

ATTACHMENT 3
DRAFT CON OPS DOCUMENT



FAA
Performance Analysis Special Projects Office

Market Survey Concept Of Operations

Data Visualization, Analysis, and Reporting System (DVARs)

Version 1.0

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1. STATEMENT OF NEED

This Concept of Operations (CONOPS) document provides high level guidance for the Data Visualization, Analysis, and Reporting System (DVARS) project. This document presents the reason for the project, including brief descriptions of the essential system functions and the project's scope of work, including program manager specified enhancements and process improvement objectives.

The System Capacity, Planning, and Improvements Program is linked to the Federal Aviation Administration's (FAA's) Strategy and Strategic Priorities. This Program focuses on Strategic Priority #2 "Deliver Benefits through Technology and Infrastructure". The Program works towards modernizing the NAS infrastructure by safely integrating new types of user technologies into the airspace. The current system, Performance Data Analysis and Reporting System (PDARS), is an important part of the System Capacity, Planning, and Improvements Program and has served as a critical tool in assisting the FAA in modernizing and improving the National Airspace System (NAS) infrastructure. Planning for facility and system enhancements hinges on the ability to track, monitor, and analyze the daily NAS operations. PDARS provides an integrated tool to address these needs, facilitate the evaluation of the current system, and hasten the enhancements required to effectively maximize capacity.

PDARS currently collects, processes, and performs quality control of the NAS data. The System provides the capability to access data and perform analyses on NAS operations to inform FAA executives and managers of status and potential issues throughout the decision making process. PDARS products include metrics, reports, and briefings, which the FAA uses to help identify deficiencies and develop proposals to improve potential gaps in NAS performance. PDARS is also a critical tool for the modernization of the NAS infrastructure. PDARS captures daily Air Traffic Control (ATC) operations surveillance data and provides analysis capabilities that allow the agency to safely integrate new types of user technologies into the airspace and evaluate effectiveness once implemented. The system facilitates the modeling, measurement, and analysis of new runways, airfield improvements, air traffic procedures, and other technological implementations that improve airport capacity and system efficiency.

The Data Visualization, Analysis, and Reporting System (DVARS) will serve as a replacement and technology insertion and upgrade, since the current PDARS contract is set to expire in calendar year 2016. DVARS will serve as a critical toolset, providing wide-spread access to the capabilities that will ensure maintenance of a safe and modern NAS infrastructure. DVARS will provide integrated visualization and reporting tools that allow users to access quality NAS data and perform modeling, analysis, and trending. The Program Office has been actively engaged in defining the DVARS requirements for the past twelve (12) months. The DVARS requirements identify opportunities for technology insertions, migration to an enterprise architecture that implements service oriented architecture features, and addresses features defined by input from the user community. DVARS functions include the following:

- DVARS will expand user access by using standard FAA work stations connected across the FAA network instead of the dedicated work stations at fixed locations.
- DVARS will provide expanded data availability beyond the airspace associated with a fixed location through an enterprise database.
- DVARS will provide uniform access to three (3) years' worth of historical data to all users with an applicable user role.
- DVARS will provide designated users with access to an additional five (5) years' worth of historical data.
- DVARS will continue to provide complete data sets for the previous day, but current day data will become available as it is processed.

- DVARS will provide access to historical (non-local storage) and geographical data from the enterprise database.
- DVARS users will initially only require administrative support to access the five (5) years' worth of data in the archive database.
- DVARS will make all flight trajectory and supporting data available from the enterprise database rather than from locally distributed flat files.
- DVARS will provide users with the ability to review complete flights across multiple air traffic control facilities' sectors.
- DVARS will provide users with an ad hoc query and reporting function in the integrated business intelligence software.
- DVARS data back-ups will be maintained in a physically separate location from the primary data processing system.
- The DVARS software architecture will employ 64-bit applications, service oriented architecture components, (such as web services, and other current industry best practices), for efficient and reliable performance.
- DVARS will employ a modular approach to its architecture to facilitate rapid and lower cost updates, additions and removals as interfaces, processing requirements, and analysis algorithms that evolve over time.
- DVARS will allow the users to adjust the opacity of weather overlays to enhance the visibility of airspace-related details such as flight tracks, runways, and navigational aids.
- DVARS will provide improved reply performance and update frequency for weather overlays.
- DVARS will provide users with expanded functions to configure displays (for example, use of center point or central point of focus and rotation degrees settings).

DVARS is intended to meet the needs of the current PDARS users while providing a modernized platform to expand access and use of the System throughout the FAA. DVARS will provide a modernized system architecture and suite of software capabilities while maintaining the same quality data and analytical capabilities that the FAA has come to rely upon from the current System. DVARS will provide modular processing, visualization, and reporting capabilities while expanding user access to relevant NAS data through an enterprise data solution accessible on the FAA network.

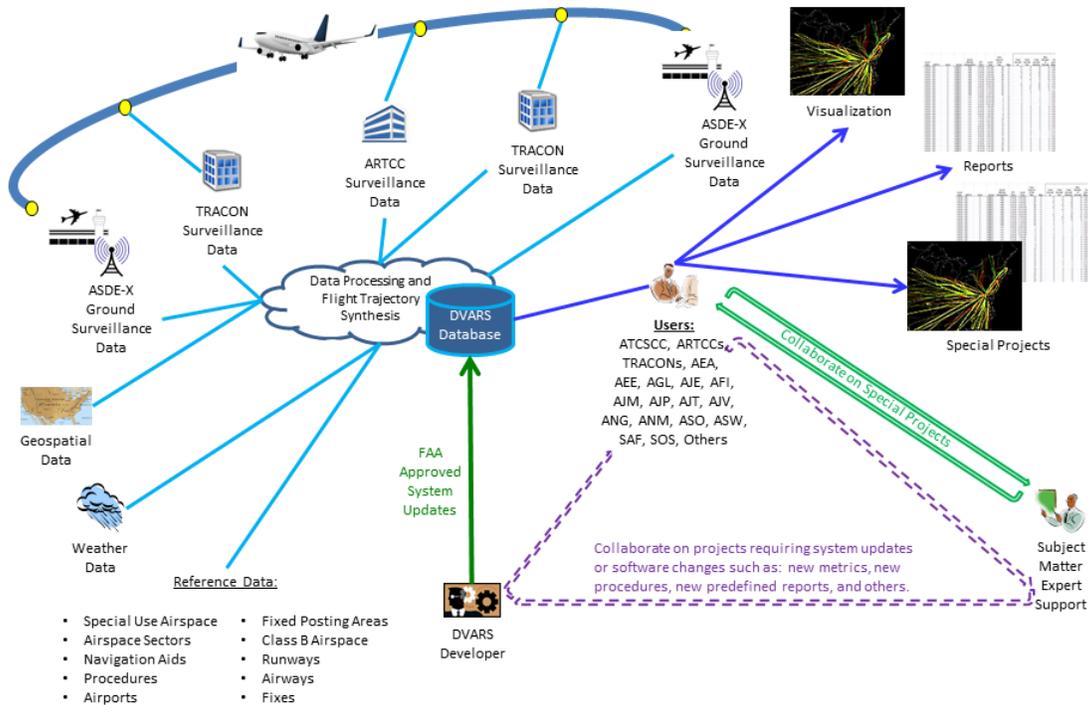


Figure 1 - DVARS OV-1 High Level Operational Concept Graphic

As depicted in the OV-1 graphic, DVARS will provide users with the capability to access quality NAS Data for use with integrated visualization and reporting tools for modeling, analysis, and trending.

DVARS will collect surveillance data from:

- 20 Air Route Traffic Control Centers (ARTCC) (15 ERAM equipped, 5 HOST equipped)
- 28 Terminal Radar Approach Control Facilities (TRACON) (20 STARS equipped, 8 CARTS equipped)
- 27 Airport Surface Detection Equipment, Model X (ASDE-X) equipped airports

DVARS will process the surveillance data into quality analysis ready flight trajectory data that includes the flight track and flight plan for each flight. The quality flight trajectories can be combined with geospatial, weather, and other reference data to present a complete picture of the captured flight operations data.

Users will have the ability to visualize flight data graphically and produce pre-defined or ad hoc reports from the database. Users will also have the ability to collaborate with subject matter experts to prepare special studies and analyses. In some cases the special projects will require collaboration between the users, the subject matter expert support, and a software developer in order to add program manager approved changes to the operational software baseline. These changes may be in the form of new metrics, predefined reports, system interfaces, and other revisions that leverage the data available in the database or incorporate data from new data sources.

In modernizing the System, the following improvements have been identified for inclusion in DVARS:

- DVARS will implement an enterprise database solution accessible on the FAA network.
- DVARS will provide access to web-distributed applications, eliminating the dedicated client workstation hardware previously required at various operational locations. This will allow the DVARS user community to expand and will increase the number of locations that are able to access the data and analysis tools.
- DVARS will include an integrated business intelligence tool allowing users to define and execute their own custom (or “ad hoc”) reports without external support.
- DVARS will provide user access from a standard FAA workstation running the standard FAA software image.
- The DVARS tool and data repository will be hosted on FAA hardware at an FAA-owned data center and maintained by authorized FAA personnel (at either the FAA Enterprise Data Center (EDC) or the FAA William J. Hughes Technical Center (ACT)).
- DVARS will provide users with increased control over the creation of reports.
- DVARS will provide an archive capability for the management of older data.
- The DVARS solution will include a back-up and restore capability that will be maintained at a separate physical FAA location from the production system.

2. ORGANIZATIONAL UNITS IMPACTED (CUSTOMERS)

DVARS is intended to support the same user base as the legacy system. This includes support for field offices as listed below:

- Air Traffic Control System Command Center (ATCSCC)
- Air Route Traffic Control Centers (ARTCCs) (20)
- Terminal Radar Approach Control Facilities (TRACONS) (28)
- Airport Traffic Control Towers (ATCTs)
- FAA Service Centers
- FAA Regional Offices
- FAA Headquarters Organizations

DVARS data will be used to support both the field offices and other FAA Offices for a variety of special studies and analysis projects. The following list provides examples of the types of projects that the DVARS data is expected to support:

- Cost-Benefit Analysis of performance, capacity, and efficiency within the NAS
- Terminal Operations efficiencies and quality assurance/quality control
- Environmental and Energy research and assessments
- Evaluation of operational enhancements
- Evaluation of Performance Based Navigation (Metroplex)
- New Technology Validation

3. WORK TO BE AUTOMATED

DVARS will provide a technological replacement of PDARS. DVARS will improve upon existing automated and semi-automated processes and allow users to access the quality NAS data and functions required for modeling, analysis, and trending work.

3.1 Enhancements to PDARS Capabilities

In addition to meeting current PDARS capabilities, DVARS will provide a technological replacement of the existing analysis tool, providing the following enhancements:

- DVARS will allow users to query NAS data from an enterprise database using integrated visualization and reporting tools. DVARS will provide:
 - Access to historical data beyond the current minimum 90 day availability (a limit at many current PDARS locations).
 - Availability of data required to evaluate flights from departure gate to arrival gate (regardless of the number of facilities' data is required).
- DVARS will provide users with enhanced reporting capabilities using an integrated Business Intelligence (BI) tool. DVARS will allow user to:
 - Generate standard pre-defined NAS reports on demand from the enterprise database.
 - Create custom NAS reports on demand from the enterprise database and Export data from pre-defined and custom NAS reports to multiple formats for distribution.
- The DVARS web distributed application architecture will expand user access.
- DVARS will facilitate exchange of NAS data through FAA services implementing a Service Oriented Architecture (SOA). SOA-compliant services will allow the FAA to:
 - Publish quality NAS data using SOA-compliant services.
 - Migrate existing inbound data feeds to SOA-compliant services, as appropriate.

4. COSTS AND BENEFITS

Historically, PDARS has resulted in increased productivity within the FAA. PDARS automated metrics that were previously calculated manually and supports shortfall analysis of operations in order to increase productivity, increase operational efficiency of the NAS users, and optimize controller staffing. Increasing access to tools that support these types of analysis will result in greater productivity gains. The DVARS modernization will make the toolset widely available. FAA offices that currently rely on PDARS and new users that did not have access in the past will be able to use the system and benefit from its use.

The cost and benefits of creating DVARS is to reduce the overall lifecycle cost of the analysis and visualization tools. A key element of the expected costs savings is the elimination of the fixed costs for the dedicated hardware and network currently used to support the PDARS tool.

DVARS' enhanced system capabilities, including a more user friendly interface and increased access to data, are expected to empower users with the ability to readily access three (3) years of data and prepare analyses projects with reduced levels of Full Time Equivalent (FTE) Subject Matter Expert (SME) support.

DVARS will provide FAA Programs that currently use PDARS to support activities, such as airspace redesign with wider access to the visualization and analysis toolset, as well as expanded data access. Wider FAA access to DVARS will spread the use of the toolset to identify and propose solutions based on the data provided by the tool.

DVARS will provide FAA Offices that respond outside the agency on issues such as airspace redesign, Metroplex, and congressional inquiries with access to tools and data for preparing communication packages. These benefits will result in two-fold cost savings to the program

offices by avoiding upfront hardware costs, for dedicated work stations, and gaining cost saving measures in the solutions that are provided through the DVARS Program.

5. OPTIONS CONSIDERED

Several options for creating DVARS are offered for consideration as solutions. No options have been identified as the definitive solution at the time of the creation of this Concept of Operations (CONOPS) document. The following options will be analyzed by the Development team:

- Commercial-off-the-Shelf Software (COTS) solutions.
- Government-off-the-Shelf Software (GOTS) solutions.
- Custom-built software.
- A blending of COTS, GOTS, and custom-built software.

Any solution must comply with the overall FAA Enterprise Architecture (EA). The requirements development phase must focus primarily on identifying the needs of the stakeholders. At this time, it is not determined as to how the solution will be best implemented.

6. HOW THE FUNCTION IS CURRENTLY PERFORMED

Currently, PDARS consists of dedicated hardware that is deployed in a distributed manner to a sub-set of ATC facilities and selected FAA offices. Users are required to log on to dedicated workstations in order to access the visualization and reporting applications that are PDARS components. Figure 2 contrasts the existing system architecture with the enterprise architecture that is envisioned for the DVARS System.

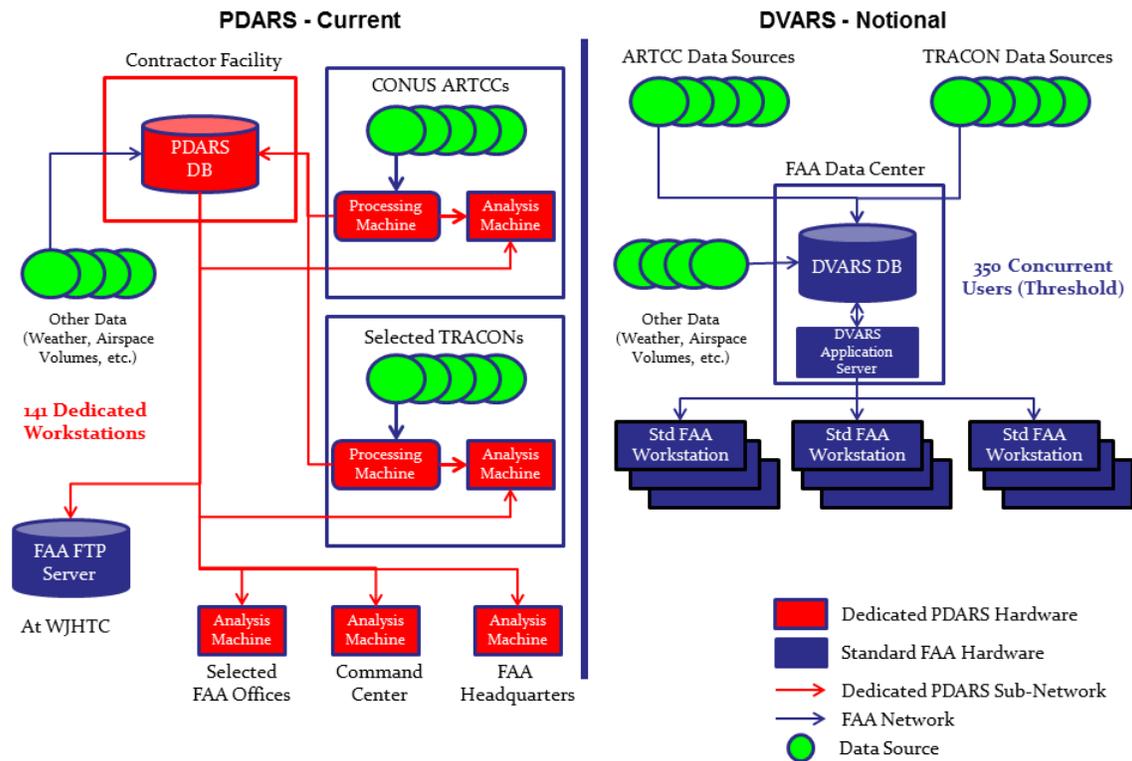


Figure 2 - Comparison of Current and Notional Architecture

Functionally DVARS will continue to collect, process, and analyze surveillance data from the NAS. Users will have access to a minimum of three (3) years' of data. Applications will be delivered across the network from an enterprise suite of database and application servers hosted at an FAA data center. Users will be able to access reports and visualization functions from a standard FAA workstation.

7. ACRONYMS, TERMS, AND DEFINITIONS

7.1 Acronyms and Definitions

The following acronyms and definitions were used in this document.

Table 7-1 Acronyms and Definitions

Acronym	Definition
ACT	William J. Hughes Technical Center
ARTCC	Air Route Traffic Control Center

Acronym	Definition
ARTS	Common Automated Radar Terminal System
ASDE-X	Airport Surface Detection Equipment, Model X
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATCT	Airport Traffic Control Tower
ATO	Air Traffic Organization
BI	Business Intelligence
CONOPS	Concept of Operations
COTS	Commercial-off-the-Shelf
DVARS	Data Visualization, Analysis, and Reporting System
EA	Enterprise Architecture
EDC	Enterprise Data Center
ERAM	Enroute Automation Modernization System
FAA	Federal Aviation Administration
GOTS	Government-off-the-Shelf
NAS	National Airspace System
NDI	Non-Developmental Item
PDARS	Performance Data Analysis and Reporting System
SME	Subject Matter Expert
SOA	Service Oriented Architecture
STARS	Standard Terminal Automation Replacement System
TRACON	Terminal Radar Approach Control Facility

7.2 Terms and Definitions

The following terms and definitions were used in this document.

Table 7-2: Terms and Definitions.

Term	Definition
Ad Hoc	For special purpose or use, such as a user defining a custom report for a special presentation or research project.
Air Route Traffic Control Center	A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. There are 20 ARTCCs in the continental U.S.
Air Traffic Control	A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.
Airport Surface Detection Equipment, Model X	A surveillance system using radar, multilateration and satellite technology that allows air traffic controllers to track surface movement of aircraft and vehicles. It was developed to help reduce critical Category A and B runway incursions.
Airport Traffic Control Tower	A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the Class D airspace area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or non-radar).
Business Intelligence	<p>Business Intelligence (BI) is the use of computing technologies for the identification, discovery and analysis of business data - like sales revenue, products, costs and incomes.</p> <p>BI technologies provide current, historical and predictive views of internally structured data for products and departments by establishing more effective decision-making and strategic operational insights through functions like Online Analytical Processing (OLAP), reporting, predictive analytics, data/text mining, benchmarking and Business Performance Management (BPM). These technologies and functions are often referred to as information management.</p>
Commercial-off-the-Shelf	Commercial-off-the-Shelf (COTS) is a term that references Non-Developmental Items (NDI) sold in the commercial marketplace and used or obtained through government contracts. The set of rules for COTS is defined by the

Term	Definition
	<p>Federal Acquisition Regulation (FAR).</p> <p>A COTS product is usually a computer hardware or software product tailored for specific uses and made available to the general public. Such products are designed to be readily available and user friendly. A typical example of a COTS product is Microsoft Office or antivirus software. A COTS product is generally any product available off-the-shelf and not requiring custom development before installation.</p>
Common Automated Radar Terminal System	<p>There are presently two major types of Automated Radar Terminal System (ARTS) models in use at FAA facilities, ARTS models IIE and IIIE. Current versions of the ARTS are now also referred to as Common ARTS or CARTS due to the common national software. The ARTS IIIE version was designed to support 15 sensors, 10,000 simultaneous tracks, and over 200 displays. ARTS-IIIEs are operational at eight large TRACONS. ARTS IIE versions were designed to support one or two sensors and up to 22 displays in two different configurations that can process 256 simultaneous tracks per sensor.</p>
Concept of Operations	<p>Describes the proposed system in terms of the user needs it will fulfill, its relationship to existing systems or procedures, and the ways it will be used. CONOPS can be tailored for many purposes, for example, to obtain consensus among the acquirer, developers, supporters, and user agencies on the operational concept of a proposed system. Additionally, a CONOPS may focus on communicating the user's needs to the developer or the developer's ideas to the user and other interested parties.</p>
Data Visualization, Analysis, and Reporting System	<p>DVARs provides modular processing, visualization, and reporting capabilities and expands user access to relevant quality National Airspace System (NAS) data through an enterprise data solution accessible on the Federal Aviation Administration (FAA) network.</p>
Enterprise Architecture	<p>The FAA Enterprise Architecture provides an explicit description of the current and desired relationships among business and management processes and information technologies within the FAA. The Enterprise Architecture consists of business process models, technical reference models, and systems models and is directly supported by the FAA Enterprise Data Architecture.</p>
Enterprise Data Center	<p>U.S. DOT security-certified Tier 3 hosting facility, known as the Systems Management Facility (SMF). The SMF is one of four authorized FAA Enterprise Data Centers. The SMF holds certification with the International Organization for Standardization (ISO) 20001 as a certified facility.</p> <p>The SMF secure IT infrastructure consists of nearly 700 physical and virtual servers, over 75 Oracle databases, more than 15 Microsoft SQL Server databases, and offers in excess of 1,520 terabytes of physical data storage. The facility has redundant operations in cooling, emergency</p>

Term	Definition
	<p>power, and uninterrupted power supply and is rated as a Tier 3 data center.</p> <p>The Data Center provides services such as: systems administration, database administration, patch management, storage administration, incident management, backup/restoration and disaster recovery. The SMF uses server virtualization technologies, strict standards, and economies of scale to enable rapid delivery of cost-effective, fully managed operating platforms with expanded inheritable security controls.</p>
Federal Aviation Administration	<p>The division within the Department of Transportation of the United States government that has the responsibility of promoting safety in the air, by both regulation and education. Aircraft and the airmen who operate them are licensed by the FAA, and the FAA maintains the airways along which the aircraft fly. The FAA is headed by a civilian, the Administrator of Federal Aviation.</p>
Government-off-the-Shelf	<p>A product that is typically developed by the technical staff of the government agency for which it is created. It is sometimes developed by an external entity, but with funding and specification from the agency. Because agencies can directly control all aspects of GOTS products, these are generally preferred for government purposes.</p>
National Airspace System	<p>The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material.</p>
Non-Developmental Item	<p>(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;</p> <p>(2) Any item described in paragraph (1) of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or</p> <p>(3) Any item of supply being produced that does not meet the requirements of paragraphs (1) or (2) solely because the item is not yet in use. (48 CFR 2.101)</p>
Service Oriented Architecture	<p>Service-Oriented Architecture is an application architecture in which all functions, or services, are defined using a description language and have invocable interfaces that are called to perform business processes. Each interaction is independent of each and every other interaction and the interconnect protocols of the communicating devices (i.e., the infrastructure components that determine the communication system do not affect the interfaces).</p>

Term	Definition
Standard Terminal Automation Replacement System	<p>Air traffic control system for managing terminal area airspace for both the FAA and Department of Defense (DoD). STARS receives radar data and flight plan information and presents the information to air traffic controllers on high resolution, 20" x 20" color displays allowing the controller to monitor, control, and accept hand-off of air traffic. STARS is capable of tracking up to 1350 airborne aircraft simultaneously within a terminal area. The system interfaces with multiple radars (up to 16 short and long range), 128 controller positions, 20 remote towers, and a 400 by 400 mile area of coverage.</p>
Terminal Radar Approach Control Facility	<p>A terminal ATC facility that uses radar and non-radar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility.</p>