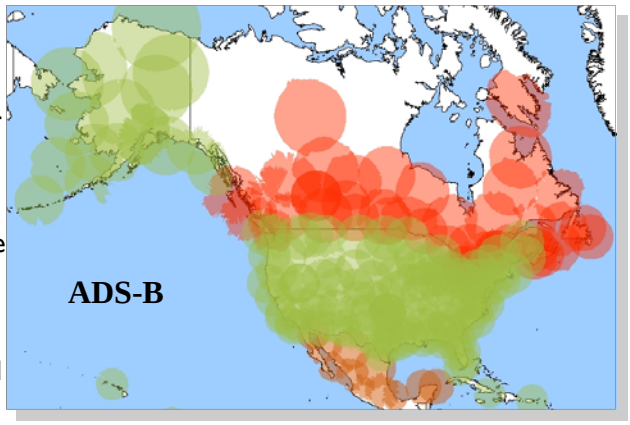
CNS Coverage Model

The Communication, Navigation, Surveillance (CNS) Coverage Model calculates the theoretical coverage of ground-based CNS facilities.

The CNS Coverage Model is used to create coverage maps for communication, navigation, and surveillance devices. These include primary and secondary radars, air-ground communication radios, VHF Omni-directional Range station and Distance Measuring Equipment navigation aids, among others. The waveforms of VHF and UHF share the characteristic of line-of-sight signal propagation. As such, the basic shape of coverage is conical, with increasing coverage at higher altitudes. VHF and UHF signals are affected by terrain and ground obstacles and therefore computing the theoretical coverage in a real world location requires complex calculations to account for such interference.

JTA developed the CNS Coverage Model as a powerful analysis tool to automate the complex coverage area calculations. This data is overlaid upon precise JTA Master Maps featuring terrain, obstacles, airways and other elements. Using the Model, JTA system engineers are able to produce highly accurate and detailed coverage analysis. This analysis has numerous applications such as determination of airspace and airway CNS coverage, assessing redundancy and gaps in coverage, and planning CNS device deployment.



Areas of radar union coverage at 20,000' MSL in Canada, United States and Mexico plotted by the JTA ASET CNS Coverage Model.

Coverage Area Methodology The CNS Coverage Model finds the spot elevations from Shuttle Radar Topography Mission (SRTM) and U..S. Geological Survey Digital Elevation Maps along azimuth lines and spot elevation lines. The granularity of the accuracy is fully configurable to meet requirements: the spacing between azimuth lines is adjustable from one (1) degree upwards and the length of azimuth lines is adjustable. The CNS Coverage Model then calculates the screening angle for each point of intersection found. Once this has been defined, the Model can then determine the device's coverage areas for different flight levels. This coverage area is derived from the maximum screening angles calculated along each azimuth.

Union and Multiple Coverage The output of the CNS Coverage Model can provide union and multiple coverage areas. Union coverage area shows the aggregate coverage resulting from multiple devices. In other words, where at least one device can provide coverage, multiple coverage shows areas of overlapping (redundant) coverage within the union coverage area. In other words, multiple coverage indicates where two or more devices cover the same area and the degree of redundant coverage.

ASET Aviation System Engineering Tools

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ASET Aviation Systems Engineering Tools:

Master Mapper - The Master Map begins with an accurate map of the physical world. Hundreds of political and aviation information layers can be added: sovereign and delegated airspace assigned by the International Civil Aviation Organization (ICAO); the world's flight information regions (FIRs); great circle routes between selected city pairs; airport locations; air routes; communication, navigation and radar facility coverage. Operational and technical details for a country or region can be added as required and the map can be projected in any traditional view.

Communication, Navigation, Surveillance (CNS) Coverage Tool - CNS Coverage Tool calculates the theoretical coverage of ground-based CNS facilities. The CNS Coverage Tool compensates and adjusts for elevation of the site, height of the antenna, and screening angles.

NAS Design Tool - NAS Design Tool enables the traceability of procedural, communication, and machine-functional requirements from an Operations Concept. The tool describes how people, procedures, and machines provide the required air navigation services to aviation users.

Air Traffic Analysis Models

Demand/Capacity Model determines the current scheduled traffic through a selected airspace, as well as other traffic that would benefit by gaining access to that airspace. When this tool is used with the Master Map, detailed airspace analysis based on demand and capacity projections can be conducted.

Revenue and Cost Model projects operating revenues and costs attributed to the levels of Air Navigation Services provided.

Air Traffic Control (ATC) Staffing Model projects the air traffic staffing required to support the projected demand using the planned sectorization scheme.

Technical Staffing Model *helps in* planning for the number of maintenance and operations personnel and their base locations.

The Performance Analysis System (PAS) - The processes and capabilities developed in support of TMA Performance Analysis evolved into a system that helps analysts quickly retrieve and analyze data, and report results in customized formats. PAS provides the capability to analyze and report the performance of the National Airspace System (NAS) utilizing relational GIS and Oracle data bases and dynamic processes that can deliver results world-wide through the use of web based automation.

Flight Plan Management and Billing (FPM+B)© - Automatically "captures" flight data from sources and generates flight progress strips and invoices for airspace use and communications charges.

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AIRPORT and AVIATION SYSTEMS Planners, Designers, Engineers

10 Post Office Road, Suite 000
Forest Glen, Maryland 20910-1103
USA

Phone +1 301-565-8000
Facsimile #1 301-585-8680
www.jta-atc.com