graphical Weather Service (GWS) – provides FAA graphics and text weather products and other flight information services (FIS) data to industry for implementation of FIS data link (FISDL)	□ GWS/FISDL IOC □ Achieve flight Information Service (FIS) IOC	□ GWS/FISDL Testbed (VDL-3) delivery	□ GWS/FISDL final site delivery in 2002

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
1B01/ 2B02	Standard Terminal Automation Replacement System (STARS) –a new system to replace Automated Radar Tracking System (ARTS). It will provide a modern capable system to meet expanding ATC needs beyond the year 2000. The STARS system will provide new color displays, computer workstations, and commercially-based software to allow FAA to move toward a uniform baseline at all terminal facilities.	Achieve IOC of Early Display Configuration (EDC) at 2 key sites Procure 3 ARTS IIIEs Deliver 245 of 288 ARTS color displays (ACDs) IOC Achieve DOD Full Service Level Initial System Capability	In Service Decision for EDC Complete deliver of 288 ACDs Procure 11 of 173 STARS systems Deliver 4 STARS systems Continue FAA FSL software (SW) development and DOD FSL deployment Perform IOT&E Assessment for EDC	Complete FAA/DOD FSL SW development in 2002 Procure 143 of 173 STARS systems Deliver 7 STARS systems in 2002 STARS deployment waterfall (2003 and beyond) under refinement
2A03	Air Traffic Operations Management System (ATOMS) – a personal based computer operational environment consisting of local area networks, data receivers, and/or personal computers at over 500 field sites		Develop tools to simplify the collection and analysis of operational data Create an Operational Data Warehouse that can be accessed by both field and headquarters personnel for aeronautical information	
2A06	ARTCC Building Improvements/Plant Improvements – implement modernization projects at the facilities to accommodate the scheduled implementation of NAS equipment and meet building code requirements	Mod 3 for 1 site Replace chillers 3 & 4 for two sites	Modernize Control Wing Basement at 2 sites; Replace chillers at 3 sites; renovate/expand one administrative wing. Begin Phase II construction of the HONOLULU CERAP & demolition of the Diamond Head Facility	Construction/Sustaining Effort for ARTCC Life Cycle Management MOD 2 at 5 sites in 2002 MOD 2 at 6 sites in 2003 MOD 2 at 5 sites in 2004 MOD 4 at 1 site in 2004 MOD 4 at 3 sites in 2005 Administrative wing

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
				rehabilitation/expansion projects Replace chillers at 6 sites
2A07	Air Traffic Management (ATM) – maintain and upgrade the existing traffic flow management infrastructure to continue mission critical Traffic Flow Management (TFM) operations in 80 air traffic control facilities	Fund the 2nd year of a 3 year nation wide lease and maintenance for hardware and communication equipment ORD of Enhanced Traffic Management System (ETMS) in new North Georgia TRACON	Fund the 3rd year of a 3 year nation wide lease and maintenance for hardware and communication equipment	Continue TFM operations and maintenance of hardware deployed in field facilities Begin infrastructure re-engineering
2A08	Critical Telecommunications Support (CTS) - enables the FAA to nationally manage programmed, unprogrammed, and emergency telecommunication network requirements		Replace 10 air traffic control tower operational switches in the Great Lakes region	
2A09	Air Traffic Control Beacon Interrogator (ATCBI)-Replacement – replaces existing surveillance ATCBI-4/5 equipment that have reached the end of their life cycles	Procure 50 production ATCBI-6 systems Install and test 2 pre-production systems Conduct site surveys for 13 sites	Procure 50 production ATCBI-6 systems and 38 sets of spares Conduct site surveys Install and test 15 production ATCBI-6 systems ATCBI-6 first commissioning	Procure 25+ production ATCBI-6 systems (including spares, test equipment) Install ATCBI-6 systems at 3 systems/month at up to 124 operational sites Continue integrated logistics support Complete interface development and test Relocate 25 Mode S systems to ASR-9 sites

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
				• Establish organic depot • Deliver last 113 production ATCBI-6 systems • ATCBI-6 last commissioning in 2005
2A10	FAA Telecommunications Infrastructure (FTI) – replace the existing telecommunications services that support critical air traffic operations	• Request For Information (RFI) release • Draft Solicitation Information Request (SIR) • Final SIR release • Initiate Proposal Evaluation	• Award FTI contract • Contract Bidders Capability Assessment Demonstration • Post Award JRC • Contractor establishes telecommunications infrastructure to begin the transition to FTI services for the inter-Air Traffic Control Center telecommunications backbone at 22 en route facilities	• In-Service Decision in 2002 • Initiate implementation and transition activities for Leased Interfacility NAS Communications System (LINCS), FTS-2000, Administrative Data Telecommunications Network (ADTN), Band Width Management (BWM) and Data Multiplexing Network (DMN) in 2002 • Initiate implementation and transition activities for NADIN in 2004 • Complete transition to FTI service for ADTN and BWM in 2005 • Initiate implementation and transition activities for Alaskan NAS Interfacility Communications System (ANICS) in 2005 • Complete transition for FTS-2000 and LINCS in 2005

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2A11	Air/Ground Communications Infrastructure – planned improvements to the air/ground communications infrastructure that include replacement of aging and increasingly unreliable equipment, associates site and facility improvements, including the establishment of new facilities intended to broaden communications coverage	□ Procure and install Radio Frequency Interference (RFI) Elimination equipment at remote communications facilities (RCFs) □ Continue Backup Emergency Communications (BUEC) systems integration, site preparation, and installation of 60 channels at 4 ARTCCs (completing 2 of the 4) □ Procure Radio Control Equipment (RCE) for new requirements, continue software upgrades, and install 200 channels □ The Communications Facilities Expansion (CFE) program will procure equipment racks, antennas, and towers □ Conduct CFE site preparation and installation at 24 sites	□ The CFE program will procure 375 replacement radios, equipment racks, antennas, and towers □ Conduct CFE site preparation and installation at 8 sites □ Procure and install RFI equipment to maintain existing communications infrastructure □ Continue BUEC systems integration, site preparation, and installation of 100 channels at 3 ARTCCs (completing 2 of 3) □ Procure RCE for new requirements, continue software upgrades, and install 200 channels	□ The CFE program will procure 625 replacement radios, equipment racks, antennas, and towers □ Conduct CFE site preparation and installation at 36 sites □ Procure and install RFI equipment to maintain existing communications infrastructure □ Continue BUEC systems integration, site preparation, and installation with replacement completed by 2005 □ Procure RCE for new requirements, continue software upgrades, and install 200 channels
2A13	Air Traffic Control En Route Radar Facilities Improvements – a refurbishment program for aging, obsolete facilities and systems	□ Remove surplus radar equipment □ Remove existing towers that may restrict coverage of the newly installed ARSR-4 radar □ Facility infrastructure upgrades	□ Upgrade facility infrastructure to include transmitter and antenna drive system refurbishment, tower removal and refurbishment, facility environmental refurbishment □ Facility environmental	□ Continue facility infrastructure upgrades including transmitter and antenna drive system refurbishment, tower removal and refurbishment □ Continue facility environmental refurbishment

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
		□ Facility environmental refurbishment □ In-service engineering support for urgent operational problems	refurbishment □ In-service engineering support for urgent operational problems	□ Continue in-service engineering support for urgent operational problems
2A14	En route Communications and Control Facilities Improvements – collection of improvement projects required to keep the national airspace system facilities efficient and up-to-date		□ Complete modernization of the San Juan CERAP operations wing 1st floor	
2B05	Terminal Air Traffic Control Facilities Replace – a program to identify and validate replacement candidate ATCT/TRACONs that cannot meet the needs of present day airport operational requirements	□ Begin activities to replace 4 ATCTs □ Commission 7 ATCTs in FY 2000	□ Begin activities to replace 5 ATCTs annually □ Procure equipment for 15 sites per year average □ Commision 35 sites □ Start construction for 8 sites per year average	□ Start activities to replace 8 ATCT/TRACONs in 2002 □ Procure equipment for 31 sites □ Commission 7 sites □ Start construction for 24 sites between 2003 - 2004
2B06	Air Traffic Control Tower (ATCT)/TRACON Facilities Improve – upgrade and improve various terminal facilities and equipment to meet current and future operational requirements	□ Continue facility improvements at 26 sites □ Cable loop relocation at St Louis/Lambert Field □ Upgrade voice switch at Manchester □ Replace NY TRACON HVAC	□ Improve, repair and sustain 71 sites □ ATCT/TRACON facilities that are not candidates for relocation or consolidation □ Add radar positions at 4 ATCT/TRACON facilities □ Add Data Display Systems to 10 ATCT/TRACON facilities □ Replace, improve heating air conditioning systems at 3 ATCT/TRACON facilities	□ Continue facility sustain and modernize activities. Number of sites dependent on Regional priorities and cost estimates

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
			□ Provide ATCT regional improvements to 21 ATCT/TRACON facilities	
2B07	Terminal Voice Switch Replacement (TVSR)/Enhanced Terminal Voice Switch (ETVS) – procures modern Commercial Off-the –Shelf/Non-Development Item (COTS/NDI) airport traffic voice switches to replace Electro-mechanical and aging electronic switches at ATCTs and TRACON facilities, and provides voice switching equipment to support new terminal and TRACON establishments		□ Procure 10 of 241 ETVS systems	□ Procure 10 of 243 ETVS systems in 2002 □ Procure 17 of 243 ETVS systems between 2003 and 2004 □ Procure 14 of 243ETVS systems in 2005
2B10	Potomac TRACON – consolidation of the Dulles, Reagan National, Baltimore-Washington and Andrews Air force Base TRACONs into a single control facility to modify the associated airspace	□ Began construction at site in Virginia	□ Procure air traffic control and airspace management systems, telecommunications equipment, and operational and administrative furniture	□ Commission site in 2002
2B11	Northern California TRACON – consolidation and integration of the approach control functions of Bay, Sacramento, Stockton, and Monterey TRACONs, as well as some Oakland ARTCC airspace			□ Commission site in 2002
2B12	Atlanta TRACON – consolidation of the Atlanta TRACON, Macon	□ Commission site	□ Consolidate Macon and Columbus facilities and	

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
	Radar Approach Control and Columbus TRACON facilities and airspace		airspace into new facility	
2B13	Voice Recorder Replacement Program (VRRP) – provide reliable legal recording services, while reducing maintenance staffing requirements and logistics support	Procure 36 of 513 digital voice recorder systems	Procure and deliver 61 of 513 digital voice recorder systems	Procure remaining 144 digital voice recorder systems
2B14	NAS Infrastructure Management System (NIMS) – establish a National Operations Control Center (NOCC) and 3 strategically located Operations Control Centers (OCCs) to centralize information and technical expertise	Procure and deliver first half of NIMS Initial Hardware Suites for OCCs Three OCCs open with a standard set of NIMS tools and procedures	Begin NIMS Phase 2 Procure and deliver remaining NIMS Initial Hardware Suites for OCCs Deploy a COTS/NDI resource management tool to the NOCC and the three OCCs Deploy a COTS/NDI based Enterprise Management tool	Migrate to new resource management (RM) database in 2003 Deploy RM interface to support field specialist and peer system interfaces Expand functionality of RM –include cost metrics and performance metrics processing Upgrade portable maintenance terminals to ensure compatibility with NIMS functionality
2B15	Airport Surveillance Radar (ASR)-11 – a digital radar system with an integrated monopulse secondary surveillance radar beacon system acquired to replace aging ASR-7 and 8 units	Procure 10 of 112 production systems and test equipment Perform 14 site surveys and site designs Complete system tests for production	Procure 16 of 112 production systems, test equipment, and initial depot spares/repair parts with site preparation, facilities and construction Perform 18 site surveys and 24 site designs	Procure 82 additional production systems (number subject to review of the ASR-11 baseline) ASR-11 first system available for operational use in 2002

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2B17	DoD/FAA ATC Facility Transfer Modernization – designates selected approach controls to be transferred from the DoD to the FAA	Assume operations at Fort Sill Army radar approach control, Henry Post Airfield, Lawton OK	Assume air traffic services currently provided by McClellan AFB, including Camp Kohler, CA	
2B18	Airport Surveillance Radar (ASR)-9 – procure uninterruptible power systems (UPS) and engine generators for specific ASR-9 facilities to reduce outages	Complete power conditioning implementation at 24 of 36 ASR-9 upgraded sites	Implement power conditioning systems at 4 of 40 ASR-9 locations Start replacement of receiver protectors that have exceeded their service life	
2B19	Mode S Provide – installation of hardware circuit card assembly's and software to deploy Traffic Information Systems, and Dynamic Reflectors	Beacon Interrogator Mode last system available for operational use	Commission 10 of 148 sites	Mode S last system available for operational use in 2004
2B20	Terminal Applied Engineering – provides up front planning and will determine how best to integrate the modernization of 40 air traffic control systems at over 400 terminal facilities		Evaluate 53 sites to identify site specific requirements for new equipment transition and integration	Complete evaluation of 310 additional sites

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2B23	Terminal Radar (ASR) Improve – provides incremental improvements to terminal radars that are used to determine aircraft positions approaching, departing, and passing through terminal areas		□ Provide digital charting □ Replace obsolete solid state video mapper with modern equipment at Anchorage Tower and Fairbanks Tower Alaska □ Provide video feed from Richmond ASR-9 capable of switching between Richmond, Norfolk, and Elizabeth City ASRs □ Install ATCBI-5 system at Nellis AFB □ Procure Micro-EARTS display at Anchorage TRACON □ Provide mobile airport traffic control tower for FY 02 Olympic games	□ Continue incremental improvements
2B24	Terminal Communications Improve – regional improvement projects to modify and sustain systems		□ Provide 4 additional VTABS PEMS at Seattle, WA ARTCC □ Provide a Systems Atlanta Information Display System (SAIDS) data display system to each operating position at Fairbanks tower and one at the Fairbanks AFSS	
2C01	Flight Service Station (FSS) Modernization – procurement of	□ HVAC upgrades at 1 site □ Procure and install UPS at 6	□ Procure 4 of 61 PCSs □ Continue acquisition of	□ HVAC upgrades at 28 sites by 2005

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
	power conditioning systems (PCS) for the AFSS to alleviate power problems and accommodate any new load requirements from future systems. Upgrade and sustain leased and owned Flight Service stations.	sites - Bypass switch maintenance at 4 sites	Power conditioning units (8 sites) - Upgrade HVAC at 4 sites	- UPS installation at 18 sites by 2003 - Major rehabilitation at 14 sites. Includes roof, fire life safety and upgrades to Occupational Safety and health Administration (OSHA) standards by 2005
2C03	Operational and Supportability Implementation system (OASIS) – The initial acquisition strategy was for a Commercial Off-the – Shelf/Non-Development Item(COTS/NDI) based leased service. The current acquisition is a modified COTS/NDI based solution. Additional software development was necessary to meet operational suitability requirements. The Flight Service Automation System hardware and software; incorporates Graphic Weather Display system and Direct User Access Terminal Service; and provides new equipment consoles	- Conduct system test and evaluation at Seattle - Complete training at Seattle - Complete new console installation at Seattle and Miami	- Continue software development and testing, - Complete IOT&E - Begin deployment of OASIS - Procure and install 3 systems	- Procure and deliver remaining 57 OASIS systems - Receive In Service Decision at Seattle in 2002 - OASIS lease service first system available for operational use – 2002 - OASIS lease service last system available for operational use - 2005

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2C05	Flight Service Station Switch Modernization – replaces electronic voice switching systems at selected stand alone flight service stations and automated flight service stations	Initiate system engineering and support activities	Perform operational capability testing	Award contract in 2002 Procure and deliver 67 Flight Service Station Voice Switches between 2002 and 2005
2C06	Flight Service Facilities Improvement – upgrade and improve flight service facilities		Replace carpet throughout the AFSS at Ranch Murieta, CA Provide a new FSS building in Cold Bay, AK Replace raised floor carpet tiles at Great Falls AFSS	Continue facility upgrade at various locations
2D01	Very High Frequency Omnidirectional Radio Range (VOR) with Distance measuring Equipment (DME) –establish VOR/DME facilities improvements for en route and terminal air navigation facilities to provide safe and efficient flights and landings		Procure and deliver 203 of 203 TACAN antenna retrofit kits Perform field installation at 183 of 198 sites to sustain network of low power TACAN antennas	Install all TACAN antenna retrofits by 2003 Install remaining 15 lower power antennas by 2005
2D02	Instrument Landing System (ILS) – establish new, partial and full Category I/II/III Instrument Landing Systems and associated equipment (DME, RVR, Approach Lighting System With Sequence Flasher 2 (ALSF-2), Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)	Deliver last 9 of 150 ILS CAT I systems Deliver last 3 of 22 ILS CAT III systems Deliver last 12 of 20 ALSF-2 systems Deliver last 3 of 52 DME systems	Install 4 ALSF-2 and 4 MALSR systems	Install 6 ALSF-2 and 2 MALSR systems in 2002

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2D03	ILS Replace Mark 1A,1B, and 1C – service life extension program replaces the Mark 1A ILS and the major subassemblies of the Mark1B and 1C with current design/production Mark 1F like equipment	Procure and deliver last 100 ILS remote maintenance monitoring kits	Procure and deliver last 20 Ancillary equipment sets	
2D04	ILS Replace GRN 27 – replaces older Category II and III ILS systems with Mark 20 ILS equipment		Complete 5 remaining installations, last system available for operational use	
2D05	Gulf of Mexico Offshore – extend current VHF communications coverage in the Gulf airspace and provide the necessary services to convert the Gulf airspace to an off shore control area rather than an oceanic sector	Award new contract for VHF Extended Range Network (VERN)	Begin refurbishing the hull on Buoy 3 Fund VERN leased-communication expenses and satellite telecommunications (SATCOM) for Buoy Communications System (BCS)	Complete refurbishing the hull on Buoy 3 in 2002
2D09	Distance Measuring Equipment (DME) Sustain – provides for procurement and installation of DME systems	DME contract award Procure 15 of 225 DME systems	Procure and install 14 of 225 DME systems Deliver 29 DME systems	Procure and deliver remaining 182 DME systems between 2002 and 2005
2D11	Non Directional Beacon (NDB) Facilities – components of the ground based navigation system	Procure and install NDB equipment at Alaskan site locations	Continue to procure and install NDB equipment	Continue to procure and install NDB equipment between 2002 - 2004

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2D12	Visual Navaids Establish/Expand – procures and installs visual navaids including Precision Approach Path Indicators (PAPIs) and Runway End Identification Lights (REILs) to enhance landing capabilities at designated airports		□ Install 14 previously procured PAPI systems □ Install 24 previously procured REILs	
2D13	LORAN-C Upgrade/Modernization – provides navigation and timing signals to a variety of users including maritime and aviation communities		□ Continue to upgrade and modernize LORAN-C navigation equipment	
2D14	Navigational and Landing Aids Improve – provide NAVAID, ILS, and glide slope improvements		□ In Chantilly, VA move monitoring and control of ILS and ancillary equipment from TRACON to the tower □ In Clarksburg, WVA, remove obstructions in area surrounding CKB VOR □ Replace outer markers with state of the art systems in 7 locations □ Procure and install self-supporting galvanized steel tower in Hyannis, MA □ Install RMM system at Parksburg, WVA, LOC and CEGS □ Relocate glideslope at Spokane, WA	□ Continue to sustain and upgrade projects

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2E01	Alaskan NAS Interfacility Communications System – establishes an FAA-owned communications system within the Alaskan region that uses satellites earth stations	Procure and deliver 4 of 82 ANICS systems, 58 systems all ready operational	Procure and deliver 2 of 82 ANICS systems	Procure and deliver remaining 18 of 82 ANICS systems
2E02	Fuel Storage Tank Replacement Monitoring – sustain Fuel Storage Tank (FST) systems in its operational inventory to support continued operation of mission-critical activities	Develop compliance assessment process for follow-up monitoring of Regional FST systems Support FST cleanup activities in AAL region Participate in FST Product Team (PT) workshops and initiatives	Provide life/cycle replacement/sustainment of approximately 3000 FST systems Provide support efforts on estimated 850 decommissioned CAA beacon sites	Conduct compliance assessment follow-up monitoring of Regional FST systems Provide life/cycle replacement/sustainment of FST systems Continue remediation efforts after FST system replacements
2E03	FAA Buildings and Equipment – provide facility replacements and upgrades to reduce maintenance requirements associated with an aging infrastructure	Repaired/replaced cable, access roads, grounds, and roof at the most critical VORs Repaired/replaced electrical systems, flooring, and plant equipment at the most critical ARSRs Established/improved lightning, grounding, bonding, shielding at limited RTR locations	Replace/upgrade outdated radio communication link equipment, heating, ventilation and air conditioning (HVAC) systems Repair or replace the most dilapidated shelters for VOR equipment, radar, radar microwave links, ILS, engine generators and communications outlets Repair/improve facility access roads	Continue funding for the most in-need/critical facilities Continue funding and repair and upgrade of buildings for compliance with laws and directives with the objective to reduce the decline in facility infrastructure condition by 2005.

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2E04	Electrical Power Systems – replace existing non-supportable engine/generators, obsolete distribution systems, and upgrade inadequate lightning protection and grounding systems	□ Deliver 27 of 404 Engine Generators □ Uninterruptible Power System first system available for operational use □ Continue to refurbish or upgrade facility power in the NAS (e.g. ups, lightning protection, battery replacements, power cable replacements, battery monitoring, and DC systems). □ Initiated installation of the first Critical Redundant Power Distribution System (CRPDS).	□ Deliver 30 of 404 Engine Generators □ Direct Current System first system available for operational use □ Replace 36 engine generators, power conditioning and battery monitoring systems	□ Deliver last 210 Engine Generators between 2002 - 2005 □ Engine Generator last system available for operational use in 2005 □ Uninterruptible Power System last system available for operational use in 2004 □ Direct Current System last system available for operational use in 2004 □ Complete the initial CRPDS installation by 2002 □ Continue to refurbish or upgrade power systems in the NAS
2E06	Computer Aided Engineering and Graphics (CAEG) Modernization – replaces the most antiquated CAEG equipment at sites with the greatest need and provides integration/site support to existing and replacement CAEG systems		□ Procure and deliver remaining 12 of 36 High Prod. Plotters □ Procure and deliver an additional 35 of 77 Medium Prod. Plotters □ Procure and deliver an additional 35 of 83 Workstations	□ Procure and deliver an additional 12 of 77 Medium Prod. Plotters □ Procure and deliver an additional 13 of 83 Workstations
2E07	Aircraft Related Equipment Program – responsible to keep the agency's aircraft fleet modernized and mission capable		□ Procure and deliver 1of 1 Flight Inspection System Enhancement □ Procure and deliver 1 of 1 Aviation Standards	□ Provide TAWS logistics support requirements such as initial spares, training, test equipment and support equipment

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
			Information System - Procure and deliver 1 of 1 Centralized Flight Monitoring and Scheduling system - Procure and deliver 20 of 132 ILS/VOR Aircraft Receiver replacements - Procure and deliver first 24 of 54 Enhanced Ground Proximity Warning System / Terrain Avoidance System (EGPWS/TAWS) (Aircraft) - Procure and deliver 1 of 1 EGPWS/TAWS (B-727 Simulator) - Procure and deliver first 7 of 54 WAAS Flight Inspection receivers - Procure and deliver first 8 of 46 LAAS Flight Inspection receivers - Procure and deliver first 35 of 35 BAe-800 Flight Inspection Aircraft Audio panels	

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
2E08	Airport Cable Loop Systems Sustained Support – provides a redundant communication path using a fiber optic transmission system		Purchase fiber optic installation equipment Complete fiber optic installations at one or two large airports Begin fiber optic installations at one or two large airports Provide FAA Academy-based training	Continue to replace airport system communication cabling system where airport construction or system installations occur
3A01	NAS Management Automation Program (NASMAP) – integrates NAS data and information, thereby matching data from legacy and emerging systems to provide consistent information	Procure and deliver an additional 100 of 2646 hardware/software systems for data translation	Procure and deliver an additional 100 of 2646 hardware/software systems for data translation	Procure and deliver an additional 60 of 2646 hardware/software systems for data translation in 2002 Procure and deliver an additional 50 of 2646 hardware/software systems for data translation in 2003 Procure and deliver an additional 50 of 2646 hardware/software systems for data translation in 2004 Procure and deliver last 50 of 2646 hardware/software systems for data translation in 2005

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
3A03	National Airspace System Recovery Communications (RCOM) – procures new VHF/FM radio equipment to replace the current VHF/FM regional networks	□ RCOM I (HF Upgrade) last system available for operational use □ RCOM II VHF radio systems contract award □ Procure 28 RCOM II systems	□ Procure and deliver 230 RCOM II systems □ Procure 32 Defense Message Systems	□ Procure 270 RCOM II systems in 2002 □ Procure 300 RCOM II systems in 2003 □ Procure 388 RCOM II systems in 2004 □ Procure 600 RCOM II systems in 2005
3A05	Operational Data Management System (ODMS) – includes the National Airspace System Resources (NASR) portion of the database which is the official Aeronautical Information Service (ASI) data	□ Operational implementation of Obstruction Evaluation /Airport Airspace Analysis	□ Provide Geographical Information System algorithms and referential checks □ Link NASR with the NOTAMS system □ Establish NASR interfaces with the FAA's Airport Airspace Analysis activities , instrument approach procedure automation program, and Obstruction Evaluation/National Airspace Redesign programs □ Establish and improve the NASR interface with the FAA HOST computer □ Begin development of NASR interfaces with Datalink, OASIS, STARs, and TDWR	

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
3A06	Asset Supply Chain Management (ASCM) Logistic Center Support System (LCSS) – data repository for real-time asset identification, status inquiry, life-cycle cost and performance analysis, and budget management and investment decision support	Complete investment analysis Establish system design baseline Establish hardware infrastructure design	Begin acquiring hardware for the operating platform	
3A07	Test Equipment Maintenance Support for Replacement – acquires replacement test equipment for field technicians		Provide portable Instrument Landing System receiver test sets and modernized Communications Service Monitors	
3B01	Distance Learning – provides the FAA with state-of-the art, quality course delivery to geographically dispersed students with a reduced dependency on travel to centralized facilities		Partial replacement of old computer-based instruction Provide technology upgrade of interactive video teletraining satellite network	
3B02	National Airspace System Training Facilities – acquire and install classroom/laboratory upgrades at the FAA Academy		Enhance the Academy's Tower Operator Training System/Enhanced Debrief Stations Update air traffic and airway facilities lab facilities	Continue training facility upgrades
3B03	Aeronautical Center Infrastructure Modernization – a multi-year program to provide adequate space, facilities and corresponding infrastructure at the Aeronautical Center to house training ,	Risk to Logistics Center personnel and unique NAS repair capability due to structural failure of the LSF is being reduced through the construction of a Technical	Provide structural upgrades to the Logistics support Facility Upgrade telecommunications infrastructure	Design for renovation of the Civil Aeromedical Institute (CAMI) building and award contract for the first phase of construction in 2002 Second phase of construction

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
	logistics, supply support, engineering, and other functions supporting the NAS	Support Facility (TSF) to house this function		for CAMI building renovation in 2003 □ Third phase of construction for CAMI building renovation in 2004 □ Fourth and final phase of construction for CAMI building renovation in 2005
4A01	System Engineering and Development Support- Procure the necessary critical technical expertise to perform the function of system engineering and integration for the NAS Architecture and FAA's Acquisition Management system	□ Continue system engineering and integration support for the NAS and its architecture	□ Continue system engineering and integration support for the NAS and its architecture	□ Continue system engineering and integration support for the NAS and its architecture
4A02	Program Support Leases – provides for the payments of land and space leases for operational facilities	□ Fund 4,000 existing operational leases	□ Fund 4,000 existing operational leases	□ Fund 4,000 existing operational leases
4A03	Logistics Support Services (LSS) – compile and maintain adequate documentation, suitable for independent audit, to establish the capitol cost of facilities throughout the FAA	□ Provide approximately 100 staff years to perform real property acquisition, material management and contracting activities	□ Provide approximately 100 staff years to perform real property acquisition, material management and contracting activities	□ Provide approximately 100 staff years to perform real property acquisition, material management and contracting activities

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
4A04	Mike Monroney Aeronautical Center Leases – provides training, logistics, aeromedical research, engineering, maintenance, administrative, and other support services for the Federal Aviation Administration (FAA)	□ Continue Aeronautical Center leases	□ Continue Aeronautical Center leases	□ Continue Aeronautical Center leases
4A05	In-Plant NAS Contract Support Services – encompasses furnishing contracting officers and program managers with expertise to monitor progress, compliance, and problems of FAA contractors.	□ Continue contracting support services for capitol investment plan (CIP) and CIP related programs	□ Continue contracting support services for capitol investment plan (CIP) and CIP related programs	□ Continue contracting support services for capitol investment plan (CIP) and CIP related programs
4A06	Transition Engineering Support – provides support resources to complete implementation and integration of virtually every Capital Investment Plan (CIP) project that is be installed at FAA integration of NAS modernization projects		□ Provide an estimated 379 contract personnel support resources for regional and headquarters transition planning and implementation of NAS programs	
4A07	Frequency and Spectrum Engineering –provides frequency engineering, radio frequency interference (RFI) investigation and resolution, and spectrum analysis support throughout the NAS.	□ Continue engineering support	□ Continue engineering support	□ Continue engineering support

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
4A08	Permanent Change of Station (PCS) - consolidation and commissioning of the identified TRACONs and facilities will require permanent change of station moves for both Airway Facilities and Air Traffic personnel	Supports relocation of personnel	Supports relocation of personnel	Supports relocation of personnel
4A09	FAA Corporate System Architecture – refinement and implementation of a FAA Corporate Information Technology Strategy		Develop and sustain FAA's Information Technology Strategy Secure electronic data exchange and electronic signature capabilities	
4A11	Resource Tracking Program (RTP) – RTP is the sole source of information for the National Work Plan (NWP).		Provide centralized national RTP database Provide Integrated Desktop Support System (IDSS) project management tool with integrated RTP Provide IDSS engineering tool	
4A12	Center for Advanced Aviation System Development (CAASD) – conduct a continuing program of research, development, system architecture, and high-level system engineering to meet FAA's long-term requirements in support of the National Airspace System (NAS)	Continue research	Continue research	Continue research

Budget Line Item	Program Description	Program Accomplishments 2000	Program Accomplishments 2001	Key Events 2002 -2005
5A01	Personnel and Related Expenses – funds the personnel, travel and related expenses of the FAA F&E workforce.	Fund personnel related expenses	Fund personnel related expenses	Fund personnel related expenses

FAA Achievement Strategy: Systems Integration: - Integrate airport and commercial space requirements into NAS planning and architecture

Budget Line Item	**Program Description**	**Program Accomplishments 2000**	**Program Accomplishments 2001**	**Key Events 2002 -2005**
1D01	Local Area Augmentation System (LAAS) – provide a navigation and landing capability to make GPS fully usable for all phases of flight for Category (CAT) I/ II/III requirements. Procure 160 LAAS systems to include 46 CAT I LAAS and 114 CAT III LAAS.		□ Begin acquisition activities to procure CAT I LAAS	□ Begin LAAS Category III FSD activities in 2002 □ Develop a certified CAT I LAAS in 2002 □ Procure 20 of 106 CAT I LAAS in 2002 □ Procure 20 of 106 CAT I LAAS in 2003 □ Procure 20 of 106 CAT I LAAS in 2004 □ Procure 7 of 106 CAT I LAAS in 2005 □ Convert 26 CAT I LAAS to CAT III in 2005