

ICAO

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IFATSEA
International Federation of Air Traffic Safety Electronics Associations

AIR NAVIGATION WORLD

COMMUNICATIONS, NAVIGATION, SURVEILLANCE, AND SPECTRUM

CNSS 2026

12 - 15 October | Kotor, Montenegro

Mr. Stuart McKay



CNS Policy Principal UK CAA/ Chair, ICAO SP

Stuart McKay is a CNS Policy Principal at the UK Civil Aviation Authority, with expertise in air traffic management, communications, navigation, surveillance systems and aviation policy. Drawing on experience within both the aviation regulator and an Air Navigation Service Provider, he brings practical operational insight and strategic policy expertise to future surveillance capabilities, separation standards, performance requirements and international aviation regulation.

Mr. McKay also serves as Chair of the ICAO Surveillance Panel, leading international collaboration on global surveillance standards and guidance and supporting the safe integration of new capabilities across the global air navigation system.

Session 15

Beyond Radar:
The Technologies Transforming Surveillance



Presentation roadmap

Implementation | Modernizing and sustaining surveillance

Miles Bellman
Protecting the 1030/1090 MHz environment

Eric Potier
Monitoring cooperative frequencies

Isabelle Brossaud
ADS-B validation for resilient surveillance

Hiromi Miyazaki
Surveillance on the airport surface

Ahmad A. Fadel
Managing the mixed surveillance estate

Miguel Muñoz Martínez
ADS-B evolution and data authentication

MODERATED DISCUSSION

How do we modernize without compromising today’s surveillance service?

Mr. Miles Bellman



Miles Bellman is an engineer in the Federal Aviation Administration's Spectrum Engineering Services Group, Planning and International Team, and has dedicated his 15-year career to public service at the United States Department of Transportation. He serves as a technical adviser to the United States Surveillance and Frequency Spectrum Management panel members.

Mr. Bellman is Rapporteur of the ICAO Surveillance Panel Surveillance Spectrum Focus Team (SSFT), which develops technical solutions to support the long-term sustainability of surveillance spectrum.

Protecting Surveillance: Managing the 1030/1090 MHz Challenge

Miles Bellman, United States Federal Aviation Administration, Spectrum Engineering

ICAO Surveillance Spectrum Focus Team Rapporteur

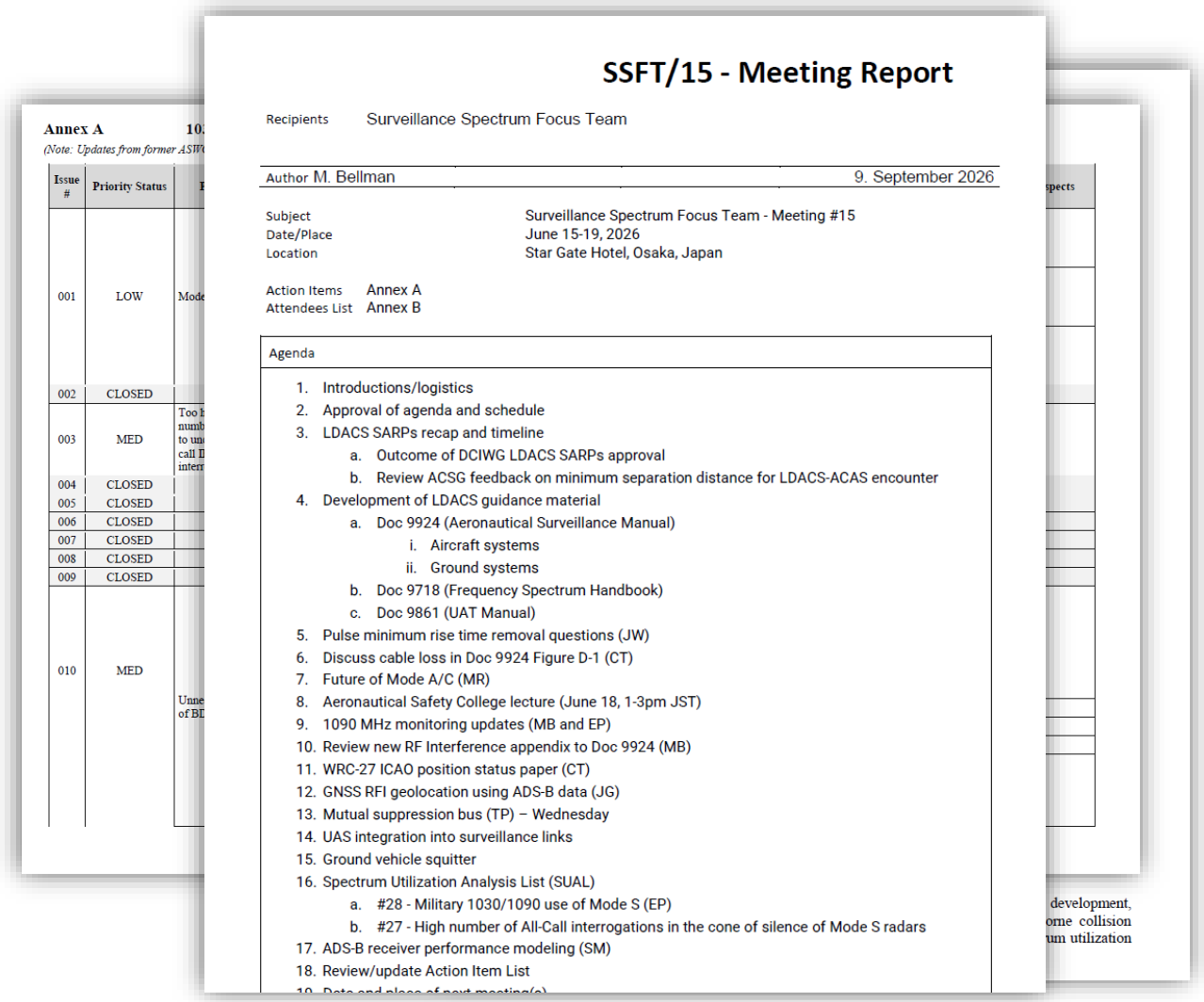
ICAO Surveillance Spectrum Focus Team

Formed in 2019 under Surveillance Panel

Maintains list of spectrum utilization problems

Develops mitigations

Initiates changes to SARPs and Guidance Material



Annex A

Issue #	Priority Status
001	LOW
002	CLOSED
003	MED
004	CLOSED
005	CLOSED
006	CLOSED
007	CLOSED
008	CLOSED
009	CLOSED
010	MED

SSFT/15 - Meeting Report

Recipients Surveillance Spectrum Focus Team

Author M. Bellman 9. September 2026

Subject Surveillance Spectrum Focus Team - Meeting #15
Date/Place June 15-19, 2026
Location Star Gate Hotel, Osaka, Japan

Action Items Annex A
Attendees List Annex B

Agenda

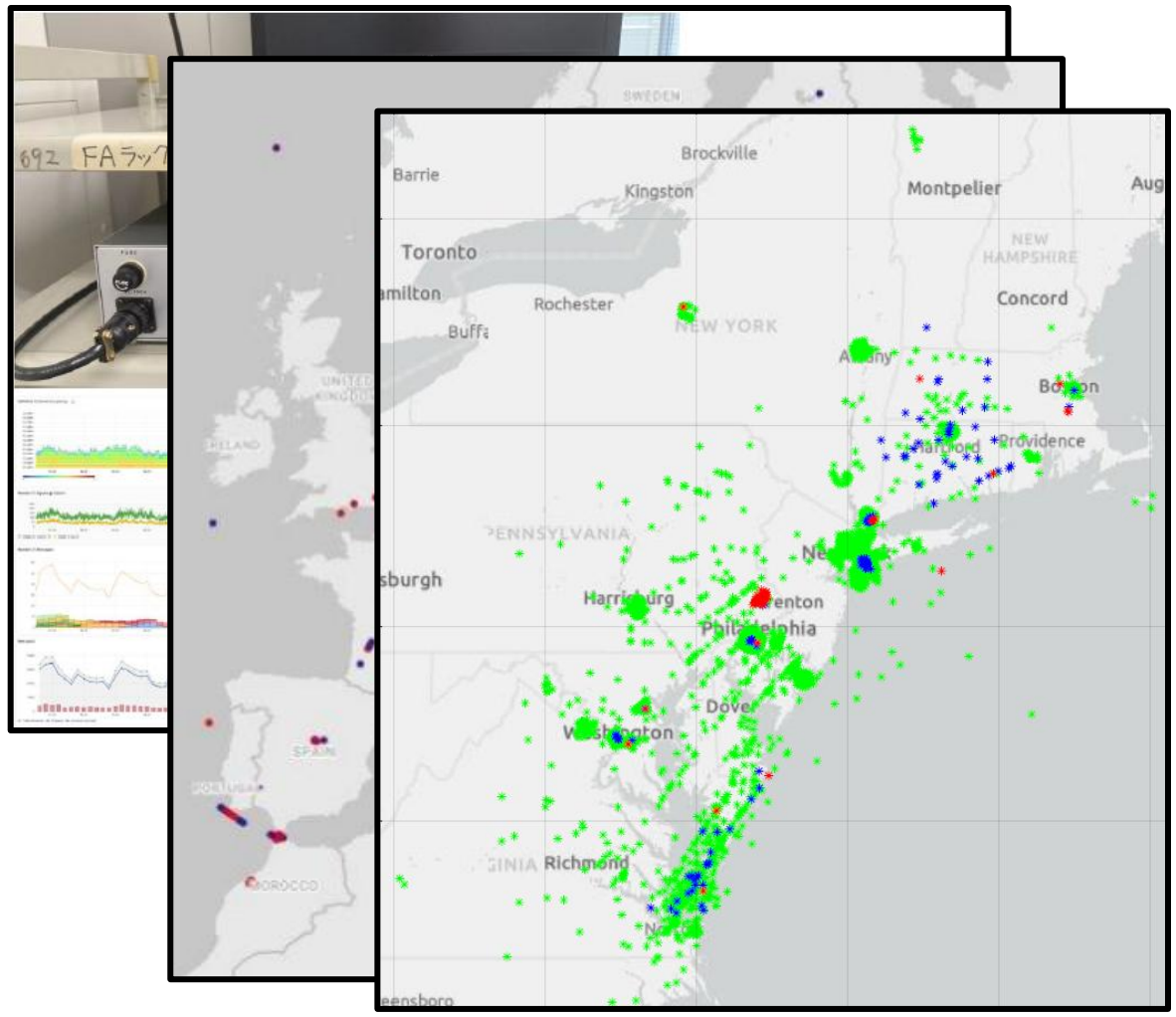
1. Introductions/logistics
2. Approval of agenda and schedule
3. LDACS SARPs recap and timeline
   a. Outcome of DCIWG LDACS SARPs approval
   b. Review ACSG feedback on minimum separation distance for LDACS-ACAS encounter
4. Development of LDACS guidance material
   a. Doc 9924 (Aeronautical Surveillance Manual)
      i. Aircraft systems
      ii. Ground systems
   b. Doc 9718 (Frequency Spectrum Handbook)
   c. Doc 9861 (UAT Manual)
5. Pulse minimum rise time removal questions (JW)
6. Discuss cable loss in Doc 9924 Figure D-1 (CT)
7. Future of Mode A/C (MR)
8. Aeronautical Safety College lecture (June 18, 1-3pm JST)
9. 1090 MHz monitoring updates (MB and EP)
10. Review new RF Interference appendix to Doc 9924 (MB)
11. WRC-27 ICAO position status paper (CT)
12. GNSS RFI geolocation using ADS-B data (JG)
13. Mutual suppression bus (TP) – Wednesday
14. UAS integration into surveillance links
15. Ground vehicle squitter
16. Spectrum Utilization Analysis List (SUAL)
    a. #28 - Military 1030/1090 use of Mode S (EP)
    b. #27 - High number of All-Call interrogations in the cone of silence of Mode S radars
17. ADS-B receiver performance modeling (SM)
18. Review/update Action Item List

1030 MHz and 1090 MHz Monitoring

Spectrum environment awareness

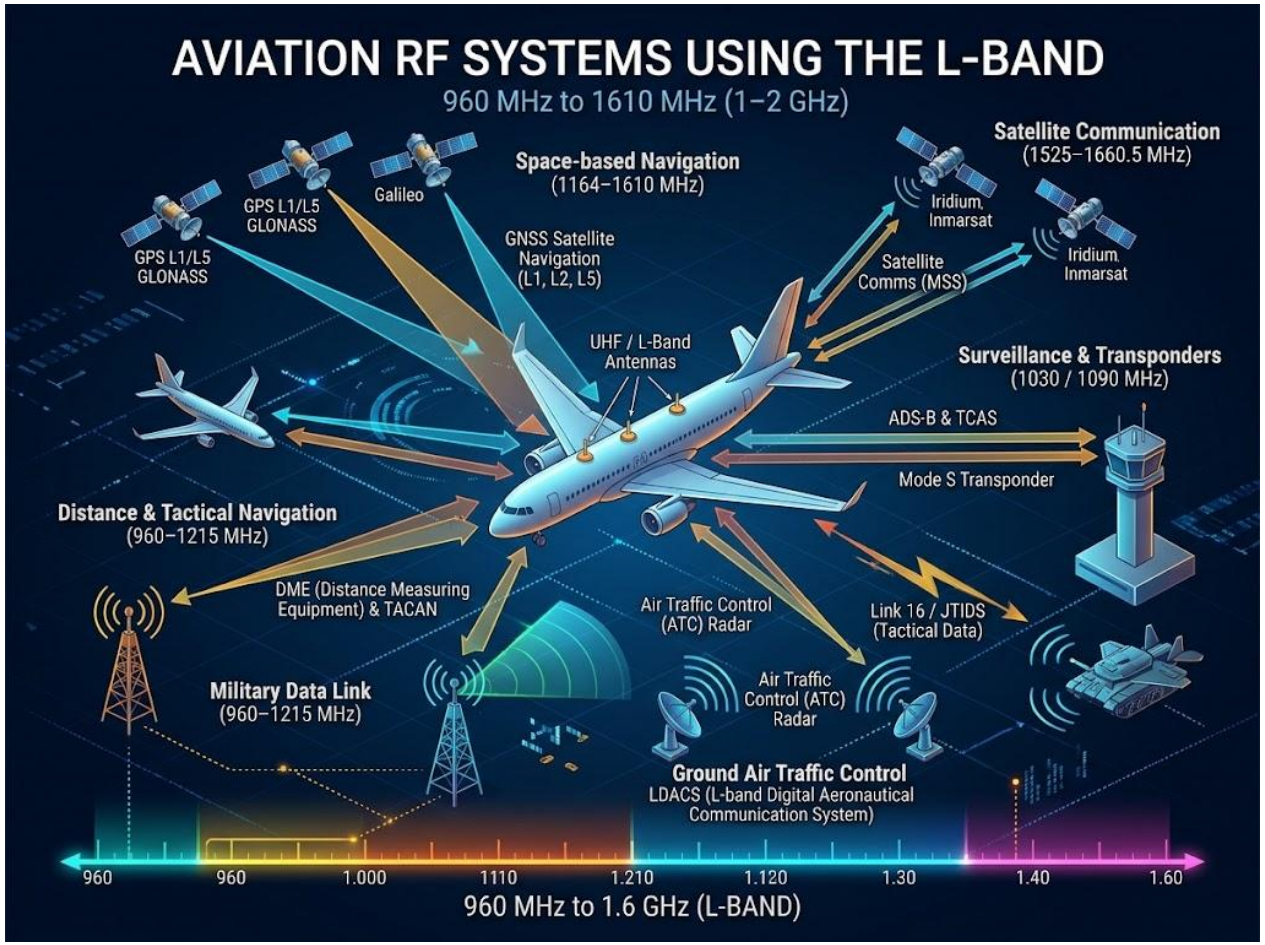
Awareness of trouble spots

Validate operating rules



Inter-panel coordination for new L-band systems

- Start early
- Collaborate to validate minimum technical requirements
- Conduct testing for gaps in required performance metrics
- Develop SARPs and guidance material

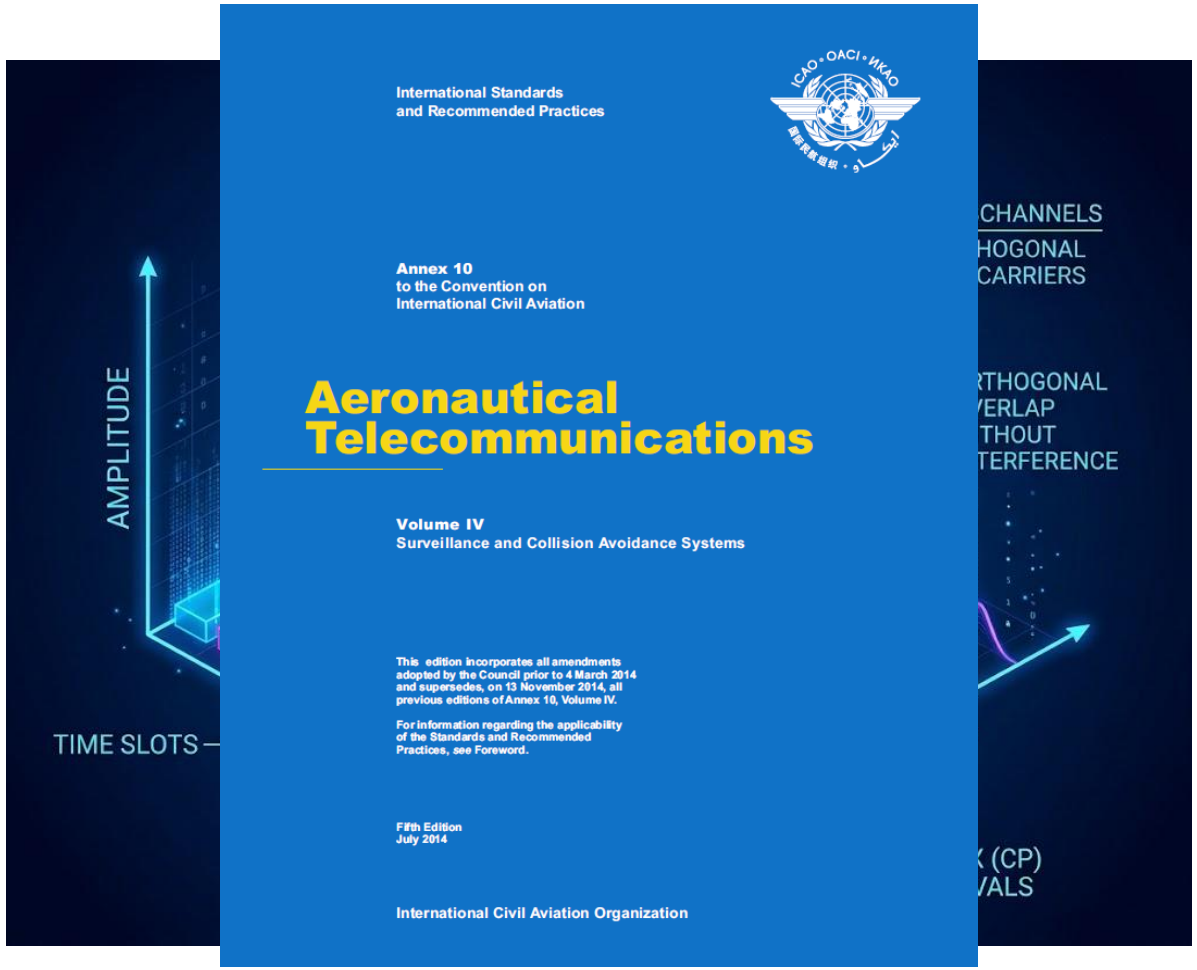


Improved receiver interference tolerance performance

Define better minimum standards

Tolerate non-pulsed waveforms

Proactive defense



World Radio Conference advocacy

Long-term surveillance spectrum protection starts at the International Telecommunications Union

Emerging threats from terrestrial and satellite services

Influence positions of administrations

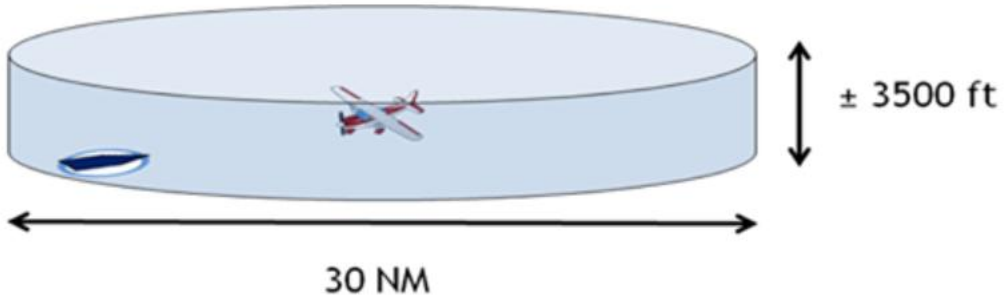
ITUWRC
WORLD RADIOCOMMUNICATION CONFERENCE

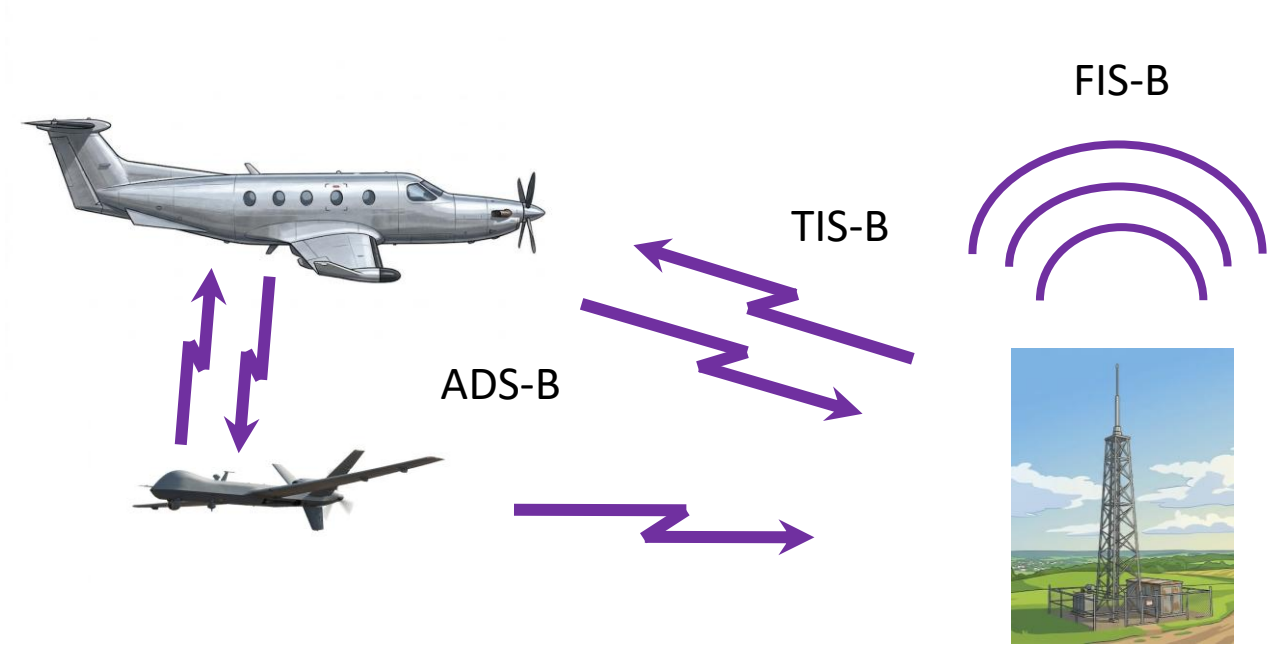
Offload new entrants to UAT 978 MHz

Already used by US

Emerging in Europe

Regional variations



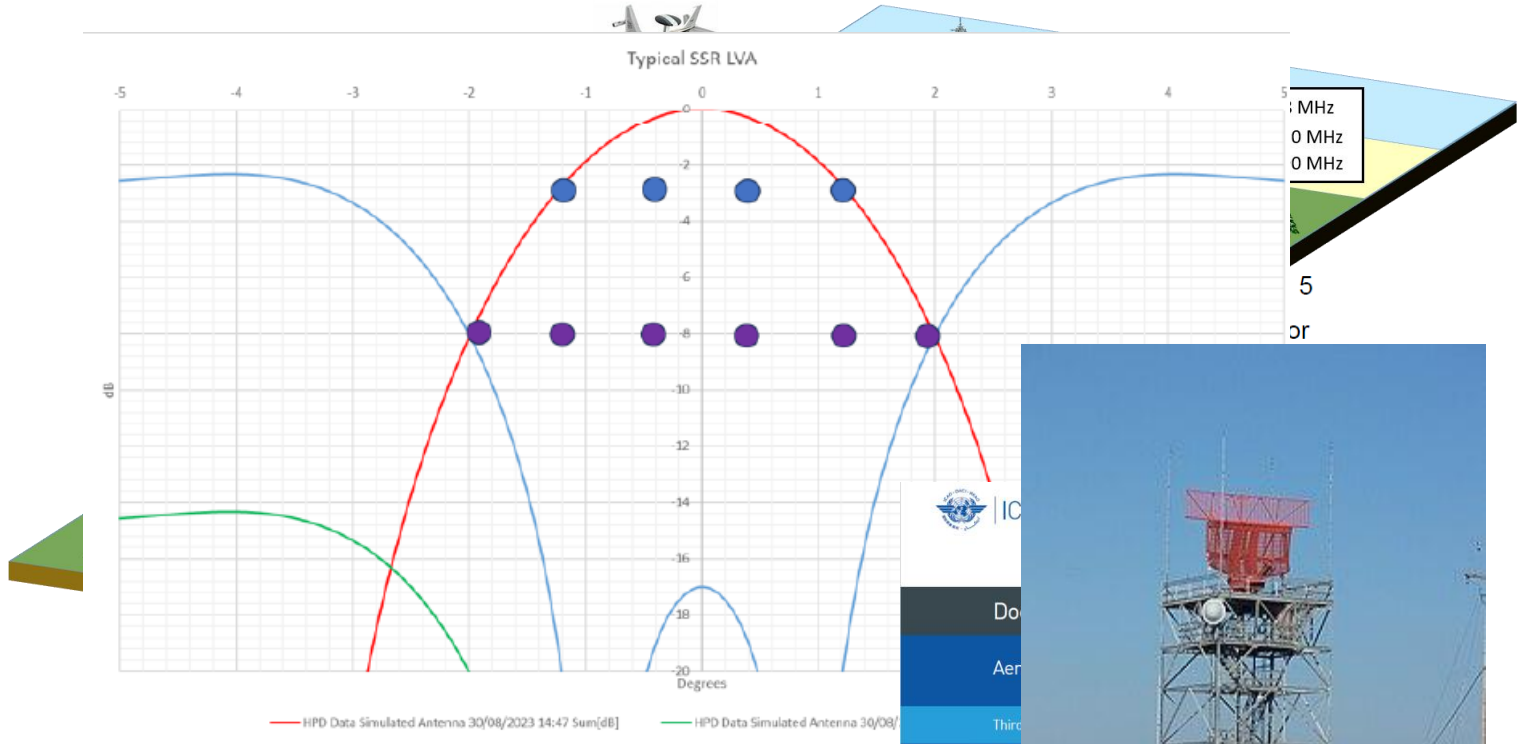


Updated SARPs and Guidance Material

Harder limits on 1030 MHz use

Interference tolerance test method recommendations

Improved guidance for aggregate management



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Mr. Eric Potier



Eric Potier is Head of the CNS Monitoring Team within the CNS Unit of EUROCONTROL's Network Manager Directorate. He has more than 30 years of experience in airborne and ground-based surveillance systems, spanning primary surveillance radar, Mode S, surveillance trackers, performance assessment tools, avionics interoperability and ACAS-related issues.

Mr. Potier has been active in the ICAO Surveillance Panel for more than two decades and chairs the Performance Based Surveillance Sub-Group (PBSSG). He also chairs EUROCAE Working Group 49, responsible for Minimum Operational Performance Standards for Mode S transponders, and co-chairs the RTCA/EUROCAE Combined Surveillance Committee.

Monitoring of cooperative surveillance frequencies

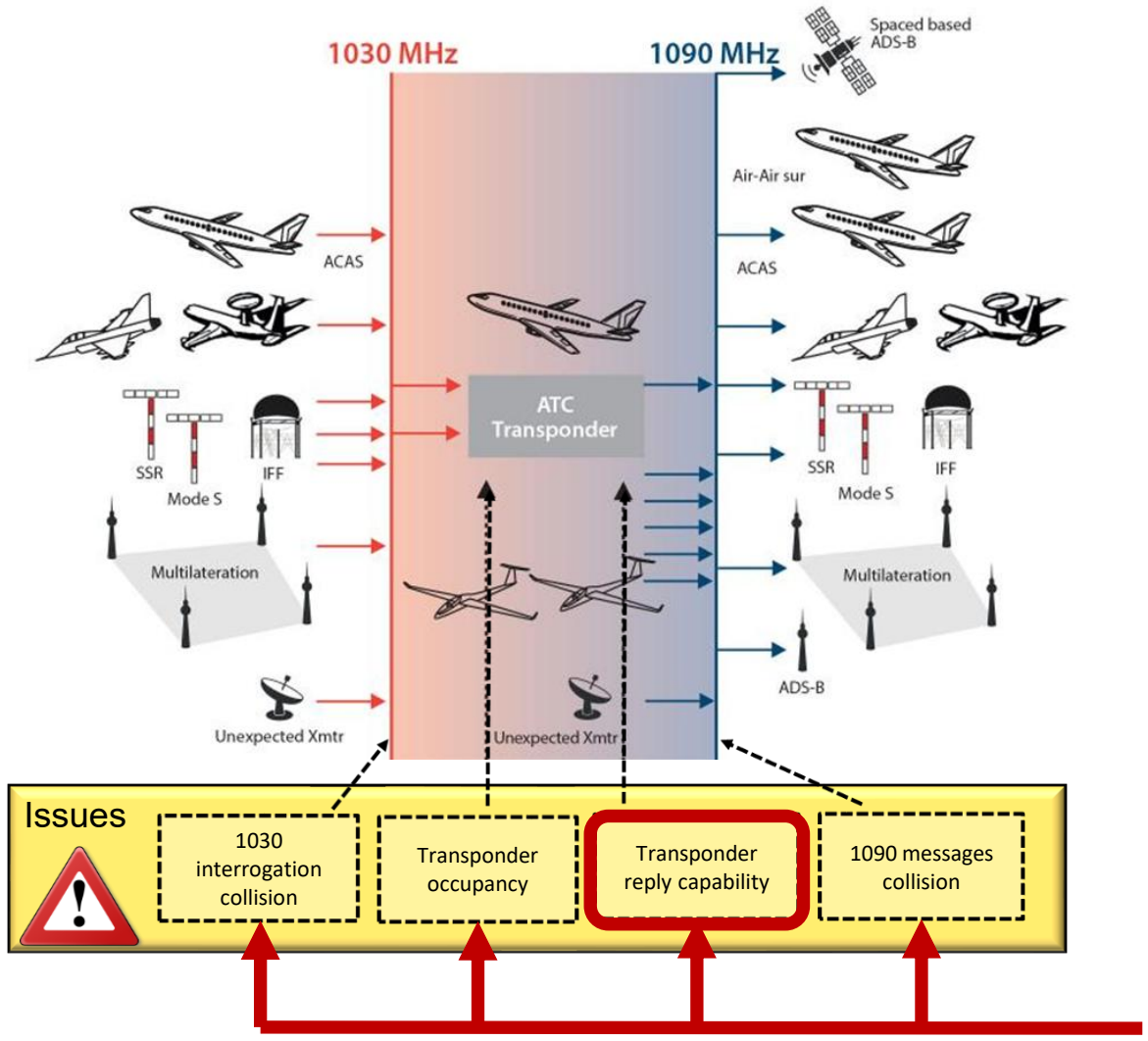
Eric Potier, EUROCONTROL CNS Unit

ICAO SP Panel member

ICAO PBSSG chairman

EUROCAE WG-49 Chairman

Interoperability on 1030-1090 is critical to good operation



RISKS

Loss of surveillance of one or multiple aircraft

Reduction of surveillance **performance** requiring additional infrastructure investment

Airborne **safety net** protection **degradation**

No possible **traffic equipage increase**

REAL BAD EVENTS HAPPENED IN EUROPE

....

Loss of surveillance of several 10s of aircraft in June 2014

Transponder over-interrogated → increasing temperature transmitter → shutdown → loss of detection → ATC restriction 9000 minutes of delay

...

1030/1090 MHz monitoring + Actions to improve

ICAO Transponder Minimum Capability

Mode A/C reply rate

(ICAO Annex 10 Amdt 92 3.1.1.7.9)

- 500 /s
- 1000/s or 1200/s over 100ms

Mode S

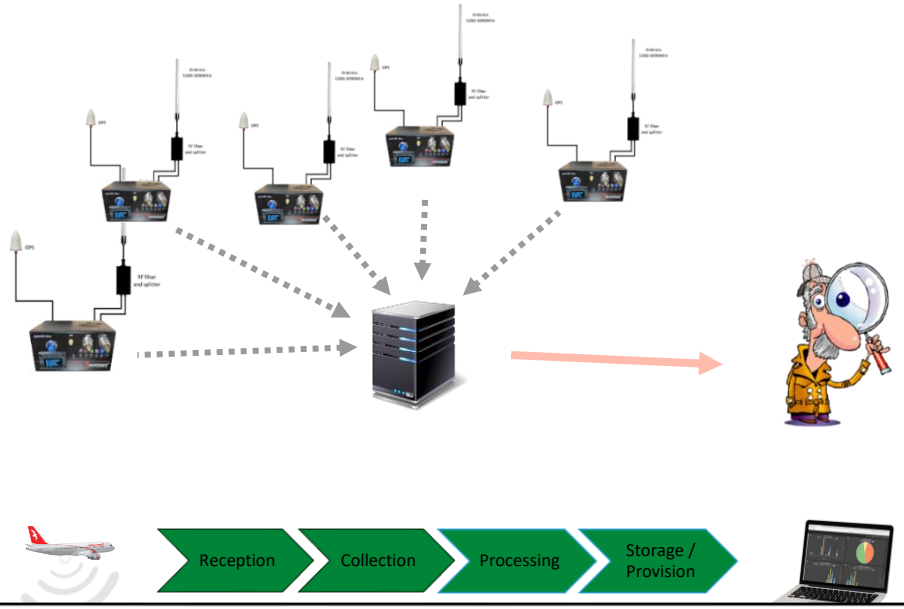
(ICAO Annex 10 Amdt92 3.1.2.10.3.7.2)

- 50 Mode S replies in any 1-second interval
- 18 Mode S replies in a 100-millisecond interval
- 8 Mode S replies in a 25-millisecond interval
- 4 Mode S replies in a 1.6-millisecond interval

- ACAS capable : 60 Mode S replies in any 1-second interval

A transponder interrogated at a rate greater than these minimum replies rates may not be able to reply!

1030/1090 MHz monitoring system example in Europe



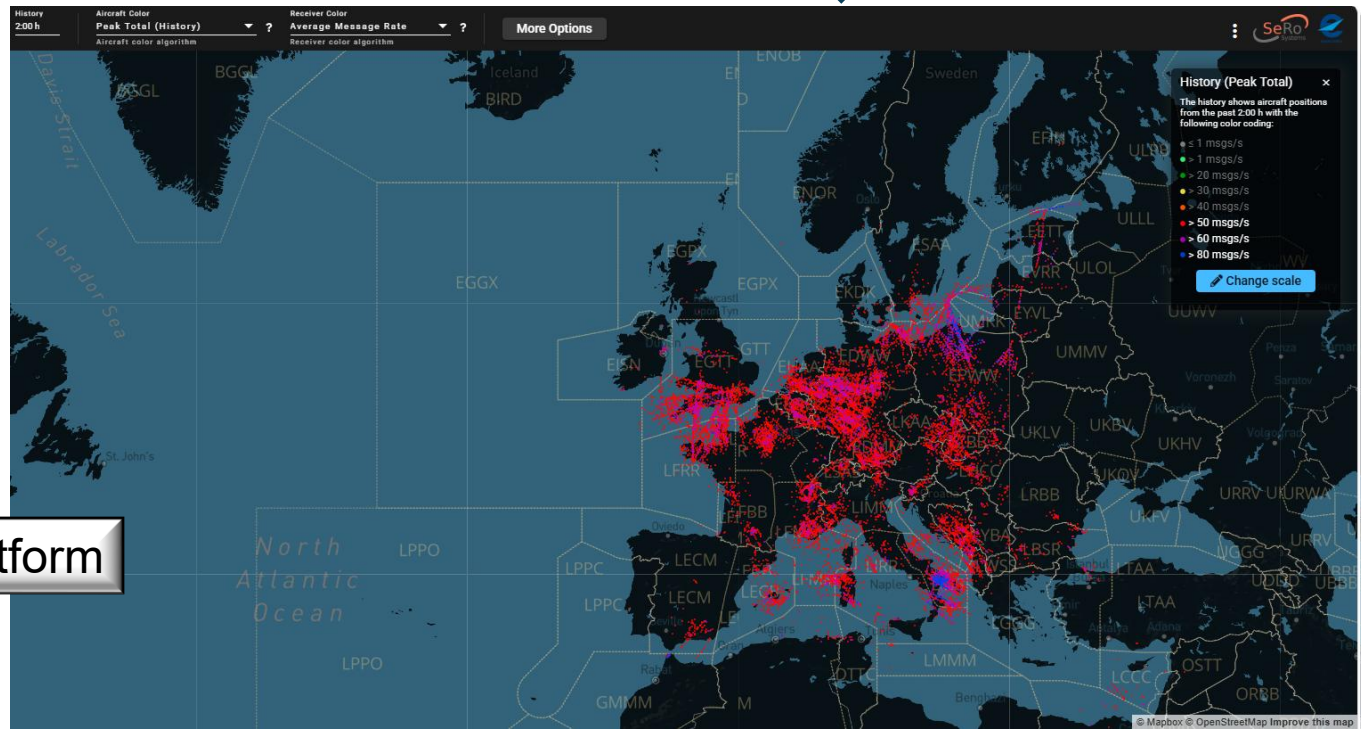
Reception → Collection → Processing → Storage / Provision

EUROCONTROL CNS monitoring Sherlock Platform

Real time big data system

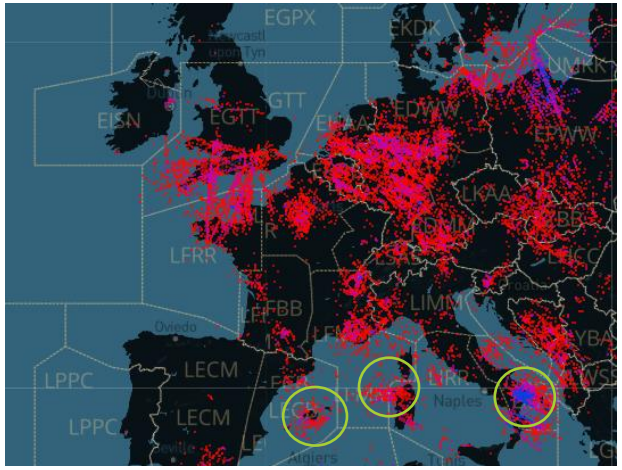
84 Rx connected
+ 100 being added

Mode S reply rate

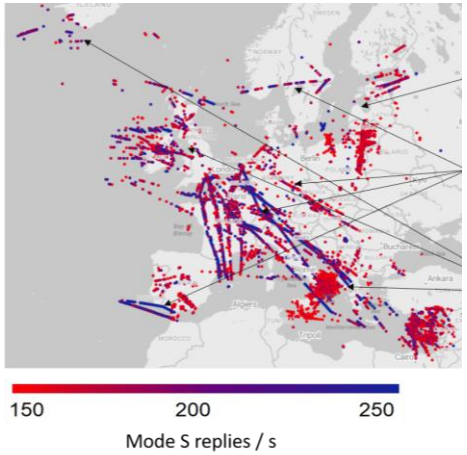


Experience → Permanent monitoring is preferable

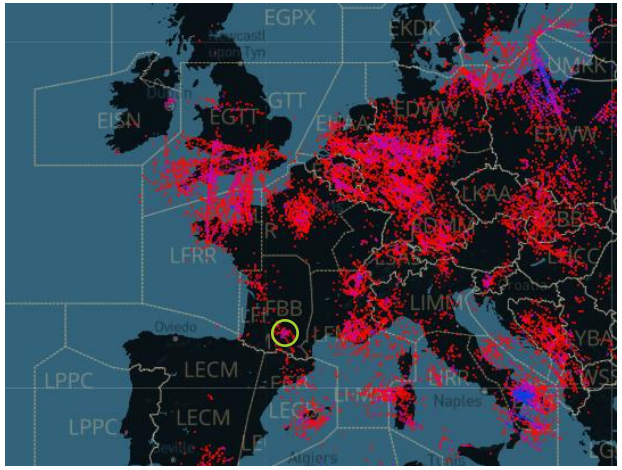
Is monitoring 1030/1090 MHZ frequencies necessary in low traffic density areas?



only one interrogator can create a bad environment



To detect aircraft acting as flying jammer



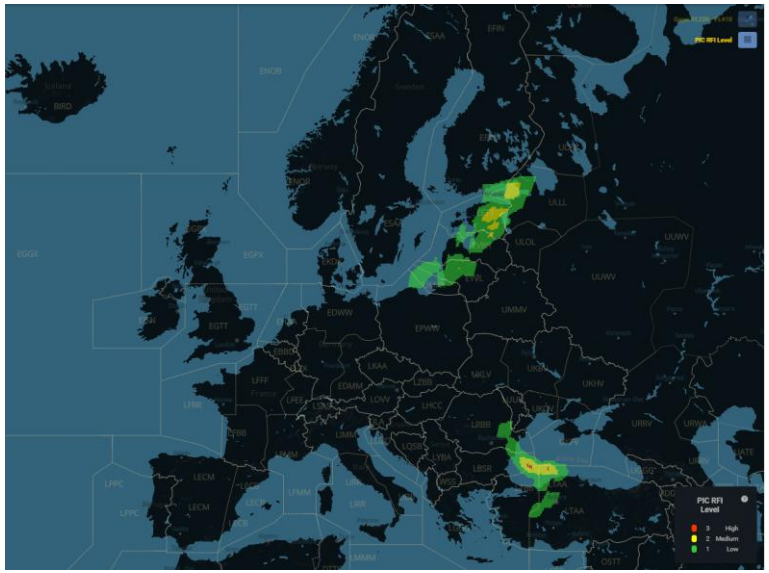
To understand antenna issue of one interrogator

Yes

unexpected bad things could happen in areas of low traffic density due to the bad operation of one element

More by-products

GNSS RFI detection



- GNSS RFI detection
- ACAS Resolution Advisory Analysis as recommended by ICAO
- Detection of Mode S Interrogator Code conflict
- Detection and Investigation of avionics issues and incidents

1030/1090 issues Resolution



State to manage transmission characteristics of interrogators before authorization transmission



Periodic evaluation of interrogator

Key performance Indicator for each interrogator

Operator contacted for optimization of their configuration



Optimize interrogator configuration

Reduce interrogation repetition frequency

Adapt interrogation power

SUR avionics interoperability issue resolution



Necessary to detect faulty unit/installation to ensure good performance



Necessary to detect design issue



Operator contacted for resolution of faulty unit/installation

Manufacturer contacted for resolution of design issue



Air-ground interoperability monitoring is essential to ensure cooperative surveillance systems deliver safe, reliable, and seamless operations

Ensure your Mode S interrogators are configured and operated to minimize unnecessary 1030 MHz interrogations

Thank You


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Ms. Isabelle Brossaud



At DFS, Isabelle Brossaud works at the interface between technical surveillance and operational air traffic management, helping to bridge technical capabilities and operational needs. Her work spans the surveillance chain from operational requirements and sensor performance to surveillance data processing, surveillance services, operational procedures and safety assessment.

She is responsible for evaluating and bringing new surveillance sensors into operational use and has been closely involved in the development of the DFS ADS-B validation unit. Her current work includes further development of Source Location Validation and future track-based separation concepts.

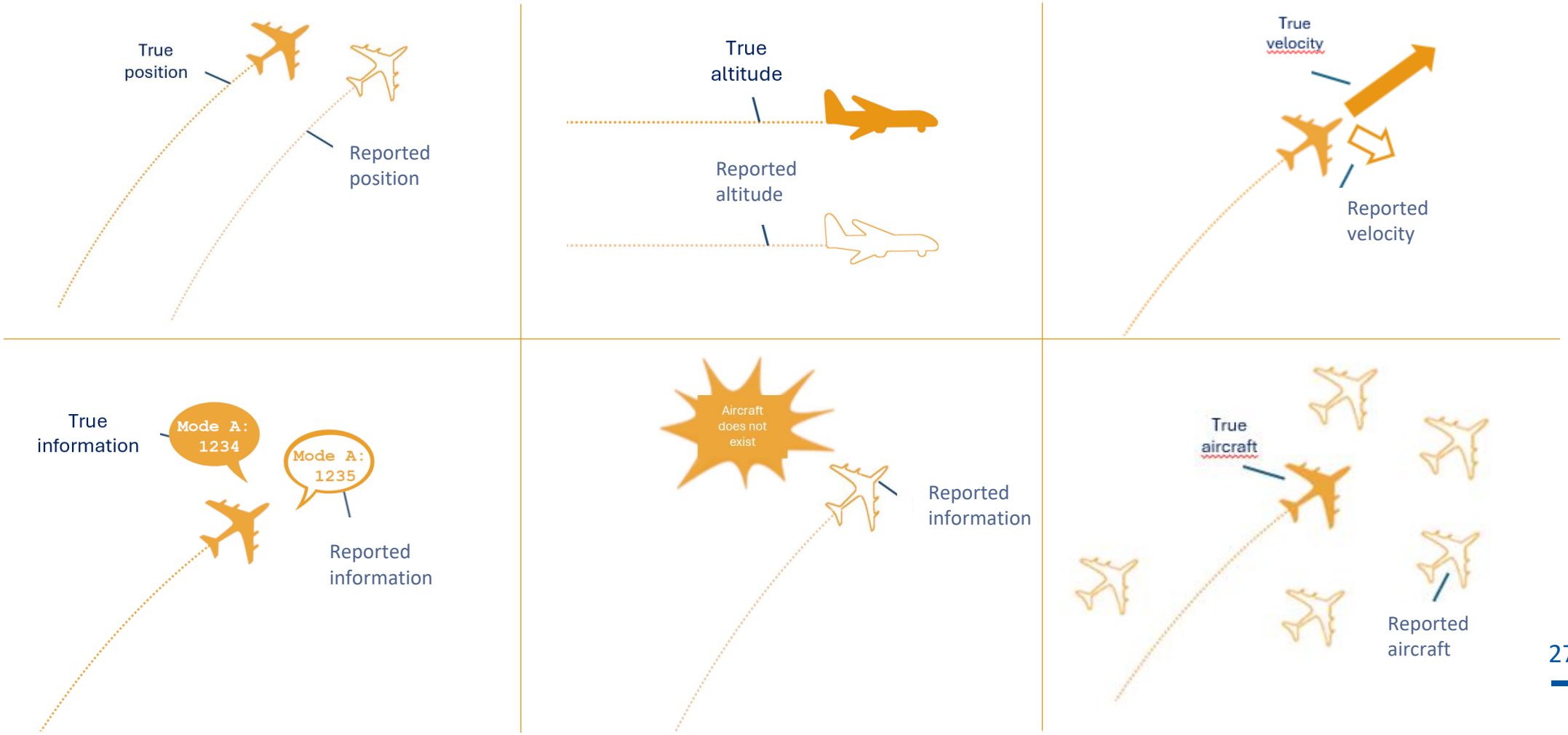
ADS-B validation for resilient surveillance

From integrity assurance to future track-based separation concepts

Isabelle Brossaud

Operational Surveillance Expert, DFS

ADS-B anomalies and threats

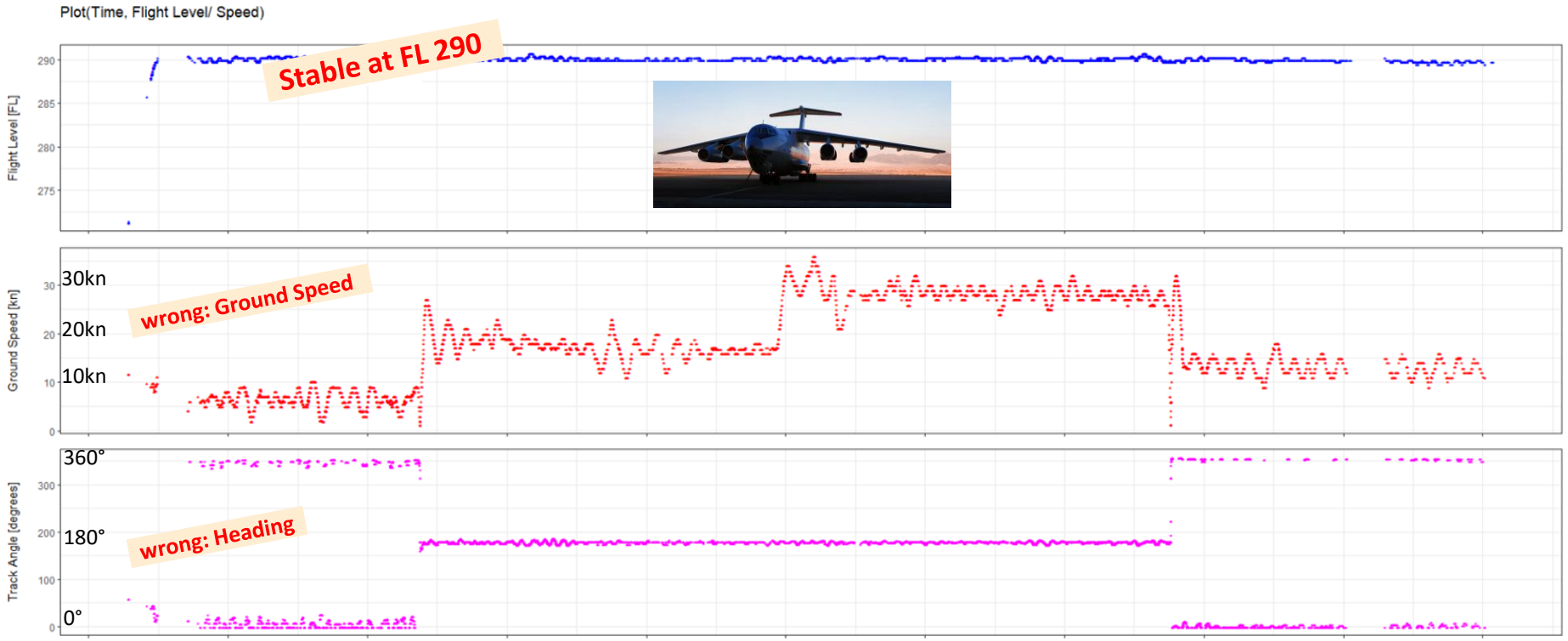


ADS-B Anomalies Example

Due to a technical malfunction, the aircraft is transmitting an incorrect ADS-B velocity vector

For Air Traffic Controller:
- false ground speed indication of 80 kn
- position prediction errors

→ Medium Term Conflict alert

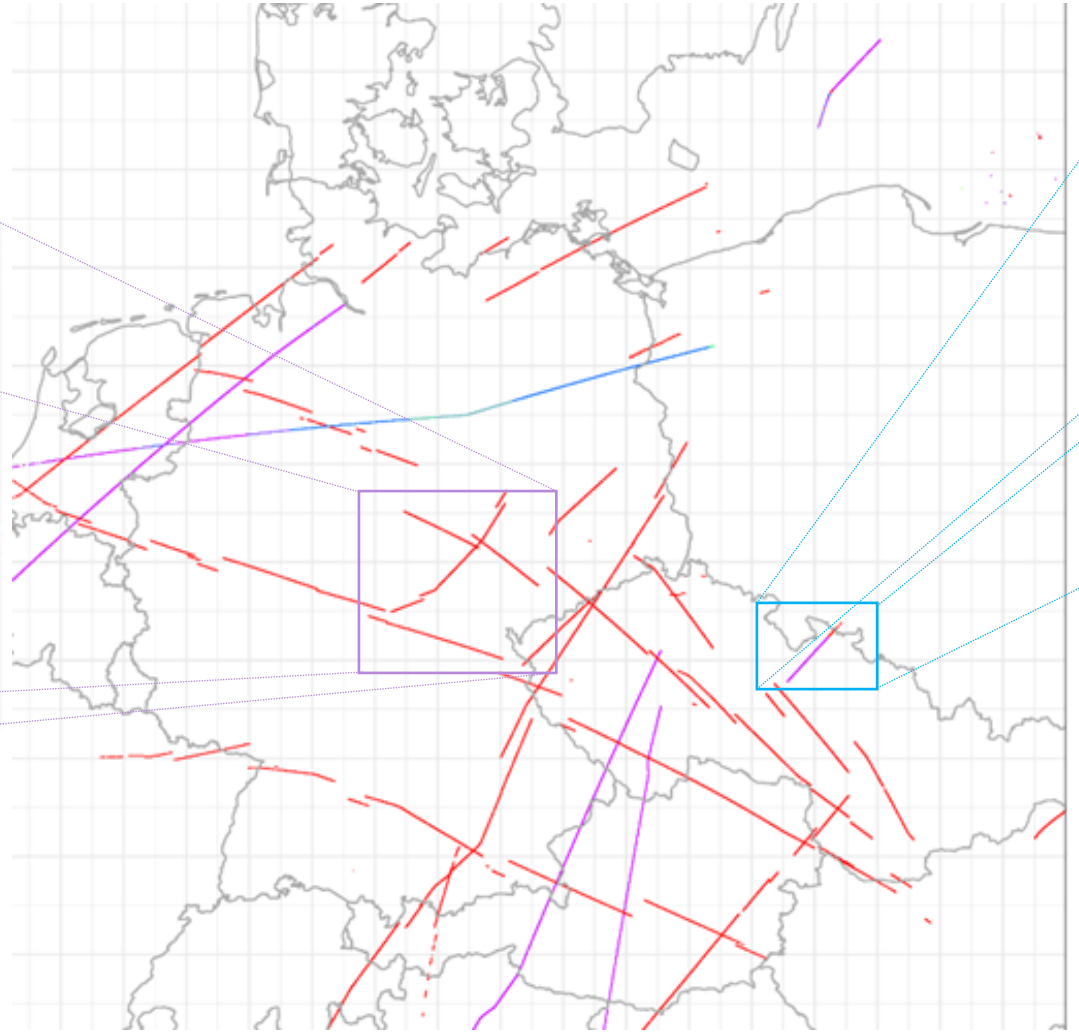


GNSS RFI effect on ADS-B

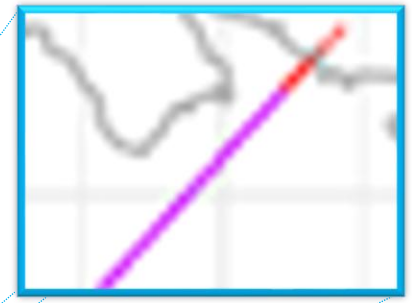
Formerly spoofed trajectory



Formerly spoofed ADS-B positions with NIC = 0, erroneous flight trajectory



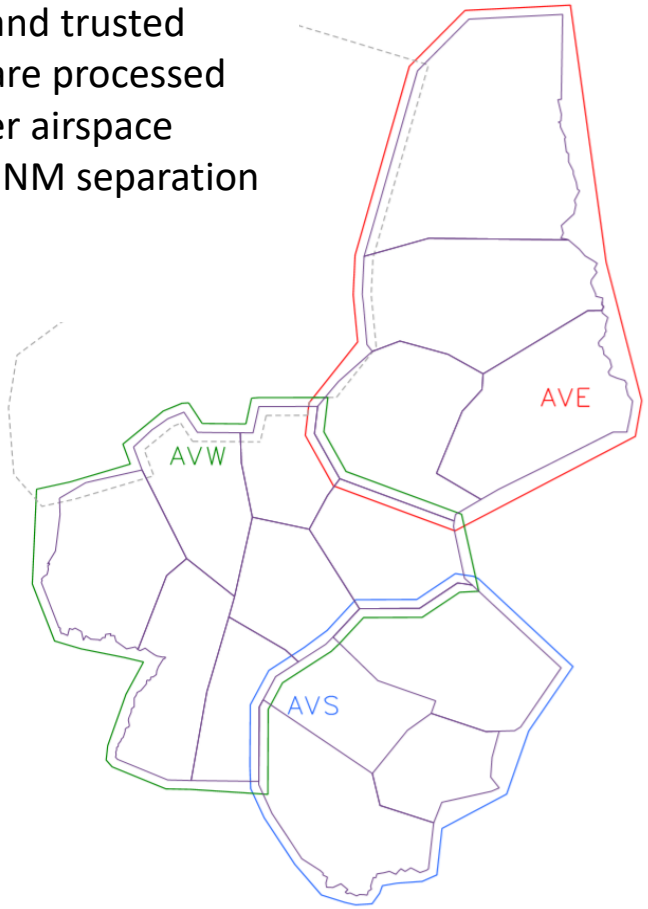
Spoofed Trajectory

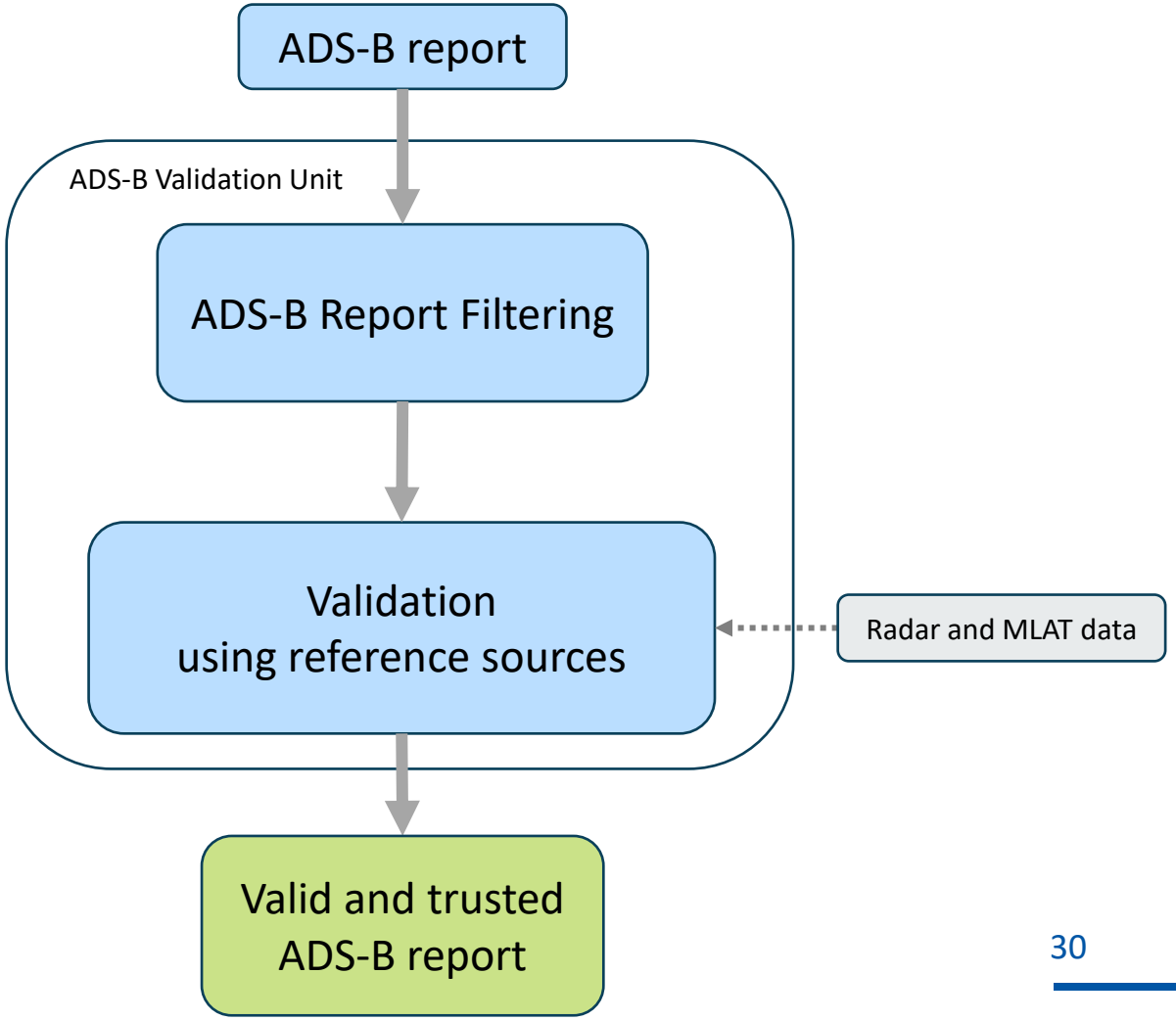


Spoofed ADS-B positions with NIC = 8 ; erroneous flight trajectory

How does the validation work

These valid and trusted ADS-B data are processed for DFS upper airspace supporting 5NM separation services

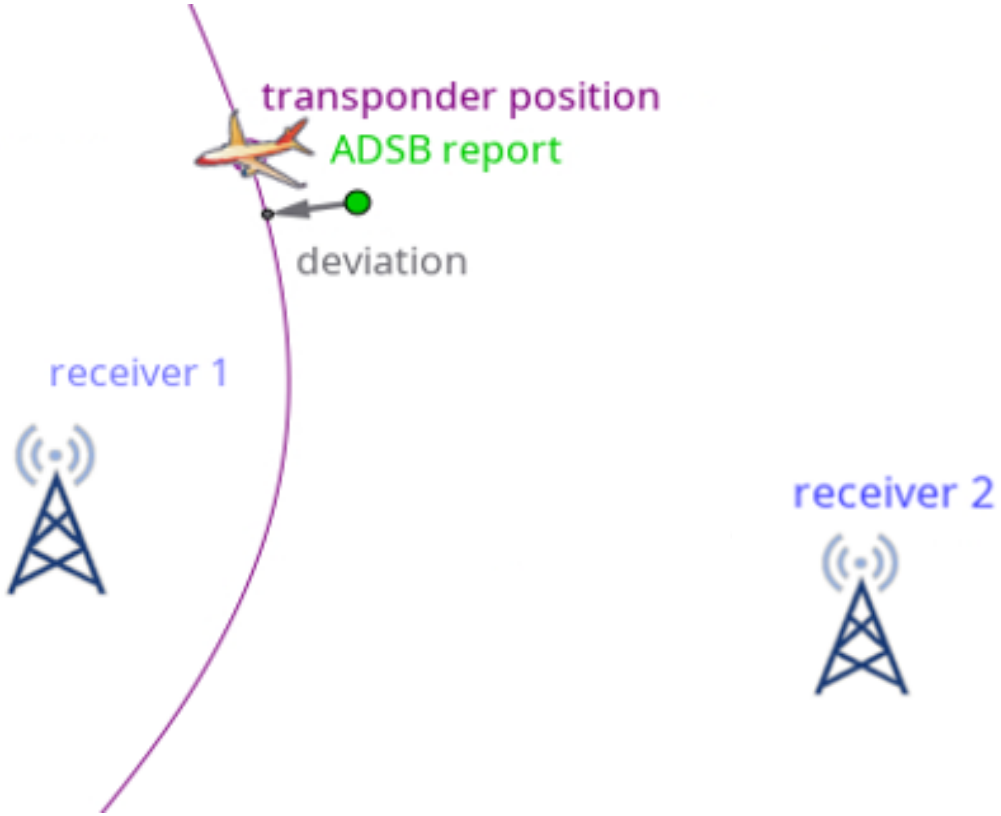




Evolution towards lower airspace

Challenges	Operational consequence	DFS Mitigation
Mixed ADS-B equipage and No ADS-B mandatory zones	Incomplete air situation picture	Mixed surveillance technology concept
Regional Airports without radar/MLAT coverage	No trustworthy tracks	Source Location Validation
Track quality based on sensor and **aircraft** performance	Non-uniform separation minima in the same airspace	Track-based separation

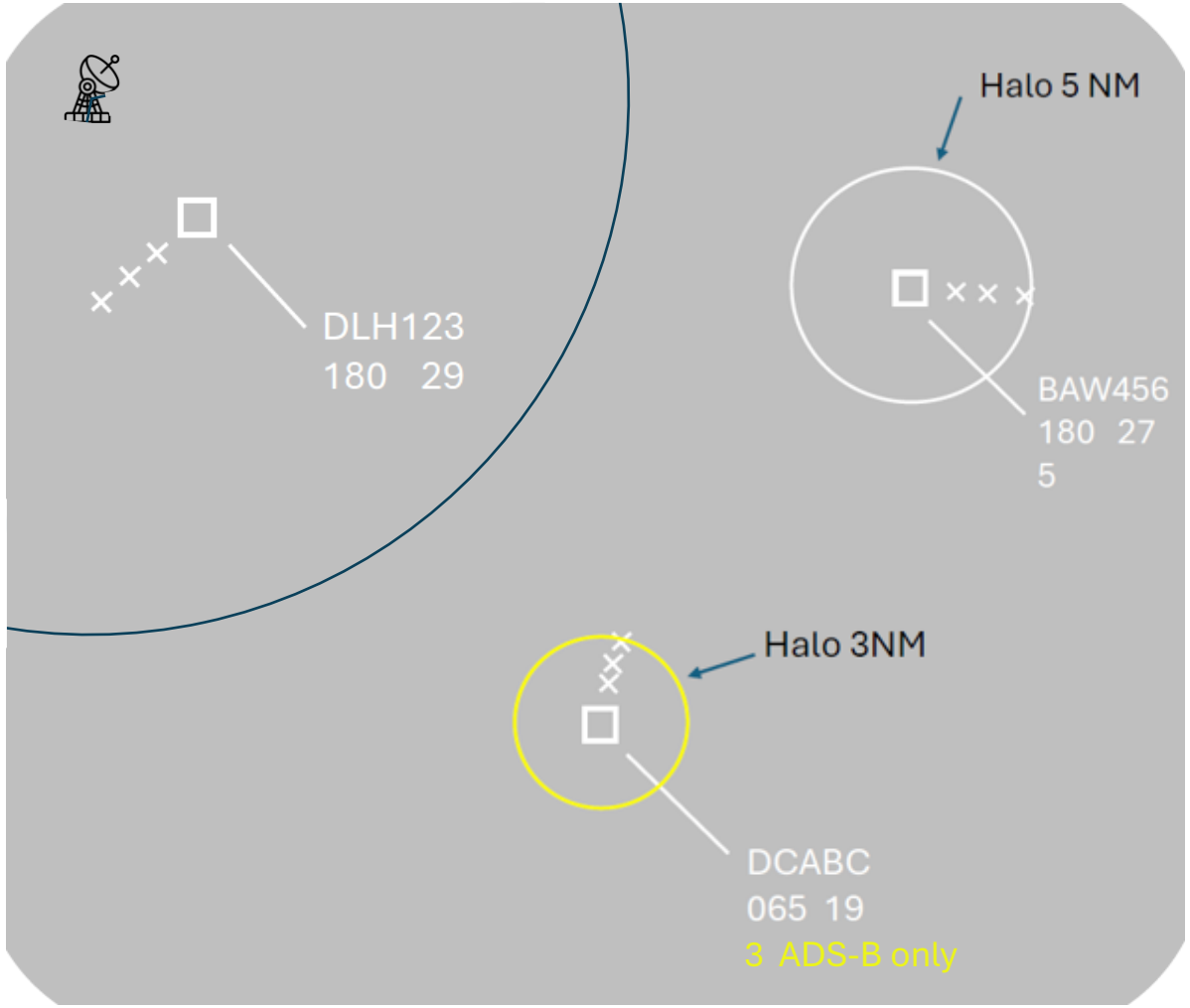
Integrity assurance with Source Location Validation (SLV)



Ongoing Research and Development activities:

- Defining suitable deviation thresholds values for validity determination
- Use of previous target state information
- Initial plausibility checks based on visual confirmation and/or adherence to known movement areas.

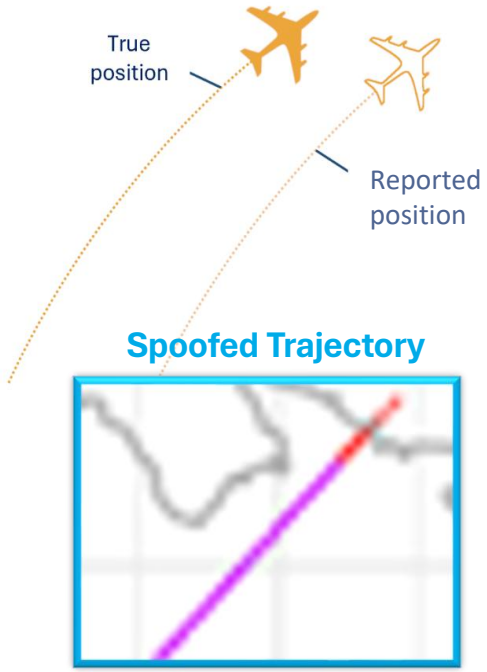
From area-based separation to track-based separation



ADS-B only

- Incomplete air situation picture possible
  - No radar or MLAT
  - Non ADS-B equipped aircraft not visible
- Uneven surveillance performance:
  - Track losses possible at any time

Wrap-up: ADS-B validation for resilient surveillance



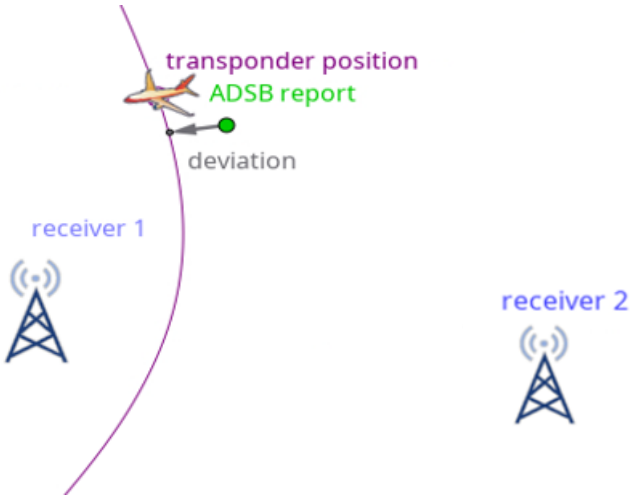
Spoofed ADS-B positions with NIC = 8 ; erroneous flight trajectory

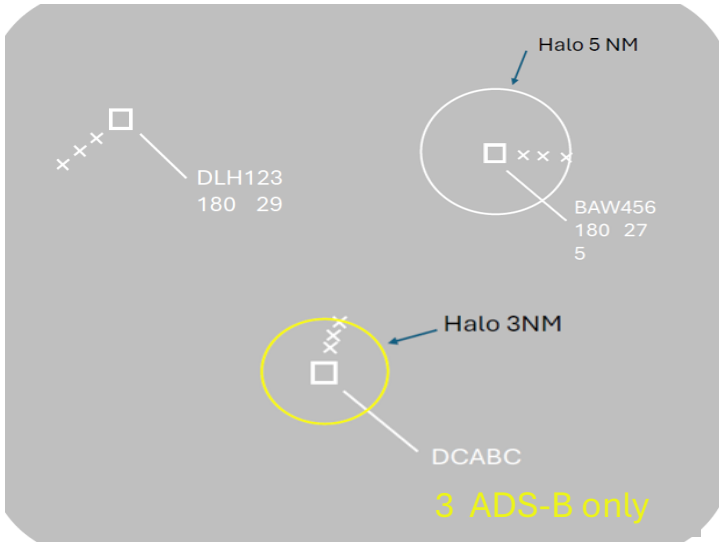
ADS-B anomalies and GNSS interferences cannot be detected through ADS-B quality indicators alone.

Validation is a prerequisite for the safe operational use of ADS-B.

DFS already operates an ADS-B Validation Unit in upper airspace.

Only future developments can unlock the full potential of ADS-B in lower airspace and especially in regions beyond radar.





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Mr. Hiromi Miyazaki



Hiromi Miyazaki received his Doctor in Engineering from Nagasaki University, Japan. He has worked at the Electronic Navigation Research Institute since 1993, where he is currently Senior Director for Research.

His main interests are aeronautical surveillance technologies, including ADS-B, multilateration (MLAT) and secondary surveillance radar (SSR).

Surveillance on the Airport Surface

Hiromi Miyazaki

Electronic Navigation Research Institute, Japan

ICAO Surveillance Panel adviser

Airport Surface Operation

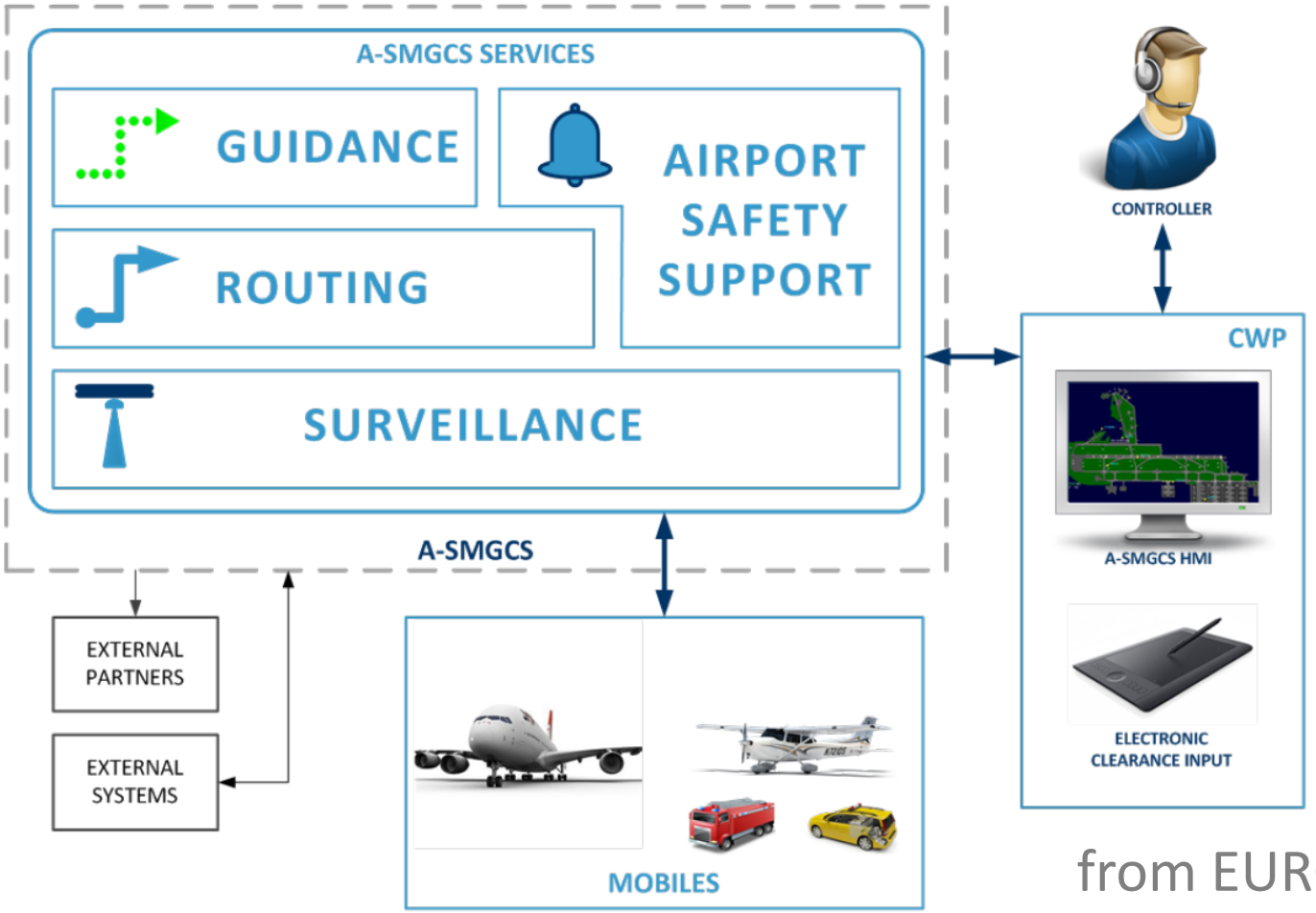




- Airport surface operations have a significant impact on the operational efficiency and safety of overall air traffic management

Advanced Surface operations by A-SMGCS

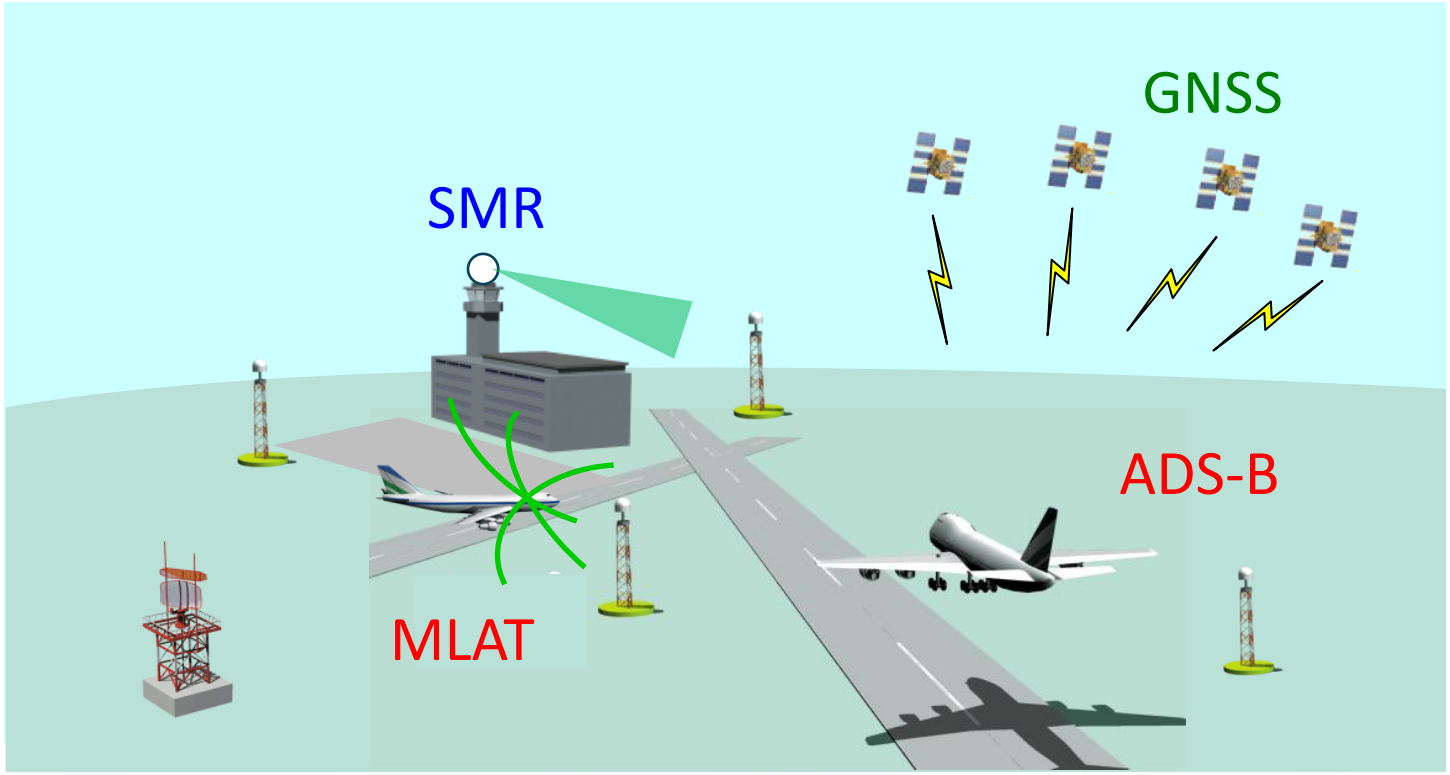
- A-SMGCS (Advanced Surface Movement Guidance and Control System) is an airport management system that provides services such as surveillance, airport safety support, routing and guidance for aircraft and vehicles on the ground



from EUROCONTROL-SPEC-171

Surveillance service on A-SMGCS

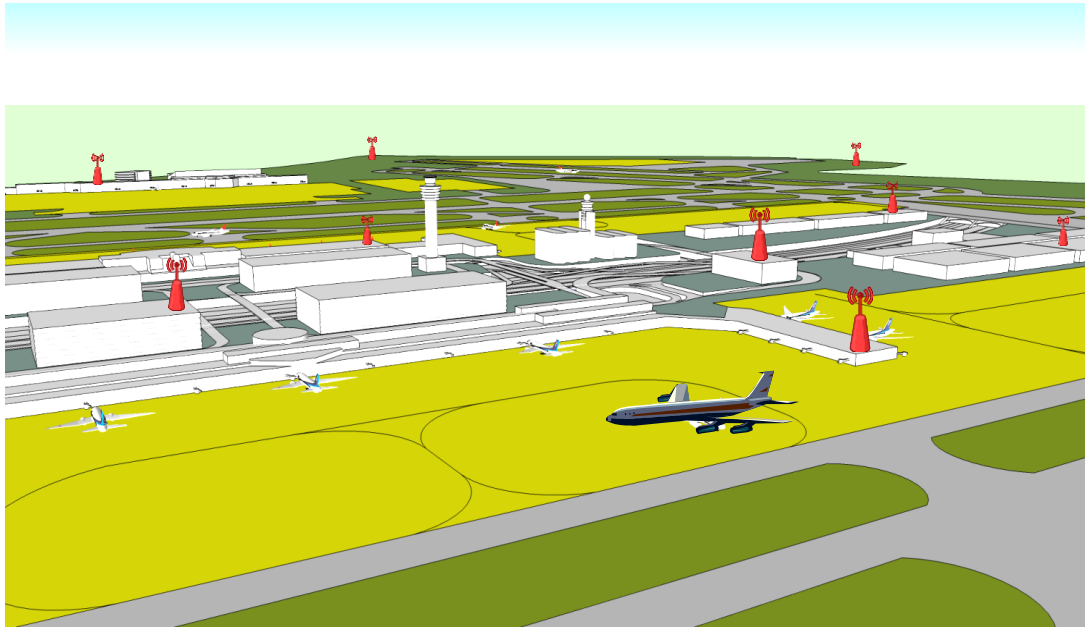
- Surveillance service needs to provide identification, position and tracking of mobiles within a predefined coverage
- For the positive identification of targets at least one cooperative sensor is necessary
- To detect any mobile, intruders or aircraft with an inoperable transponder, at least one non-cooperative sensor is needed

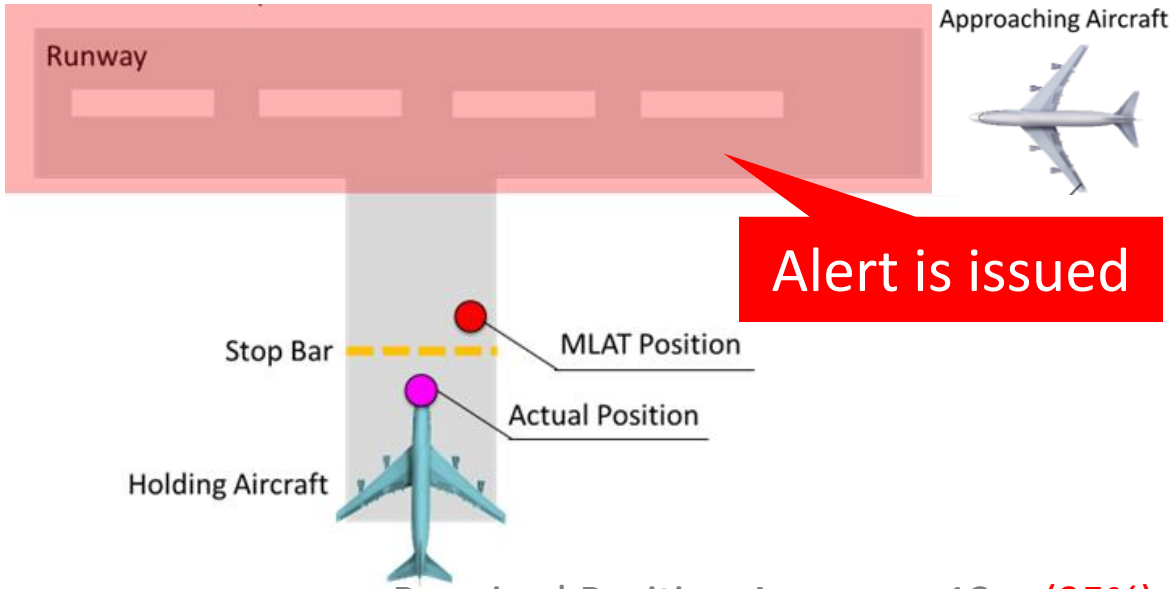


Cooperative Sensor
MLAT and ADS-B

Non-Cooperative Sensor
SMR

MLAT (Multilateration)





Required Position Accuracy: 12m (95%)

Good point

- Coverage can be designed flexibly by adding receiving stations

Weak point

- Performance degradation occurs in area where the receiver constellation isn't ideal
- Many receiving stations are needed in large airports, resulting in increased costs

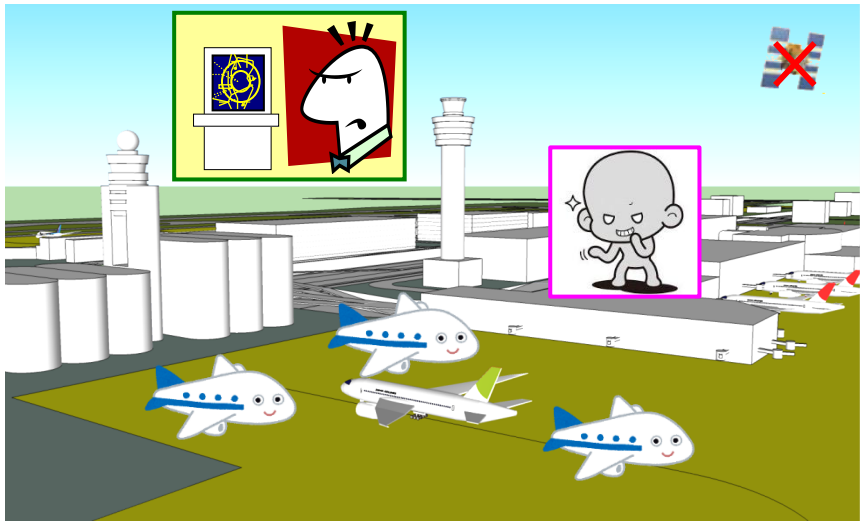
ADS-B (Automatic Dependent Surveillance-Broadcast)

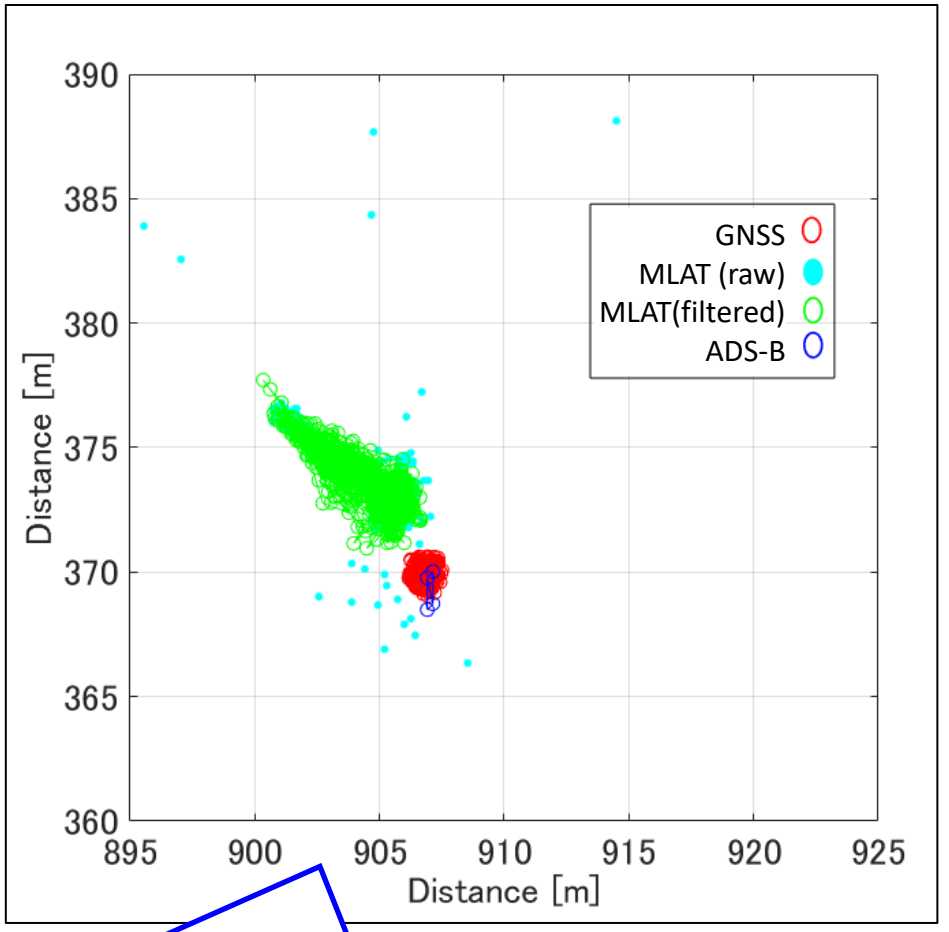
Good point

- High performance is obtained stably
- The coverage can be easily expanded

Weak point

- ADS-B avionics must be installed on the aircraft
- There is a risk of GNSS anomaly and spoofing.

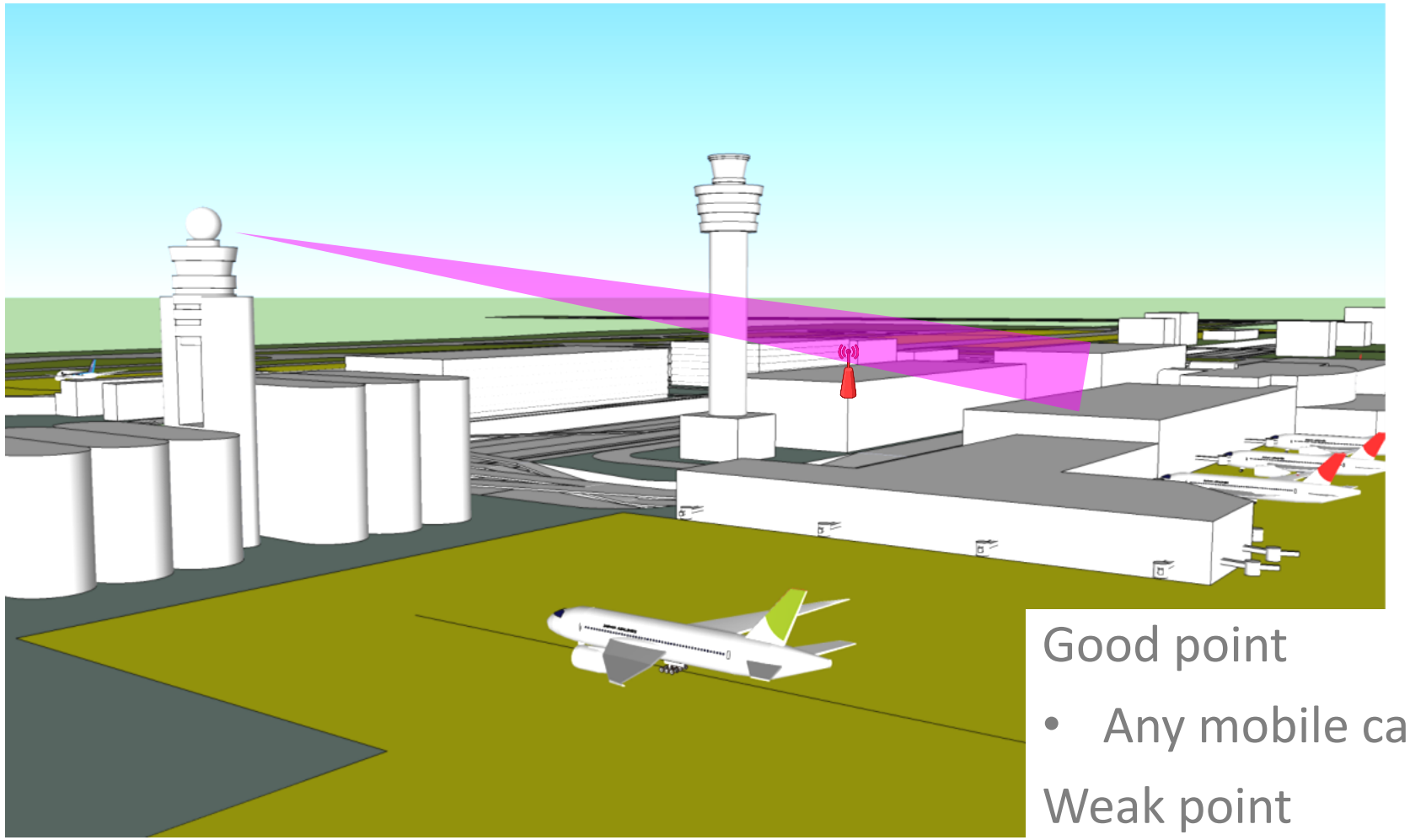




95th percentile of positional errors

Reference GNSS: 0.73 m
ADS-B : 1.27 m
MLAT (raw) : 12.14 m
MLAT (filtered) : 3.64 m

SMR (Surface Movement Radar)



Good point

- Any mobile can be detected

Weak point

- A blind area occurs
- No ID information is available

Challenges and Solutions

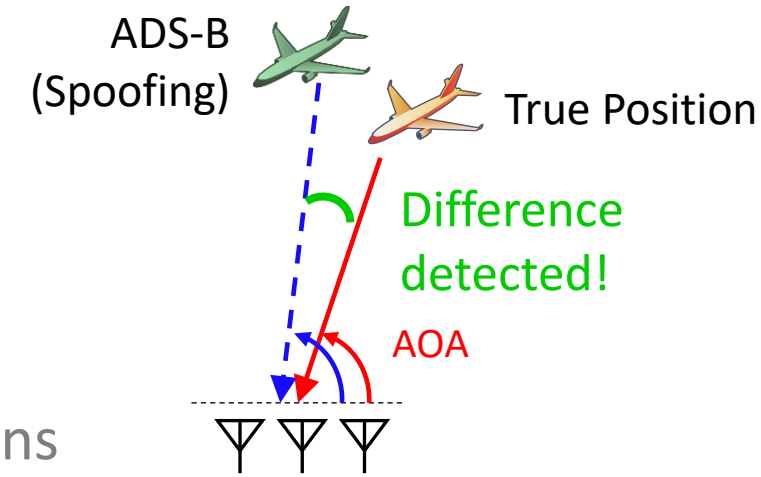
Sensor	Challenge	Solution
MLAT	Many receiving stations (Cost)	ADS-B or New technology
MLAT	Performance degradation	ADS-B and Data fusion
ADS-B	ADS-B avionics installation	MLAT and Data fusion
ADS-B	GNSS anomaly and Spoofing	MLAT or Validation technology
SMR	No identification information	ADS-B and MLAT
SMR	Blind area	New technology

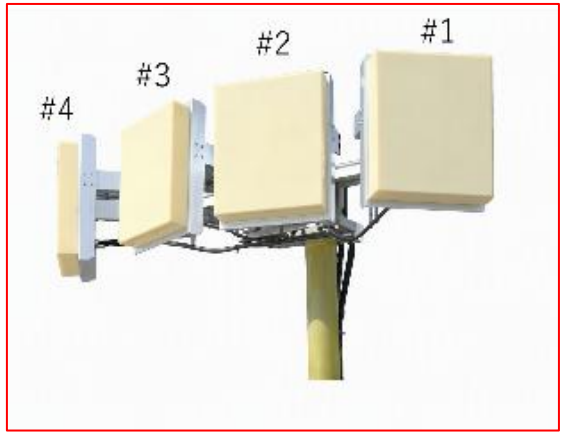
- ADS-B is the best primary sensor (Performance and Cost)
- Complementary sensors (MLAT and SMR) and Data fusion are required
- Some new technologies are needed for the solutions

Angle of Arrival Measurements by Array Signal Processing

- Array signal processing is a modern wireless technology that receive and process a signal with multiple antennas

This new technology is under development



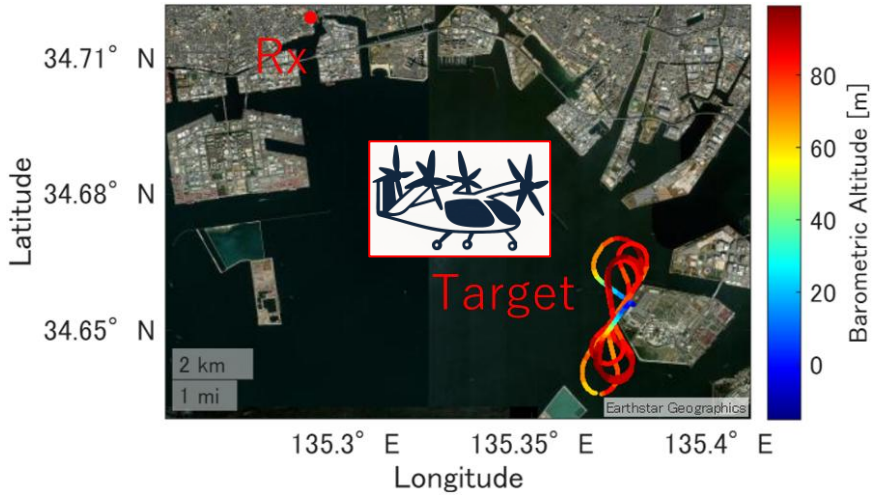


Potential Applications

- ADS-B Position Validation
  - ➢ Anti-spoofing
- TDOA-AOA Hybrid Localization
  - ➢ Reducing MLAT receiving stations

Experiments with Advanced Air Mobility

- Demo flight at Expo 2025 Osaka
- 4-element
- 4.6°accuracy



J. Naganawa, et al, 2025 ICNS Conf. / J. Naganawa, et al, IEEE CAMA 2026.

Future operational needs (for Remote Tower System)

- Remote tower system requires a new cost-efficient surveillance sensor providing a basic surveillance service for small and regional airports to increase the situational awareness of a remote tower controller
- Enhanced video camera plot extraction is expected to combine with ADS-B and MLAT by the data fusion, as a non-cooperative source

(from SESAR PJ.14-W2-84B - TRL6)





Enhanced video camera plot extraction as a non-cooperative source

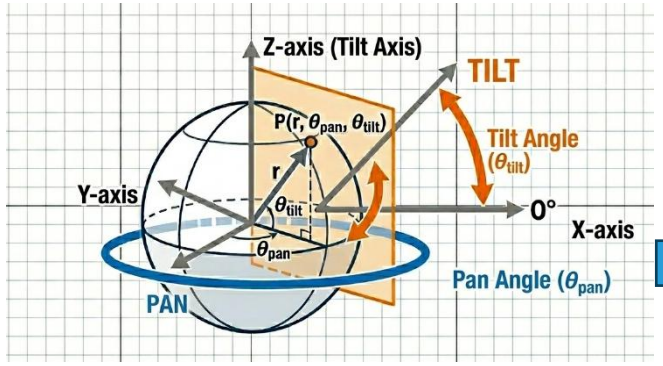
This technology is under development

Positioning principle

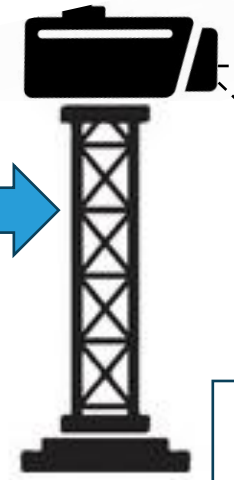
Target detection on the display



Image recognition
（Target detection and acquisition of position information ）



Coordinate transformation
(2D coordinates → Rotated coordinates → 3D coordinates)



The camera's horizontal line (towards infinity)

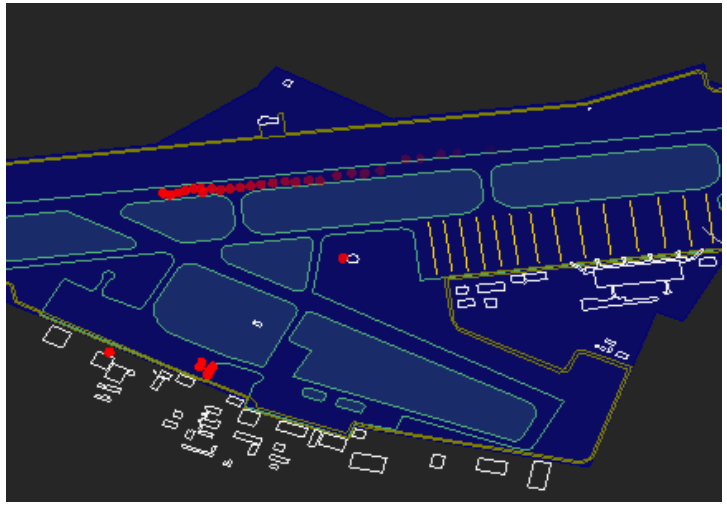
Angle of the target

Target position on the airport surface



Projection of the target's ground position （ Ground position coordinates of airport surface）

Experiments at Sendai airport



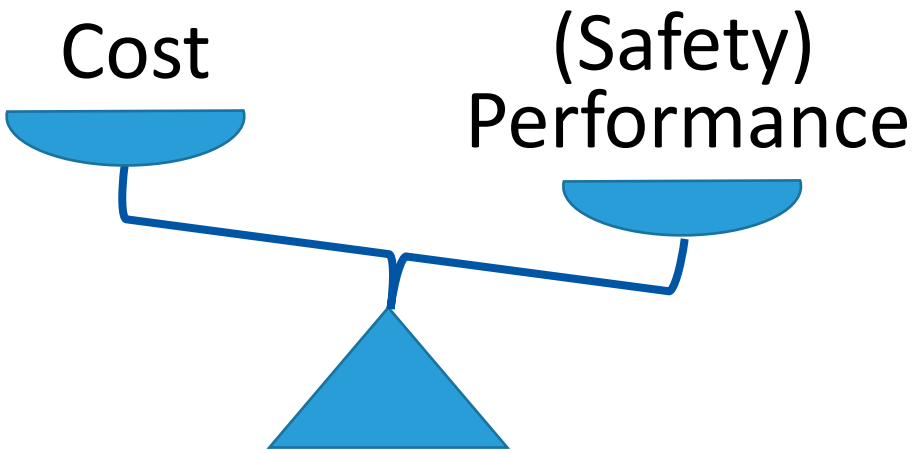


Conclusion

- Cost and Performance are in a trade-off relationship, making it difficult to take a balance
- If the balance cannot be achieved, any action is required

➢ Lower the performance requirements

➢ Develop a new technology



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Mr. Ahmad A. Fadel



Ahmad Fadel is a Senior CNS Inspector at GACA, Saudi Arabia, with experience in safety management of changes. Having worked on both the ANSP and regulatory sides, he has contributed to major CNS changes across navigation, surveillance and communications, including Mode S, ADS-B, A-SMGCS, CPDLC and virtual towers.

A member of the ICAO Surveillance Panel, he has an academic background in electronics, communications, networking and security.

From a conventional to a mixed surveillance operating environment

Modernization is also a sustainment challenge:

Managing the mixed surveillance estate

Ahmad A. Fadel

ICAO Surveillance Panel member, Saudi Arabia

Two operating environments

Conventional environment

- Faults raise alarms
- Equipment-based maintenance
- Replace at end of life
- One core skill set

Mixed environment

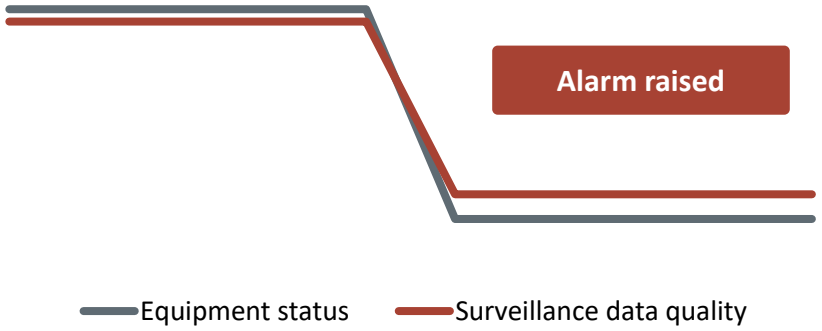
- Integrity degrades silently
- Equipment + data maintenance
- Replace or transition?
- RF + network + data skills

Part 1 · The differences

Part 2 · Managing the change

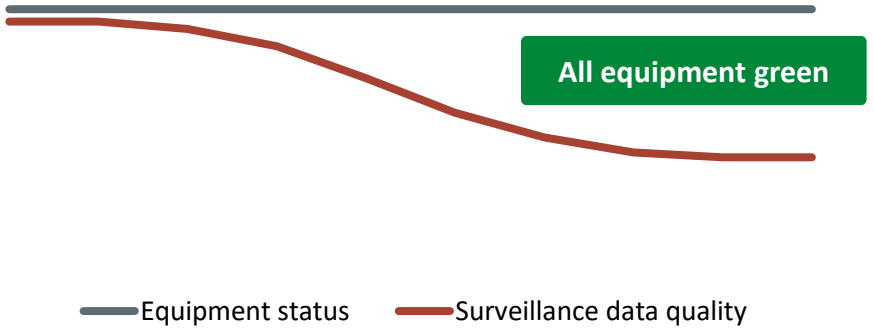
Failure modes and monitoring

Hardware fault – any sensor



Equipment fault: detected by BITE / alarm

Data fault – e.g. ADS-B



Integrity degradation: no equipment alarm

Examples: integrity failures with no equipment alarm

Avionics
Wrong / duplicate address

GNSS
Jamming, spoofing

Network / SDP
Frozen tracks, link up

Maintenance and test equipment

Preventive

Site checks → + many remote sites, network, timing

Corrective

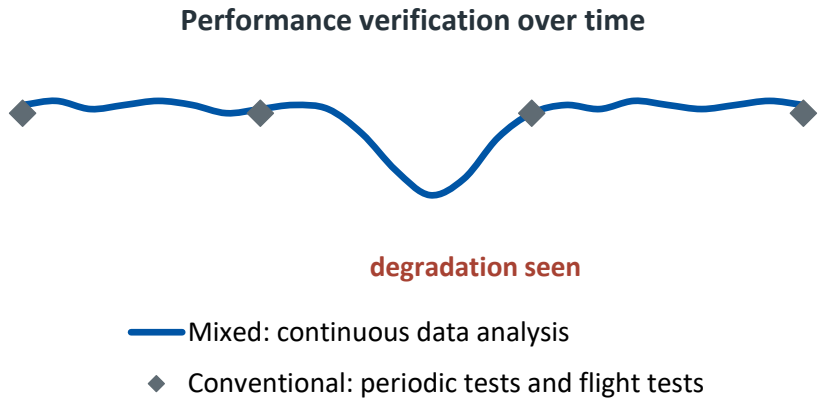
Replace the unit → + site, network, timing or aircraft?

Performance monitoring

Periodic tests → + continuous, incl. Cat 062

Changes and configuration

Stable hardware → + ASTERIX / adaptation consistency



RF toolkit	Data toolkit
Power meters, spectrum analyzers, test transponder	Recording / replay, ASTERIX and network analyzers

Maintenance shifts from repairing one site to monitoring the whole system

Obsolescence: replace or transition?

Plan

Track end of support and spares stock

Decide before the spares run out

Decide

Replace with a new radar,

transition to ADS-B / MLAT, or a mix?

Factors

Required performance · fleet equipage · GNSS fallback · non-cooperative needs · cost

One radar's end of life

In service

End of support announced

Start planning

Decide before spares run out

Replace | **Transition** | **Mix**

The end-of-support notice is the right time to start planning

Technical competencies

Conventional competencies

- PSR, SSR and Mode S principles
- RF transmitters and receivers
- Antennas and waveguides
- Electronics and fault finding

Added in the mixed environment

- ADS-B and MLAT principles
- GNSS and time synchronization
- Data networks and ASTERIX
- Surveillance data quality monitoring
- Cybersecurity
- Data Fusion techniques and characteristics

ATSEPs keep their radar skills and build on them with GNSS, network and data skills

Managing the change

Part 2: what each difference means in practice

Failure modes and monitoring	Data integrity is monitored alongside equipment status
Maintenance and test equipment	Whole-system monitoring is added to site maintenance
Obsolescence	Planning starts at the end-of-support notice
Competencies	Radar skills stay; GNSS, network and data skills are added

The mixed estate is sustained as one Service

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Mr. Miguel Muñoz Martínez



Miguel Muñoz Martínez holds an MSc in Aeronautical Engineering, specializing in navigation systems, from Universidad Politécnica de Madrid. Since 2021, he has been Technical Director – ATM at Startical, leading space-based VHF and ADS-B solutions.

Previously, he spent more than 15 years at Indra, leading satellite-based CNS developments and roadmaps, managing SESAR2020 activities and contributing to EUROCAE, ICAO and RTCA. With more than 25 years of experience, he has also played a key role in major aerospace projects, including the Airbus A380 and Nimrod MR4.

ADS-B technology evolution & data authentication

Miguel Muñoz Martínez

Indra

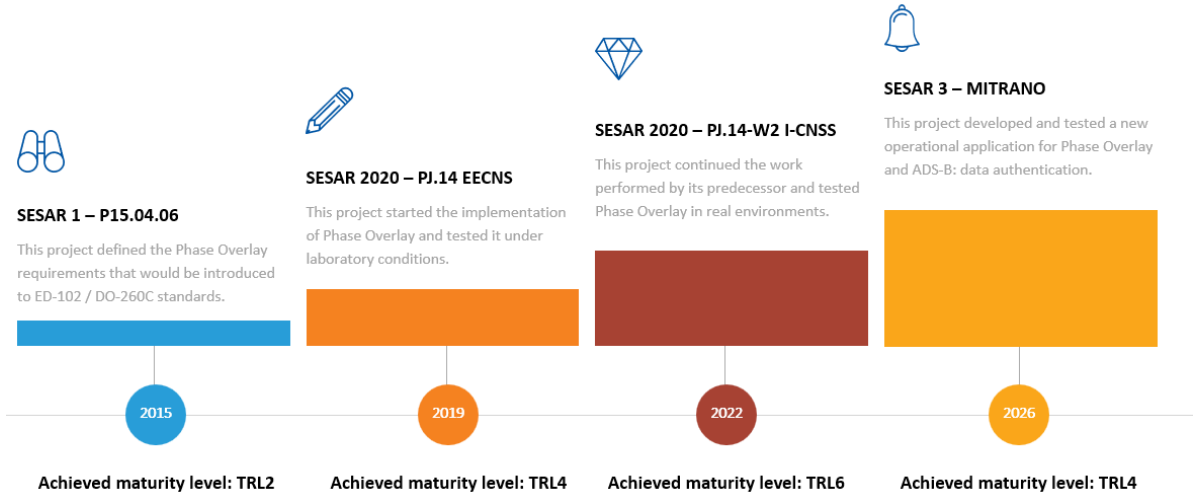
The presentation will explore the evolution of the ADS-B 1090ES link from PPM to 8-PSK modulation, providing increased capacity to support improved spectrum use and potential target authentication to address vulnerabilities such as spoofing. It will also consider the possible application of this evolution to Mode S radar systems, as well as the transition from ground-based to space-based ADS-B and the future evolution toward space-based multilateration systems.

ADS-B current challenges

Capacity and cybersecurity

- Currently, ADS-B is not a 100% reliable surveillance source because there are no means to know if a single squitter comes from a real or spoofed aircraft.
- With the current definition of ADS-B (PPM), it is not possible to introduce authentication without adding more PPM squitter types and increasing the rate, what would lead to a larger congestion of the 1090 MHz frequency (not desired).
- Therefore, a new way to send more data without modifying the PPM signal is needed: **phase modulation** (or Phase Overlay is DO-260C / ED-102B standards).
- This phase modulation allows ADS-B to improve its data capacity by adding an 8-PSK modulation on top of the original PPM, increasing the number of transmitted bits from 112 to 448 (from 56 to 260, effectively).

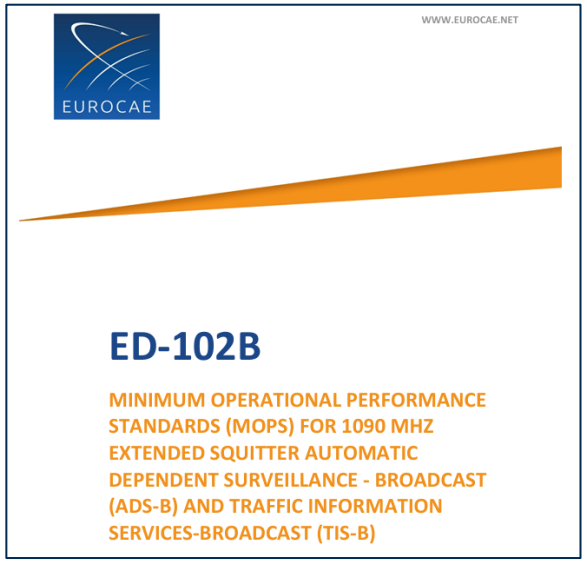
In SESAR, partners from all parts of this sector (industry, ANSPs, pan-European organizations) have worked together to validate this new phase modulation for ADS-B and provide new operational applications for it.

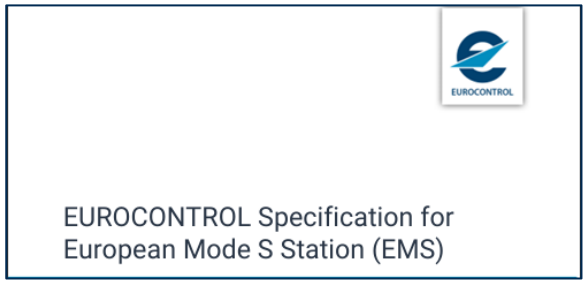


Phase modulation for ADS-B

Increasing the data capacity

- Between 2013 and 2022, spread across there different projects, different SESAR partners validated the new phase modulation for ADS-B, demonstrating that this new technology was ready for its deployment.
- The new data capacity provided by Phase Overlay can be used for different purposes:
    - Reduction of number of transmissions of ADS-B squitters by compressing the information provided currently in less squitters (not feasible).
    - Transmission of relevant information for controllers, such as weather.
    - Introduction of authentication data in order to improve the overall security of the system.
- EUROCONTROL's EMS 4.0 already considers this new phase modulation, stating that Mode S stations with integrated ADS-B must be able to implement 8-PSK without changing the hardware. This opens the possibility to introduce 8PSK in Mode S messages, increasing the bandwidth and potentially reducing the 1090 MHz congestion as more data can be obtained in a single reply.



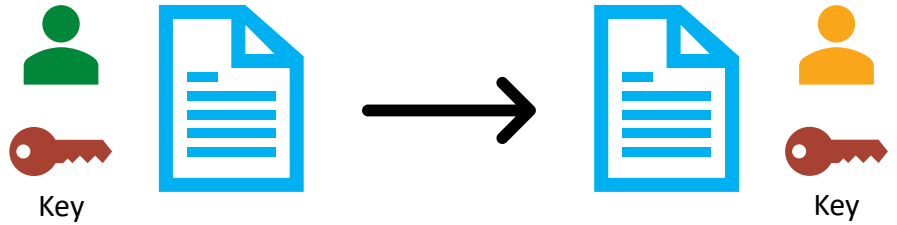


ADS-B authentication

Cryptography

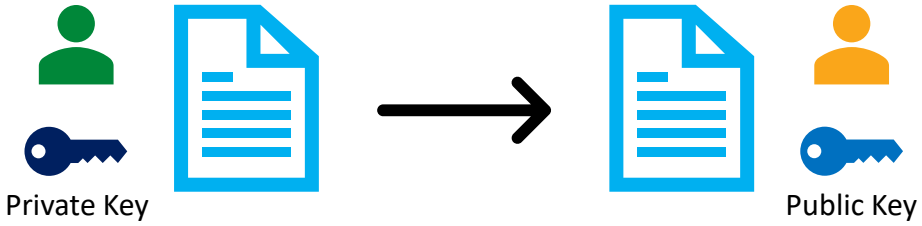
- After validating the new phase modulation of ADS-B, the last SESAR project focused on defining and testing a new authentication feature for ADS-B.
- In order to implement authentication (the process of verifying the identity of an entity to assure the authenticity and integrity of the data), the partners introduced cryptography.
- As there are two types of cryptography (symmetric or asymmetric), the main constraints of ADS-B were analyzed:
    - **High loss rate:** squitters can be lost due to the channel or collisions).
    - **Unidirectional:** there is no way to know if the squitter arrived at its destination.
    - **Fixed length:** ADS-B squitter length cannot be modified in order to ensure backwards compatibility.
- After an analysis, it was chosen to use symmetric keys to represent the identity of every single aircraft.

Symmetric cryptography



Same key is used by the two users to verify the message content

Asymmetric cryptography

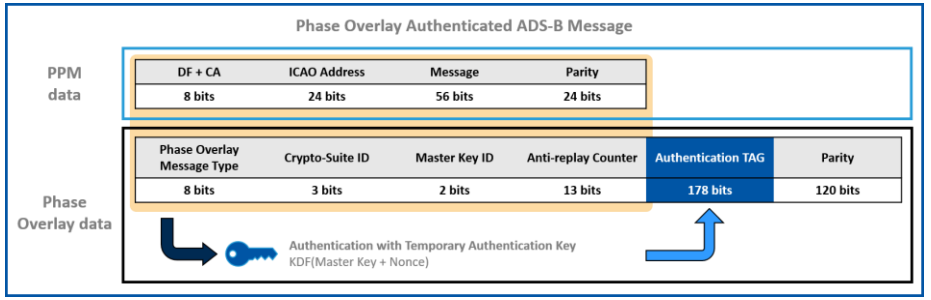


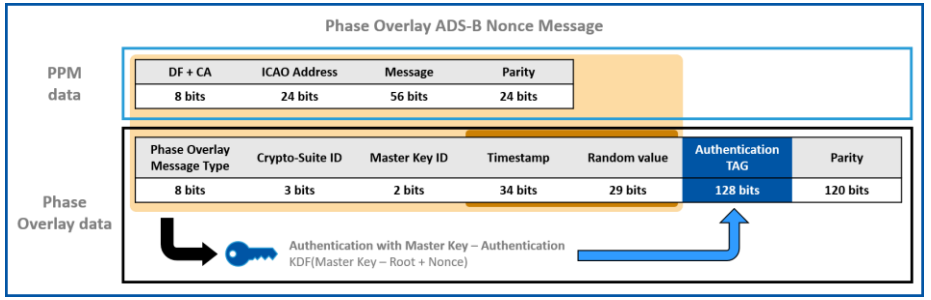
Here, public and private versions of the same key are used

ADS-B authentication

Work procedure

- The work procedure of this authentication feature is simple:
  - The aircraft and the receiver have the same private key that represents the aircraft's identity.
  - They both use it with external data (that can be time or time and a random number) to generate temporary authentication keys.
  - These authentication keys are combined with the information contained in the PPM message and part of the Phase Overlay message to generate a "tag", a kind of signature that allows the receiver to check that the squitter comes from a specific aircraft and has not been modified in the way.
- For this to work, two more additional Phase Overlay message format were defined in order to transmit these authentication data.

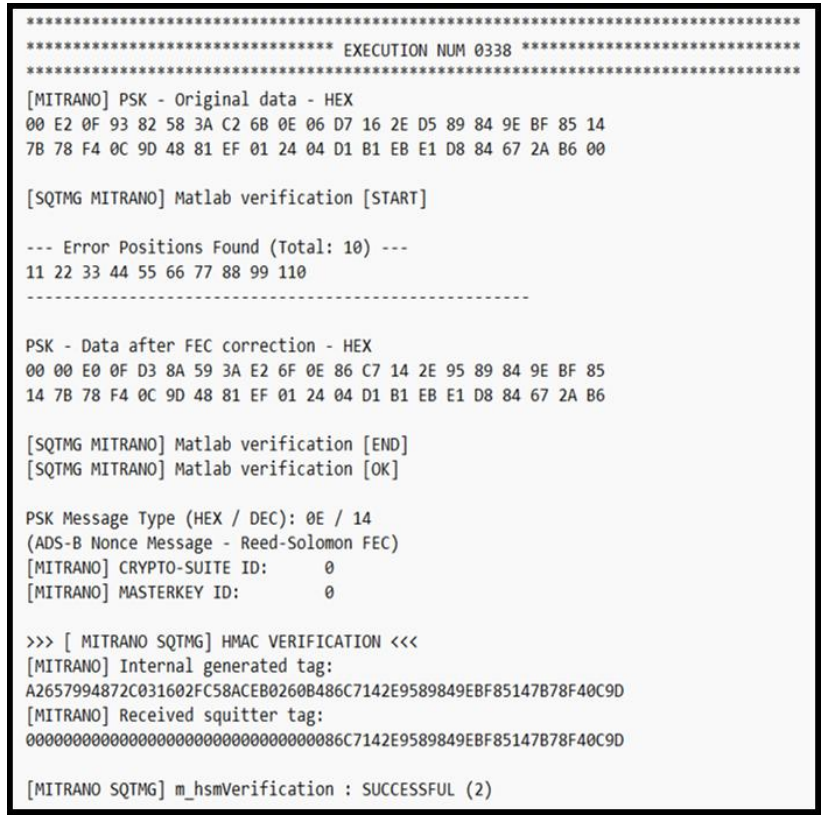




ADS-B authentication

Conclusions

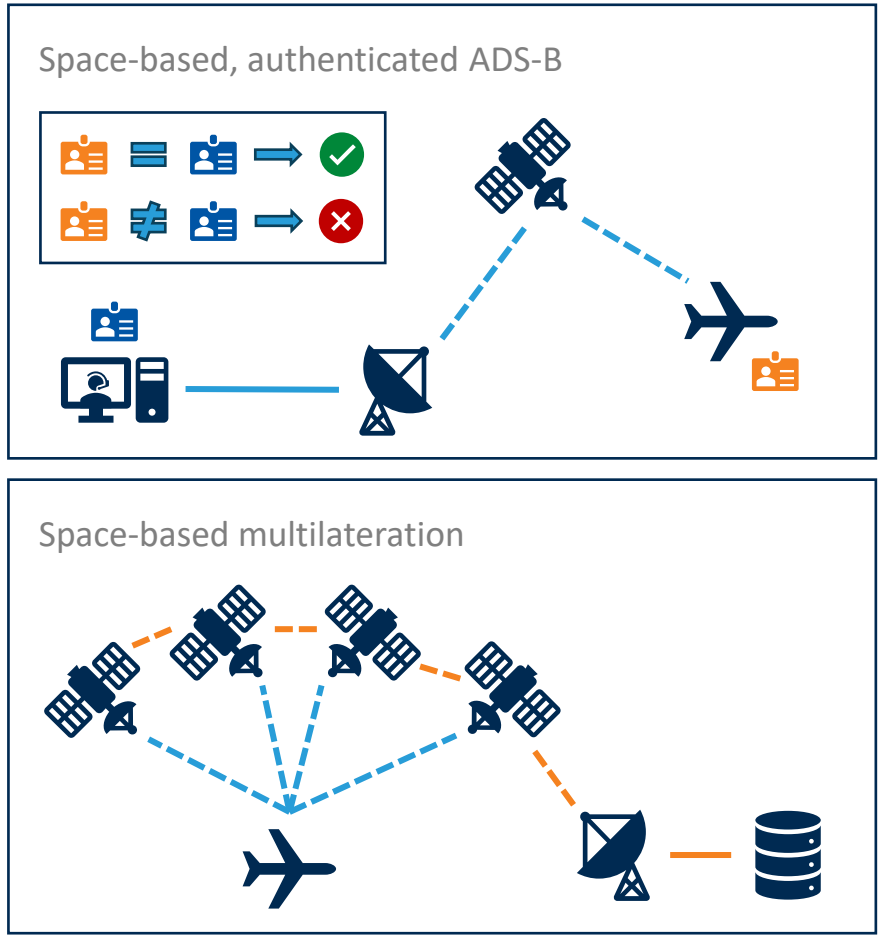
- The introduction of this new authentication feature allows ADS-B to mitigate spoofing attacks, that is, transmissions of ADS-B squitters from non-real aircraft or aircraft impersonating other aircraft.
- In addition, this authentication algorithm also added countermeasures against replay attacks, that is, the transmission of real ADS-B squitters previously recorded and later relayed to generate chaos and confusion.
- This feature was tested and validated under laboratory conditions, demonstrating that the most critical squitters such as position can be authenticated while leaving space for other operational applications (transmission of relevant data, like weather).
- This also allows ADS-B to increase its security and provide controllers more confidence on ADS-B data.
- Partners of different parts of this section are working on improving this new technology to test it out in real environments and check its maturity for a future standardization, regulation and deployment.



Transition from ground to space

Space-based ADS-B

- For continental and coastal airspaces with radar coverage, the introduction of authentication into ADS-B does not have a huge impact on safety, as controllers usually rely more on radar (primary and secondary) to control the airspace.
- However, there are still continental, coastal, and especially oceanic airspaces where it is not viable to deploy radars. In those areas, there is only one solution: **space-based ADS-B.**
- Space-based ADS-B allows controllers to keep tracking of all aircraft outside the radar coverage, increasing the safety of all flight operations and potentially reducing the separation minima, what could benefit the capacity of the airspace.
- The introduction of authentication measures into ADS-B, along with other techniques such as multilateration (position validation through TDOA), increases the confidence of the ADS-B data.



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