

# Capstone

## Sensis Solutions at Work

During the past 10 years, Alaska has experienced an average of one general aviation aircraft accident every other day. The Southeast Alaskan region is mountainous and has no radar coverage below 10,000 feet. With no highway structure connecting communities, airplanes are the primary form of transportation.

Capstone, a joint industry and FAA initiative, uses current and emerging technologies to accelerate improvement of aviation safety and efficiency in the area. Sensis Automatic Dependent Surveillance – Broadcast (ADS-B) Ground-Based Transceivers (GBTs) are being deployed to help reduce mid-air collisions, weather-related accidents, and controlled flight into terrain events in this environmentally challenging state. The transceivers will improve safety and search and rescue activities by providing enhanced air traffic surveillance coverage and weather data to the cockpit.

ADS-B enables aircraft to share position, velocity and other information, leveraging the Global Positioning System (GPS). Sensis Corporation provided 78 GBTs supporting Universal Access Transceiver (UAT) data link and will be providing 15 transceivers supporting 1090 Extended Squitter (ES). These two data links were decided upon by the FAA in June 2002. UAT is intended for general aviation aircraft; 1090ES is intended for air carrier and private/commercial operators. To ensure high performance, Sensis GBTs were designed to be compliant with the RTCA Minimum Operational Performance Standards (MOPS) developed for both data links.

To meet the challenge of servicing the ADS-B transceivers in the remote, rugged terrain, Sensis is deploying a Remote Control and Monitoring System (RCMS). RCMS consists of a Central Control and Monitoring Server (CCMS), which allows system specialists at the FAA's Air Route Traffic Control Center in Anchorage to monitor, maintain and certify ADS-B GBTs without sending field technicians to the transceiver locations and a Local Control and Monitoring System (LCMS), which



enables field technicians to reconfigure the ADS-B GBTs and to address any issues identified by the CCMS via their laptop PCs on site.

### Benefits

- **Provides latitude, longitude, velocity, altitude, heading and identification information** — the ADS-B transceivers capture this information as determined by onboard avionics and a Global Navigation Satellite System
- **Improves safety and search and rescue activities** — by providing enhanced air traffic surveillance coverage and weather data to the cockpit
- **Improves separation standards and approaches in low-visibility conditions** — by providing surveillance data in areas not covered by traditional radar
- **Provides a flexible software architecture** — to incorporate future growth

## Capstone Overview and Specifications

In addition to the introduction of current and emerging concepts and technologies, Capstone links multiple initiatives under a common umbrella for planning, coordination, focus and direction. UAT ADS-B GBTs are deployed at Embry-Riddle Aeronautical University in Prescott, Arizona and Daytona Beach, Florida under the FAA's Safe Flight 21 Program. Safe Flight 21 is a joint FAA and industry cooperative effort in the lower 48 states to explore the use of ADS-B and other related enabling technologies for improving the safety, efficiency and capacity of the National Airspace System.

Sensis' ADS-B technology extends beyond its UAT and 1090ES ADS-B GBTs. Sensis multilateration GBTs – an integral component of the FAA's Airport Surface Detection Equipment, Model X (ASDE-X)



program – contain built-in 1090ES ADS-B capability in compliance with the RTCA MOPS.

Sensis ADS-B GBTs improve situational awareness by supporting satellite navigation, broadcast services for cockpit display of aircraft traffic, graphical weather maps and textual aeronautical data.

### ADS-B Specifications

#### Performance Specifications

<b>Sensitivity:</b>	-98dbm
<b>Transmit Power:</b>	10, 25, or 75 W (adjustable)
<b>Target Capacity – Downlink:</b>	500 targets per second
<b>Target Capacity – Uplink:</b>	190 TIS-B targets and 8 ground uplink blocks per second
<b>Latency:</b>	<400 msec
<b>Data Output Standard:</b>	ASTERIX Category 21 and 33
<b>MOPS Compliance:</b>	UAT Transceiver: DO-282 (relevant sections)
<b>Ground Interfaces:</b>	Ethernet (UDP or TCP), asynch serial, synch serial
<b>Local and Remote Maintenance Interfaces:</b>	Asynch serial, synch serial Internal GPS timing or external timing interface available

#### Environmental Specifications for Transceiver

<b>Transient Protection:</b>	All External Interfaces
<b>Input Power Voltage:</b>	24V DC
<b>Power Consumption (nominal):</b>	29.4 watts
<b>Safety Certifications:</b>	UL60950-1, EN60950-1, IEC60950-1 and EN60215
<b>RF Compatibility:</b>	MIL-STD 461E
<b>Temperature:</b>	-40 to +70 degrees Celsius
<b>Relative Humidity:</b>	5 to 90 percent
<b>Size:</b>	3U EIA rack standard; depth 11 inches
<b>Weight:</b>	19.5 lbs



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