Implementation of MLAT/ADS-B Systems

ICAO/FAA Workshop on ADS-B and Multilateration Implementation

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Proven Multilateration and ADS-B Surveillance Solutions
1. ADS-B Surveillance is gaining a momentum
2. Many leading ANSPs have made strategic decisions to deploy ADS-B
3. However, these deployments are still well ahead of aircraft equipage and this is the main reason why ASNP’s should be considering the accepted migration path through Wide Area Multilateration either before or simultaneously with any ADS-B surveillance deployment.

Issue 1
How do we bridge the equipage gap?

Issue 2
How do we validate ADS-B self-reported position?

“ADS-X”
Combination of ADS-B with Multilateration
Price/Performance Drivers
Top 5 Reasons for WAM Migration Path

1. Seamless Integration with current surveillance and ATM systems
2. SSR Replacement keeping the same or better performance
3. Enhanced Approach Operations such as PRM
4. Coverage Gap Filling / Application in Mountains
5. ADS-B Augmentation / Integrity Checking

MAJOR ANSPS HAVE DEPLOYED WIDE AREA MULTILATERATION OVER LARGE PORTIONS OF THEIR AIRSPACE
Era MSS Surveillance Solutions

Area Control Center
(En-Route Surveillance)
- Wide Area Surveillance
  - SSR replacement
  - Surveillance Gap Filler
  - Active or Passive

Approach Control
(Terminal Manoeuvring Surveillance)
- Precision Approach
  - PAR replacement
  - PRM replacement
  - Up to 80 NM

Tower Control / APRON / Gate
(Airport Surface Surveillance & Airport Ops)
- Vehicle Tracking
  - SMR complement
  - Surface only
- Airport Surface
  - A-SMGCS
  - Up to 5 NM
  - With / Without Vehicle Tracking
- Airport Operations
  - Environment Monitoring
  - Revenue Maximization
  - Operations Optimization
  - Specialized Applications
MLAT / ADS-B Ground Stations: Extremely Reliable

- Built to IP67 Standards - Rugged
  - Lightning strikes
  - Gale-force winds
  - Torrential rain
  - Sand/dust storms
  - Heat up to 60°C
  - Cold down to -40°C
  - Direct force up to 250kg
One Technology Fits Many Applications

1. National Wide MLAT/ADS-B system in Namibia
2. WAM MLAT/ADS-B system in Tajikistan
3. Oil Rigs - North Sea low level traffic system
4. TMA and approach surveillance in New Zealand
Namibia – National Wide Area Multilateration

- New national ATM system
  - Thales Eurocat fusion and display
  - Thales radar in Windhoek
  - Era multilateration for national en-route
  - ED-142 performance required

- 36 ADS-B/MLAT stations
  - Some very remote, hostile locations
  - Builds on regional experience in ATNS
  - Covers 800,000km² of airspace, FL >145 and TMA

- N-1 availability required

- Safety Case and operational approval by Austrocontrol, Austria

- Ongoing extension program for Walvis Bay and Caprivi strip

The largest WAM coverage area in the World!
Namibia Wide area multilateration system – MLAT accuracy vs. MSSR at FL 145

MSSR in Windhoek coverage at FL 145

White colour represents MLAT coverage with accuracy of 20m RMS !!!!
Namibia Wide area multilateration system – Installation examples
Cross Border Surveillance is Easily Achieved

Caprivi strip

Angola
Zambia
Botswana

Expanding Cross-Border MLAT Coverage

Country A

Country B

Existing MLAT
Additional MLAT
Existing Coverage
Expanded Coverage
WAM system for Tajikistan

• **Requirements**
  - Reliable detection and processing of signals from Mode A/C/S equipped aircrafts in Northern Tajikistan (120 x 120 NM)
  - Final approach to Khujand
  - MAK Certificate
  - ED-142 Performance

• **System Composition**
  - 8 Ground Stations (5 Receiving Only and 3 Receiving/Transmitting)
  - 1 Central Processing Station in Dushanbe

• **Status**
  - Fully operational since May 2011

• **Future Plans**
  - Extension to complete the whole country in 2012
WAM system for Tajikistan - Coverage

Coverage of the Khujan airport at 200m AGL

Enroute coverage at FL160
WAM system for Tajikistan – Final Results
WAM system for Tajikistan
- Installation Examples
North Sea WAM/ADS-B for LVNL

- **Requirements**
  - Provide surveillance for low level traffic between oilrigs (helicopter traffic)
  - Surveillance of commercial traffic above the North Sea
  - Data fused to ARTAS data fusion placed at ACC Amsterdam
  - Requirements according to the ED-142
  - Extreme weather conditions for installation

- **System composition**
  - 19 MLAT/ADS-B Sites

- **Area covered** about 350km by 500km

- **Test bed for EUROCONTROL CASCADE project**
North Sea Wide area multilateration system – for LVNL – Installation examples
Queenstown TMA and Approach WAM/ADS-B

• Requirements
  - Provide TMA and approach surveillance for Queenstown airport starting from 500ft AGL
  - Display system at Queenstown Control Centre.
  - MW links used for data communication
  - Fused into old Lockheed Martin Skyline Flight data processor (ASTERIX 1 used)
  - Extreme weather and terrain conditions for installation

• System composition
  - 14 MLAT ground stations
Queenstown Wide area multilateration system – MLAT accuracy at 500 ft AGL
Queenstown Wide area multilateration system – SAT test flight visualisation
Queenstown Wide area multilateration system – Installation examples
Thank You for Your Attention