Beyond Radar

WAM/ADS-B Composite Surveillance

Presented by:
Aleš Košťál

Heritage of proven innovation

AGENDA

ERA – who we are

ATC Surveillance Overview

WAM/ADS-B Composite Surveillance

WAM/ADS-B Deployed Systems

About ERA

The **pioneer** and **leading supplier** of NextGen surveillance and flight tracking solutions for the air traffic management, military, security and airport operations markets

- **50 years** of TRADITION and EXPERIENCES in MLAT
- More than **100** installations **worldwide**
- Solutions for ATC and MILITARY
- **46** countries in **5** continents
- Continuous development
- Own strong **R&D** centre

ATC Surveillance Technologies Overview

ATC Surveillance Technologies

Non-COOPERATIVE	COOPERATIVE	COOPERATIVE
INDEPENDENT	**INDEPENDENT**	**DEPENDENT**
Aircraft position is determined by measurement **without cooperation with aircraft**	Aircraft position and additional information is determined **on bases of aircraft transmission**	Aircraft position is determined **on-board** and distributed with additional information to land surveillance components

Monostatic Sensors

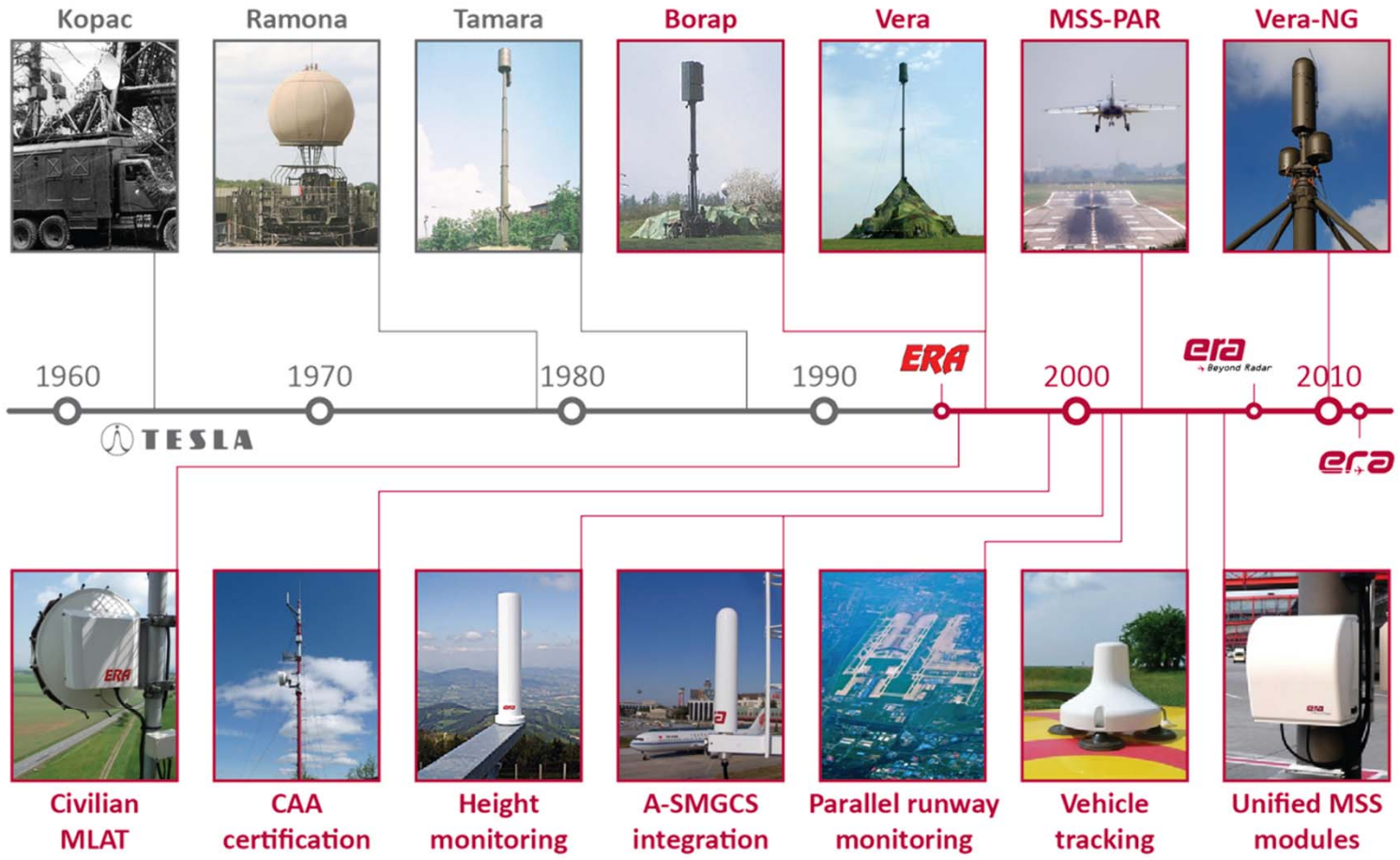
Primary Surveillance Radar (PSR)	Secondary Surveillance Radar (SSR); Mode A/C, S	**A**utomatic **D**ependent **S**urveillance **B**roadcast

Multistatic Sensors

Composite System

Wide Area Multilateration	**A**utomatic **D**ependent **S**urveillance **B**roadcast (ADS-B)
MultiLATeration (MLAT)	

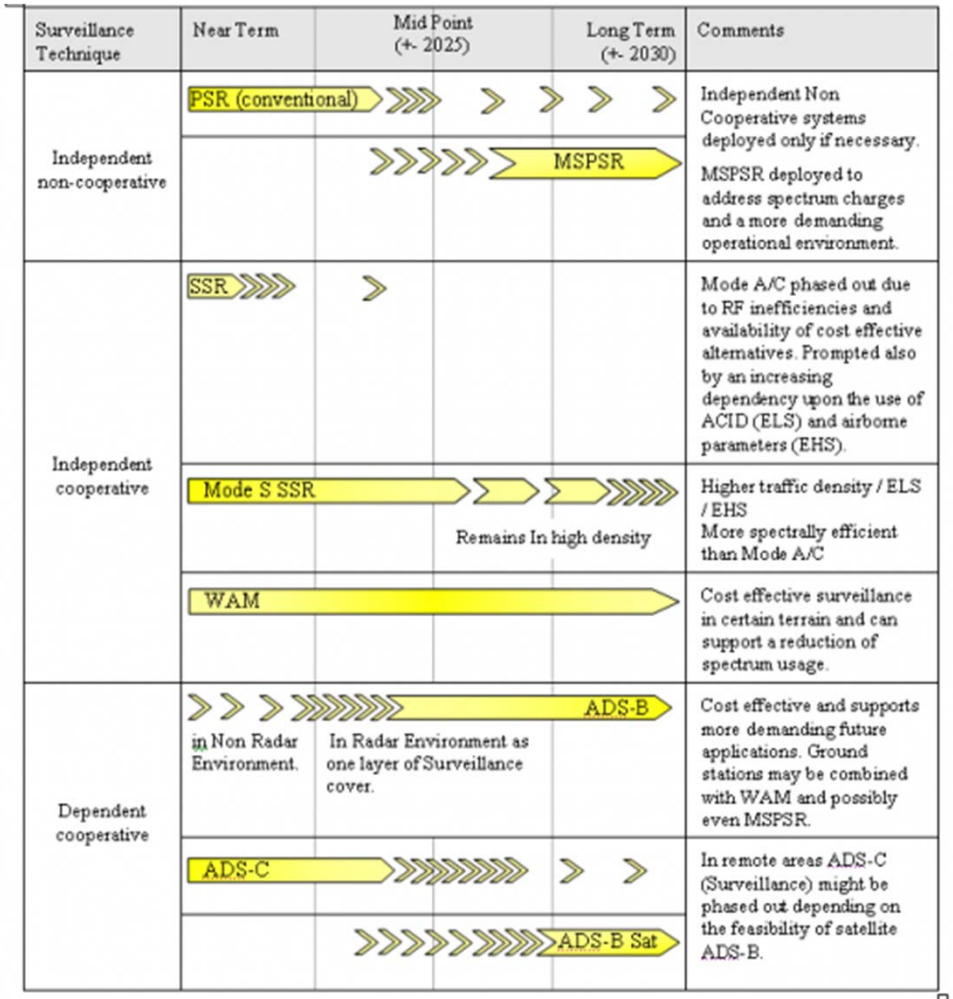
A Bit of Hostory



Development of Surveillance Technologies

Drivers

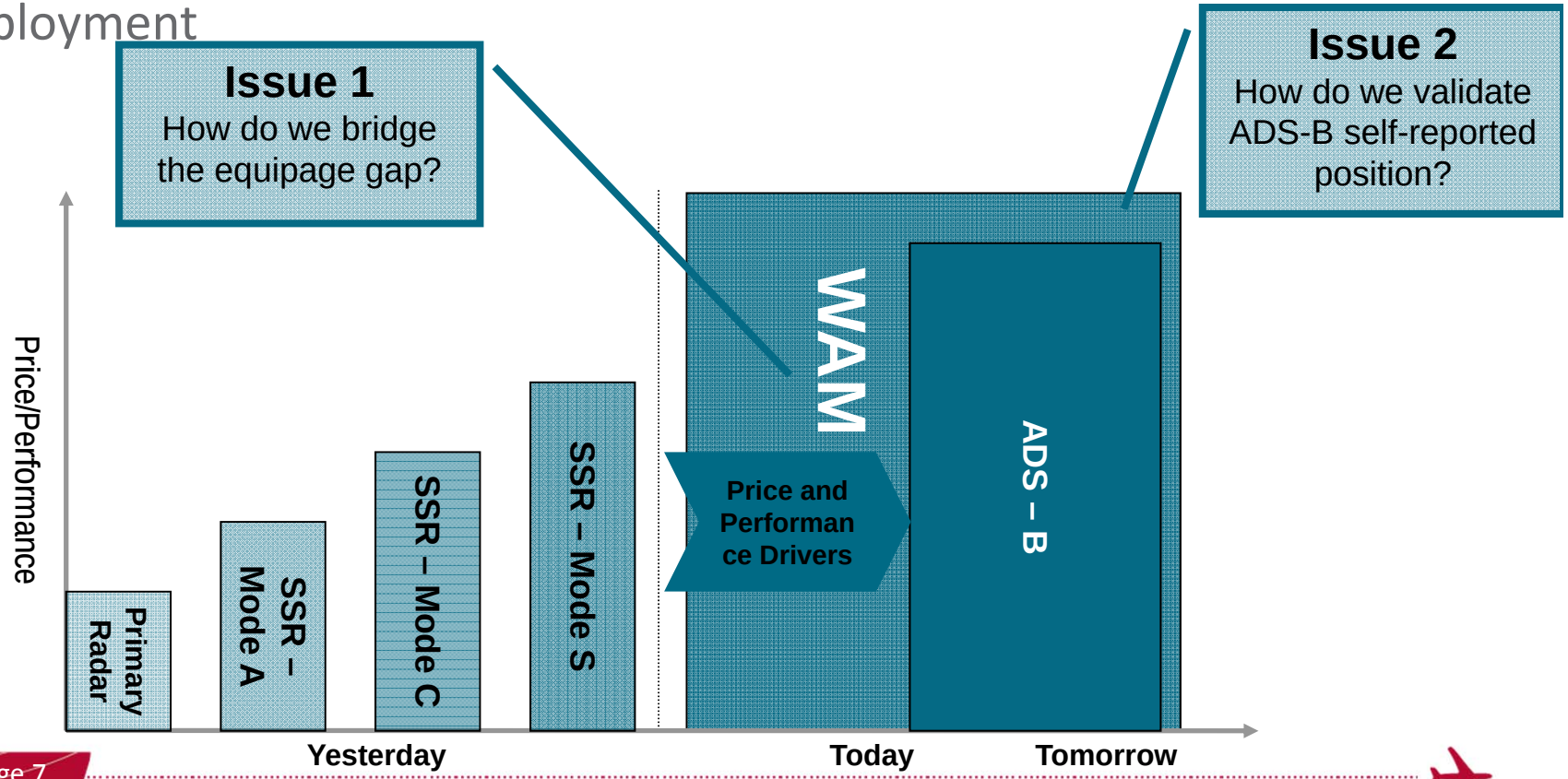
- Global and local strategies (ICAO ASBU, SESAR, NEXT Gen, Carats,…)
- Interoperability
- Civil-Military coordination
- Functional Airspace Blocks (FABs)
- Small targets - GA and UAVs
- Investments and Operational cost
- Efficiency
- Frequency Spectrum
- New Technologies



Airborne surveillance by ground

ADS-B and Multilateration

- Decisions for ADS-B surveillance is progressing however ADS-B deployments are still well ahead of aircraft equipage
- Multilateration can provide migration path and complement ADS-B deployment



Composite ADS-B/WAM

- Pragmatic, flexible ADS-B/WAM deployment
- En-route, on approach, on the ground
- High integrity, validation

ADS-B

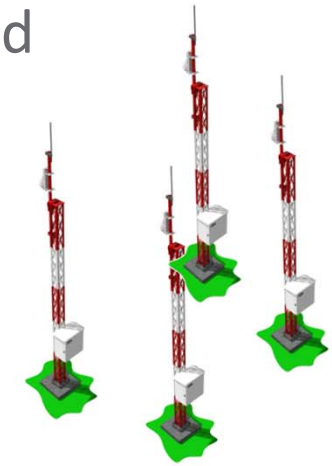
- Long Range (Cost effective for large areas)
- ADD data without interrogation
- Ideal for NRA also possible as another layer in RAD
- Aicraft must be properly equipped

Multilateration

- No new avionics required
- Good accuracy and high update rate
- Independent Information
- Layer in NRA and/or RAD

PROS

- 1 COST EFFECTIVE deployment
- En-route, Approach, On the Ground
- Cross checking function
- Increased Safety
- Possible 3 layers (output channels)
  - Independent WAM/MLAT
  - Independent ADS-B
  - Combined (optional)



Multilateration WAM/MLAT

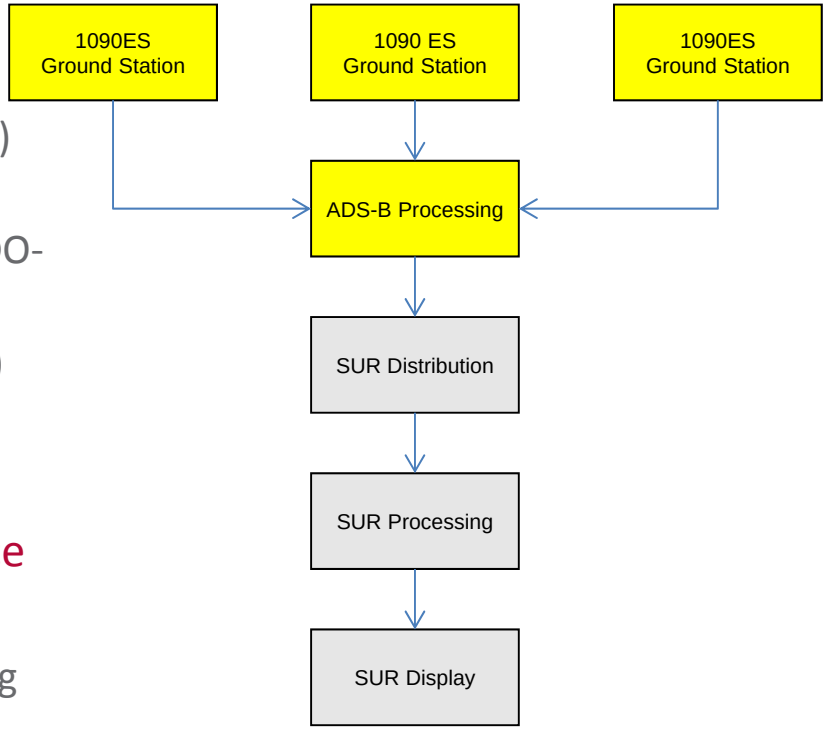
ADS-B

COMPOSITE SURVEILLANCE

Standartization process - EUROCAE WG51 SG4

- ED-142 (WAM) & ED-129 (ADS-B) undergoing revision

- Recognising common architecture
- Moving beyond NRA (“non-radar environment”) limitations
- Recognizing ED-163 ADS-B RAD and ED-102A (DO-260B)
- EUROCONTROL GEN-SUR (Generic Surveillance)



ED-XXX ADS-B & WAM Composite Surveillance

- Assumed new EUROCAE standard
- Minimum requirements (and guidance) for using combined ADS-B & WAM

ED-129A expected to support distributed ADS-B

MLAT/WAM – Proven and Widely Deployed Solution

AIRPORT

- **Airport Surface Surveillance**
- Up to 5 NM
- A-SMGCS
- Vehicle Tracking

TMA

- **Terminal Manoeuvring Surveillance**
- Up to 80 NM
- Terminal area

EN-ROUTE

- **En-route Surveillance**
- Up to 250 NM
- WAM, HMU

TMA

- **Terminal Manoeuvring Surveillance**
- Up to 80 NM
- Terminal area
- Precision Approach

AIRPORT

- **Airport Surface Surveillance**
- Up to 5 NM
- A-SMGCS
- Vehicle Tracking

Main reasons for WAM/ADS-B

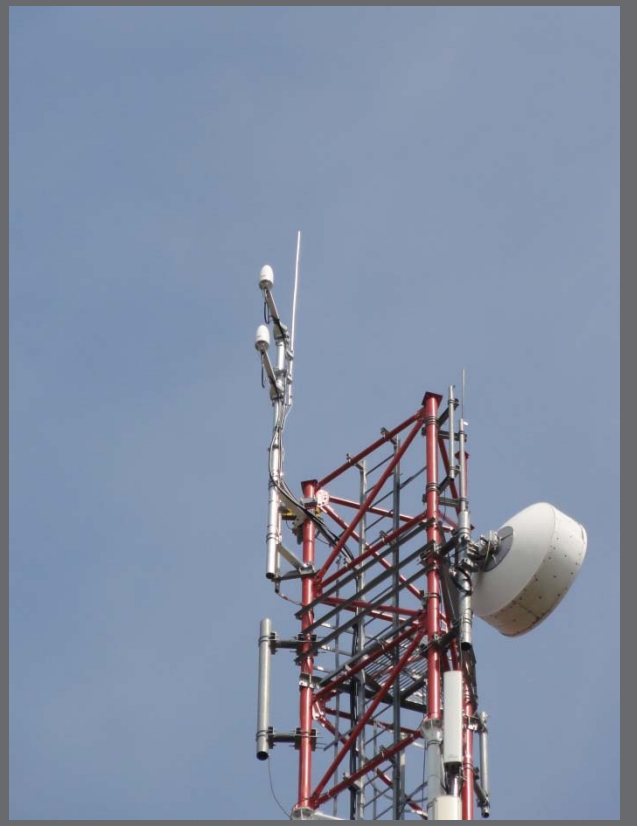
- Replacement of SSR or gap filling while keeping the same or better performance and operational needs
- ADS-B has a longer adoption period but MLAT is ready today and combined systems provides ideal migration to ADS-B and validation of ADS-B.
- The same technology meets surface, approach and wide area requirements.
- Enhanced approach operations such as PRM

Number of ANSP has deployed WAM (ADS-B)

WAM/ADS-B Romania

- Requirements
  - Surveillance coverage for Cluj TMA – area of 120 x 100 NM over three internationals airports
  - ED-142 Performance and other international standards
  - ADS-B output
  - The system uses national GSM providers as communication infrastructure
- System Composition
  - 17 Ground Stations (13 Receiving Only and 4 Receiving/Transmitting)
  - 1 Central Processing Station in Bucharest
- Status
  - Fully operational since December 2011
- Extension and Future Plans
  - Ongoing extension program for coverage of lower altitudes around Cluj-Napoca International Airport
  - Additional 6 Ground Stations

Installation Examples

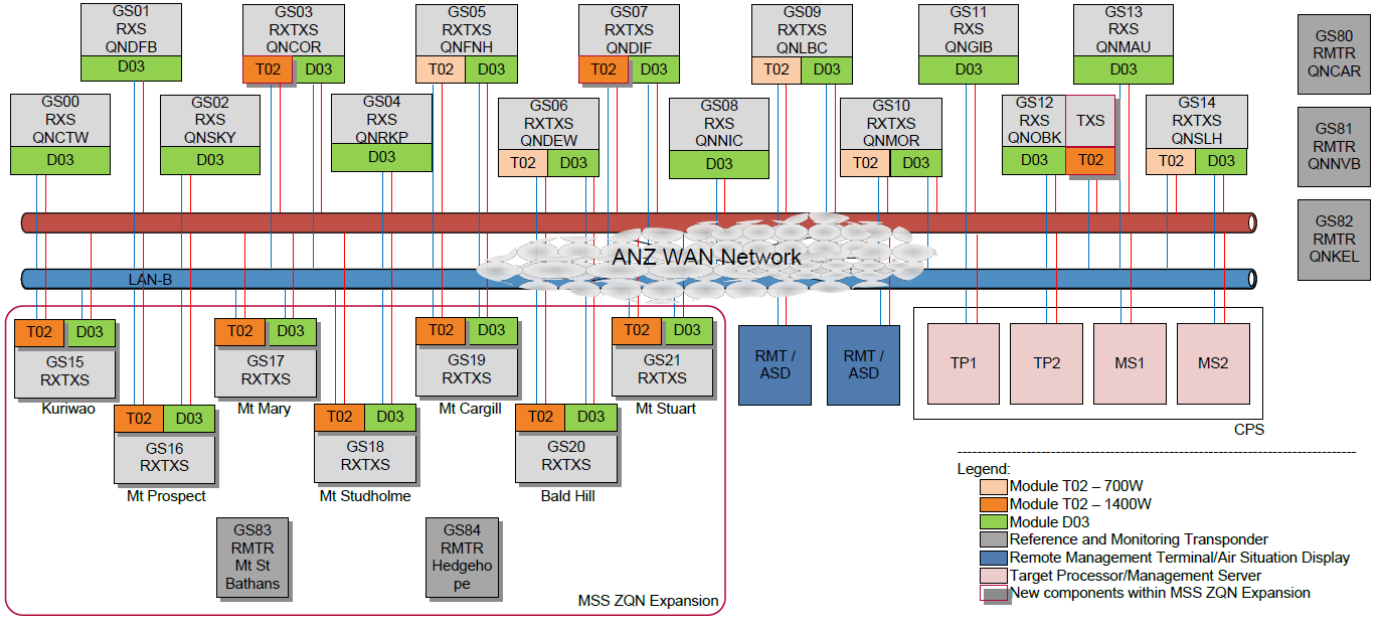


WAM/ADS-B Queenstown

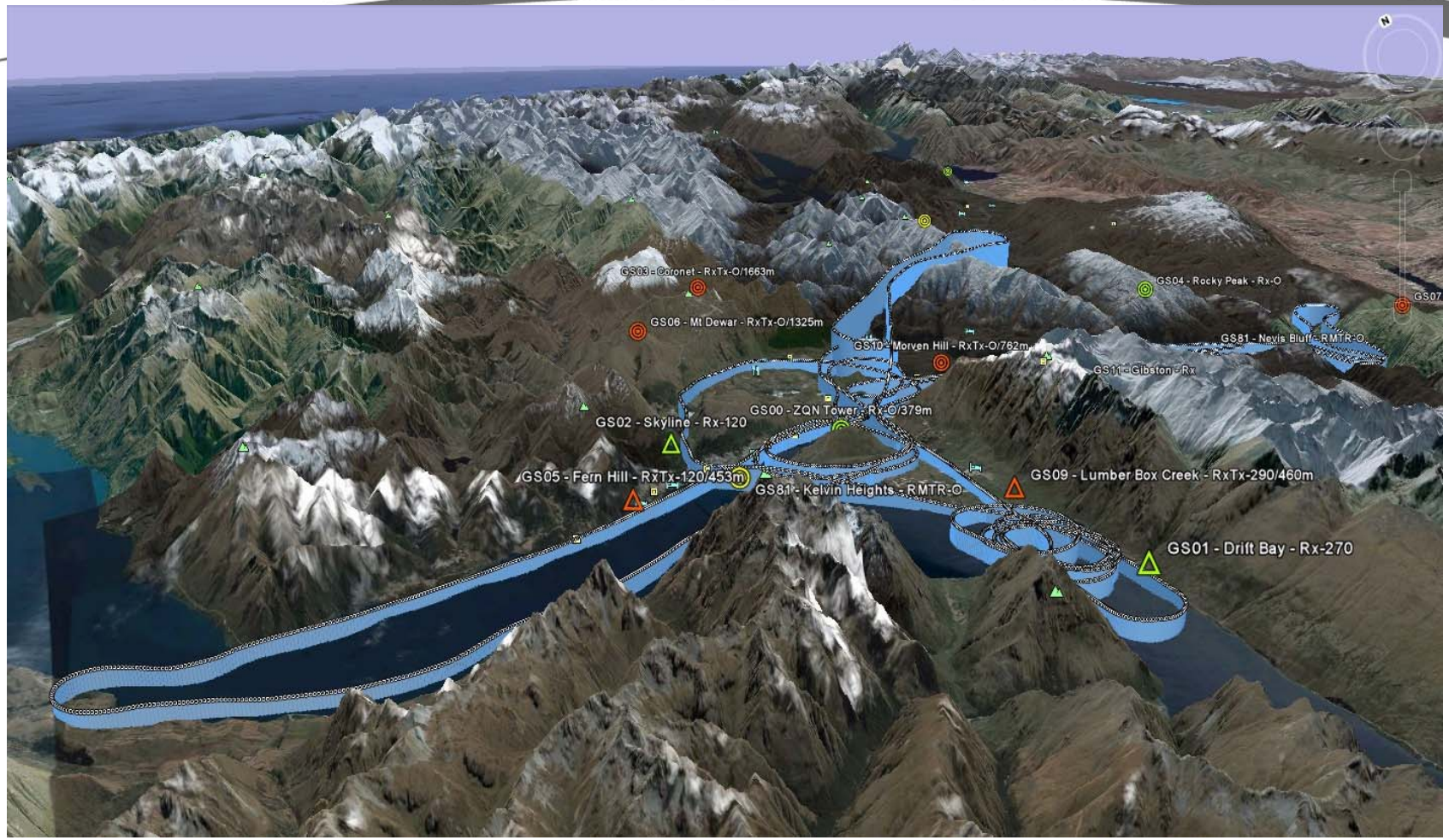
- WAM/ADS-B Queenstown
  - End User: AIRWAYS New Zealand
  - ED-142 Performance
- Requirements and challenges
  - Queenstown surrounded by extreme terrain (high mountains, deep valleys)
  - Provide TMA and approach surveillance for Queenstown airport starting from 500ft AGL
  - Display system at Queenstown Control Centre.
  - Fused into old Lockheed Martin Skyline Flight data processor (ASTERIX 1 used)
  - Extreme weather and terrain conditions for installation

WAM/ADS-B Queenstown

- System composition
  - 15 MLAT Ground Stations
  - MW links used for data communication
  - Ongoing extension program - 7 additional Ground Stations



SAT results visualization



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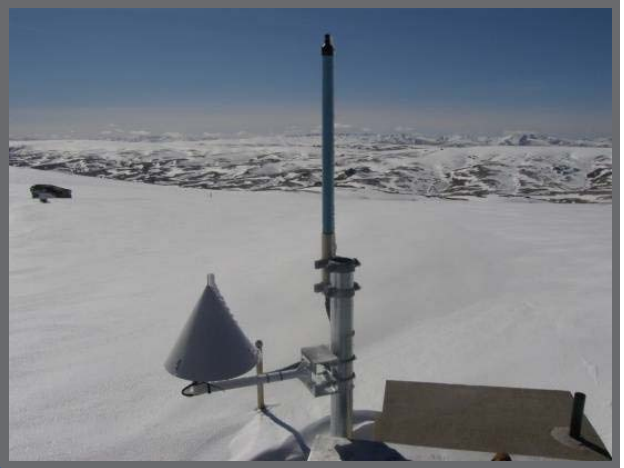


WAM/ADS-B Fiji

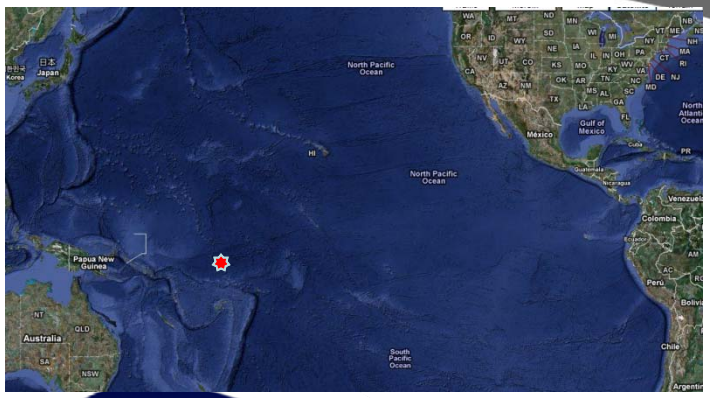
NextGen ATM System replacement

- ADS-B/MLAT Surveillance data for first time
- New Adacel fusion and display
- Airspace redesign and safety cases
- New charging and billing system
- Avionics equipage and mandate

11 ADS-B/MLAT stations

- ADS-B coverage up to 500nm from Nadi
- Multilateration core for higher altitude
- Multilateration into main Nadi airport

Operational early 2010



WAM Newcastle

- WAM Newcastle
  - End User: NIA
  - Contracted 2011
- Requirements
  - Coverage over TMA area (minimum 50NM)
  - TMA, approach and surface (vehicles) surveillance
  - Data fused to existing INDRA system
  - Survive harsh climatic conditions
- System Composition
  - 8 Ground Stations
- Fully Operational from 09/2013
  - Extensive rigorous Safety Case approved by UK CAA

Installation Examples

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Drivers

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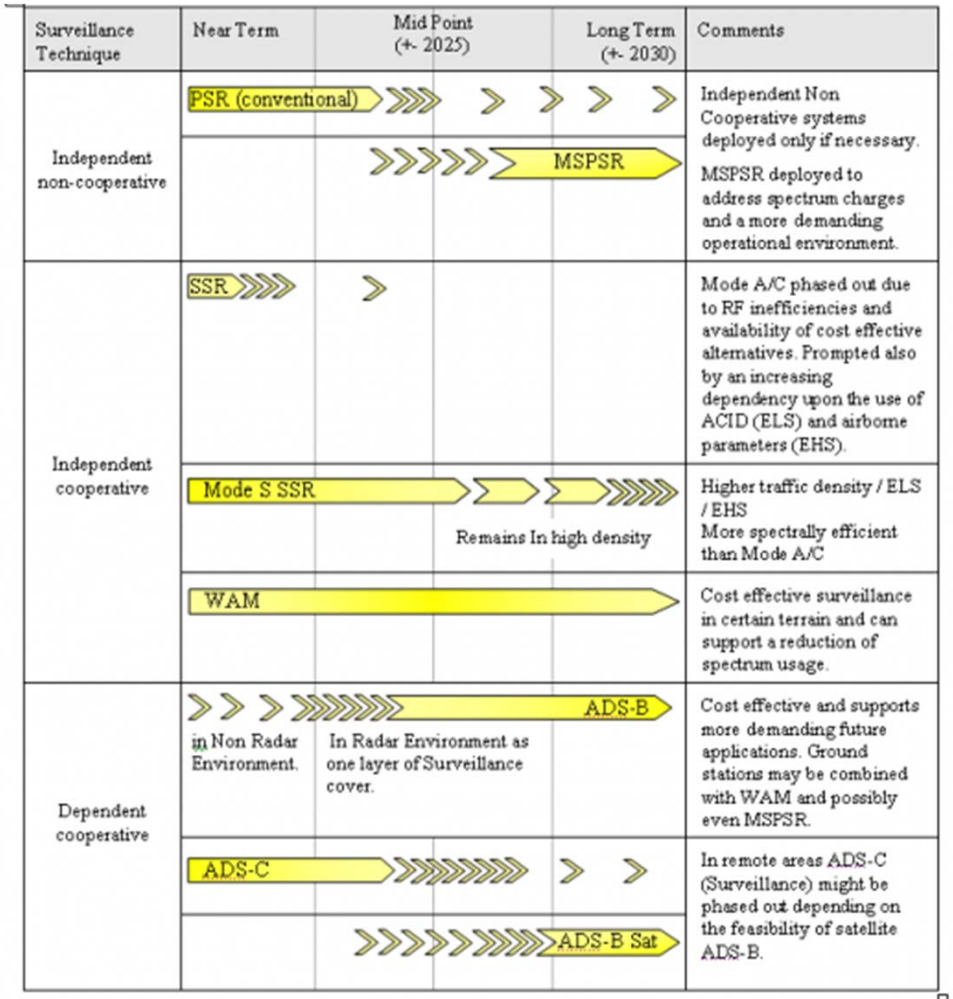

Airborne surveillance by ground

Thank you for your attention