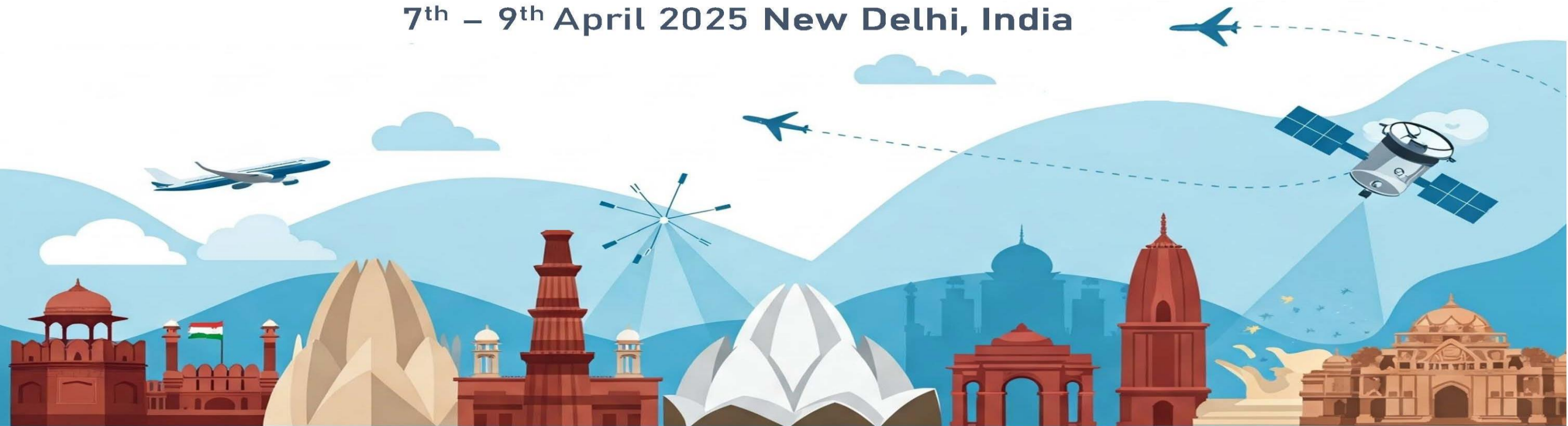


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Ho Wee Sin

Deputy Director (Air Traffic Management)
Civil Aviation Authority of Singapore



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Presentation overview

01

Quick overview on ADS-B

02

Spoofing of ADS-B

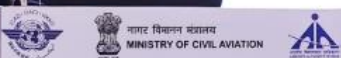
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Reasonableness
checks on position

04

Other works by the
aviation community

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Spoofing of ADS-B

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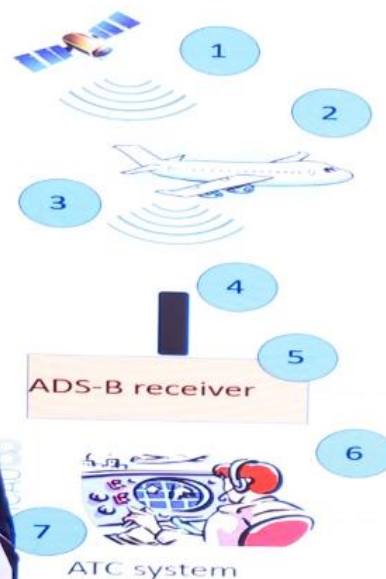






Steps of ADS-B messages creation

9



1. GNSS satellites broadcast GNSS signals.

2. GNSS signals are received by GNSS antenna on aircraft. Aircraft equipment calculates position.

3. Aircraft transponder generates the ADS-B messages (including flight ID, velocity, altitude etc) and broadcast the ADS-B messages.

4. ADS-B messages are received by ADS-B receivers on the ground.

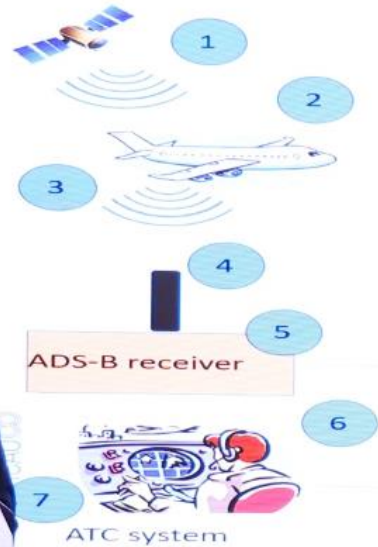
5. The ADS-B receivers compile the ADS-B messages into ADS-B reports in ASTERIX CAT 21.

6. The ADS-B reports get relayed to the ATC system.

7. The ATC system processes the ADS-B reports and display as "aircraft position" to controllers.



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Space-based Surveillance : delivering a real-time, continuous and safety-certified ATC surveillance data flow whenever the areas

29

Context

Space Base Surveillance needs for resiliency

Thales strategy to support next gen surveillance
Needs, solutions, treats and strenghts

Challenges and Benefits

Points of attention and possible opportunities



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Challenges

Points of
opportunity



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What is space-based ADS-B?



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What is space-based ADS-B?



Iridium Next satellites equipped with ADS-B receiver 1090ES

Augments current radar systems with oceanic and remote air space coverage

Delivers true pole-to-pole global coverage

- > Real-time delivery of "ADS-B Out" data to ANSPs
- > No additional aircraft equipment by using 1090 MHz ES
- > Adheres to all current and future ADS-B standards



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Research activities for investigating on-board electromagnetic compatibility issues in current radio environments

Shunichi FUTATSUMORI

Principal Researcher, Electronic Navigation
Research Institute (ENRI), National Institute of
Maritime, Port and Aviation Technology



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Shunichi FUTATSUMORI

Chief Researcher, Research Division, Investigation
Department, National Institute of
Transport and Aviation Technology



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Overview

Research background

On-board electromagnetic compatibility (EMC) issues in current radio environments.

IPL measurement results

Case study on characteristics of aircraft: BK117 C2, KingAir 350, DHC8-Q400, CRJ-900, A320neo, A321XLR, A350-900, A380-800, B737 MAX 8, B787-9, B777-300ER, A320neo, A321XLR, A350-900, A380-800, B737 MAX 8, B787-9, B777-300ER.

Interference path loss (IPL)

IPL is a one of parameters that stands for aircraft's tolerance to electromagnetic interference (EMI).

Estimation of EMI tolerance

Estimation of EMI tolerance due to the sub-6 GHz devices on board.



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Q&A

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To Mr. Ho Wee Sin- How to address spoofing risks in regions relying on ADS-B only surveillance? (Without backup Radar)

Anonymous
Thales: Does your new inertial management unit able to provide resilience against spoofing and jamming?

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