MULTILATERATION

Airport Surface, Terminal and Wide Area Surveillance

Effective surveillance contributes to increased safety, capacity and efficiency of airspace and airports alike. Unfortunately, traditional radar alone does not provide the performance required to obtain these benefits. Saab multilateration offers a proven solution to this problem.

Multilateration offers accurate surveillance and identification of all transponder-equipped aircraft in the air as well as on an airport’s surface. It provides highly reliable data for further processing by Air Traffic Control (ATC) displays, Advanced - Surface Movement Guidance and Control Systems (A-SMGCS), decision support tools, flow management systems and airline/airport operation applications. Controllers receive seamless surveillance data which enables increased operations in low visibility conditions and enhances safety.

Certified for ATC use, Saab multilateration is deployed around the world for surface, enhanced terminal and wide area surveillance. Saab multilateration has been the solution of choice for more than 90 locations throughout Europe, Canada and Asia. Additionally, it is a core component of the FAA’s Airport Surface Detection Equipment, Model X (ASDE-X) system which Saab has installed at 35 airports across the U.S.
Saab multilateration, a transponder based system, uses multiple sensors to capture aircraft transponder pulses and calculate position and identification. Low cost, non-rotating sensors receive, decode, timestamp, and transmit the data from the transponder to a Target Processor (TP). The TP compares the reports to derive the target position based on the time of receipt of the signals at each sensor.

- **Improved Accuracy** – The multilateration process, with its typical update rate of once per second, allows the multilateration system to provide an accuracy of five meters or better for surface surveillance, and 30 meters or better for wide area surveillance.

- **No Additional Avionics Required** – An important feature of multilateration is that it works with any transponder-equipped aircraft without additional avionics. Additionally, multilateration supports Automatic Dependent Surveillance – Broadcast (ADS-B) with no equipment modifications.

- **Minimal Installation Requirements** – Unlike traditional radar, multilateration relies on small equipment enclosures and non-rotating antennas that are installed on existing communication towers, terminals and other structures. Additionally, multilateration sensors can communicate with the TP via a wide variety of communication options.

**Airport Surface Surveillance**

Saab multilateration offers an ideal solution for the complexity of airport surface surveillance. At larger airports, multilateration complements the existing surface movement radar system, providing considerably improved and more reliable data than from a single surveillance sensor. For smaller airports that rely on visual surveillance, multilateration provides a cost effective surveillance system to enhance safety. The flexibility in configuring the system allows coverage over the entire airport area, including the ramp and approach/Departure areas, or just the movement area. Airport vehicles can also be equipped with low-cost transmitters enabling aircraft and vehicle tracking in a single system.

**BENEFITS:**
- Improved situational awareness in all weather conditions
- Enhanced safety
- Reduced runway incursions
- Improved airline operations management
- Increased capacity
- Improved airport efficiency
Terminal and Wide Area Surveillance

Saab multilateration is being used worldwide for terminal, enroute, and gap filler surveillance. The system can cost-effectively scale from small airport applications to cover hundreds of thousands of square miles. The small, low-cost sensors are easy to install in rough terrain where traditional radar systems often experience coverage gaps due to terrain blockage. Saab multilateration provides controllers with positive identification, high update rates and accurate positional information in all weather conditions.

BENEFITS:
• Better accuracy and update rate than existing radar systems
• Adaptable, low altitude coverage in challenging environments
• Low maintenance, low power consumption for remote sites

Saab multilateration accurately tracks targets at both low and at high altitudes simultaneously. Saab multilateration is being used to track flights in a number of challenging air surveillance applications including terminal area surveillance and precision runway monitoring (PRM) for ATC, military range surveillance and enroute flight following.

Saab multilateration provides a bridge to the future of surveillance – ADS-B. Each multilateration sensor is equipped to provide both multilateration and ADS-B positions. Installing multilateration in a wide area configuration establishes the infrastructure required for today’s surveillance needs as well as tomorrow’s ADS-B equipage.
Multilateration Specifications

<table>
<thead>
<tr>
<th>Equipment Specifications:</th>
<th>Outdoor Equipment:</th>
<th>Indoor Equipment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-40 to 55°C</td>
<td>10°C to 30°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5 to 95%, non-condensing</td>
<td>20 to 80%, non-condensing</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>95 kts (operation), 120 kts (survivability)</td>
<td>n/a</td>
</tr>
<tr>
<td>Lightning Protection</td>
<td>All external interfaces</td>
<td></td>
</tr>
<tr>
<td>Input Power Voltage</td>
<td>18-30 VDC or 100-240 VAC +/- 10%</td>
<td></td>
</tr>
<tr>
<td>Input Power Frequency</td>
<td>50 to 60 Hz nominal +/- 3%</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt; 90W w/o heater, &lt; 150W w/ heater</td>
<td></td>
</tr>
<tr>
<td>Safety Certifications</td>
<td>CSA, cTUVus, UL 60950, EN 55022, 61000, 60215, 60950, IEC 60950, CE</td>
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</tr>
<tr>
<td>RF Compatibility</td>
<td>FCC Part 15, Class B</td>
<td></td>
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</tbody>
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System Performance

Dependent on system configuration:

- Transponder Types: Mode S, (ELS/EHS), Mode S ES, Mode A/C
- RMS Position Error (accuracy): surface: < 5 m, airborne: < 30 m
- Target Capacity: 2000 targets
- Track Initiation: 5 seconds max
- Target Update Rate: 1–12 seconds (Adaptable)
- Probability of Detection: >97%
- System Latency: 250 microseconds
- SSR Interrogation: ICAO Annex 10 compliant
- Data Output Format: ASTERIX CAT 010, 011, 20, 48, CD2 (MLAT), ASTERIX CAT 21 (ADS-B), ASTERIX 19, 23, 34 (Status)

Target Processor (TP):
- Computes and tracks target positions (2D/3D)
- Performs time synchronization of RU messages
- Reports targets in multiple industry standard ASTERIX formats
- Manages data communications over wired and wireless media
- Schedules interrogations

Reference Transmitter (REFTRAN):
- Synchronizes system timing in surface applications
- Provides system self-test functionality
- Optional high gain DME Omni antennas for WAM

Sensor/Remote Unit (RU):
- Receives, timestamps and decodes 1090 MHz transponder reply signals and ADS-B messages
- 1030 MHz interrogations of aircraft transponders for identification, altitude, and data link (optional)
- Can operate in receive only or receive & transmit
- Time synchronization can be achieved through RefTrans, Site Monitors, or GPS

Embedded Local Control & Monitoring Software (ELCMS):
- Provides local control of the RU for field maintenance
- Web based application that can run on any laptop with a web browser

Maintenance Display Terminal (MDT):
- Provides user interface for System configuration and control
- Displays system health and status
- Provides recording capabilities and optional 22TB recording storage vault
- Target playback functionality for performance analysis

Specifications subject to change without notice.

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