



# **EASA Feedback on Certification of ADS-B Applications**

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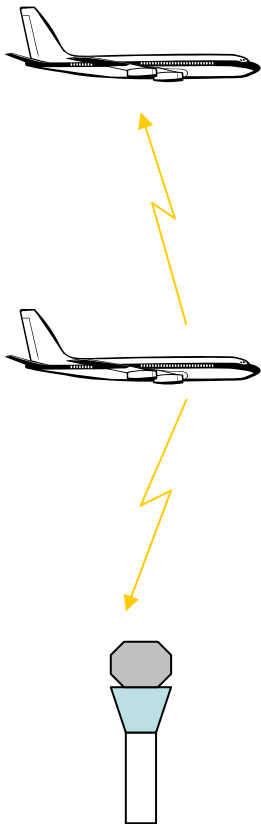


# Overview

- ADS-B Explained
- ADS-B in Europe: Timeline / Overview
- ADS-B OUT (AMC 20-24 / AMC 20-XY)
- Airborne Traffic Situational Awareness (ADS-B IN / ATSA)
- Applications:
  - ADS-B OUT (AMC 20-24)
  - ADS-B IN / ATSA
- Use of EFB for display of ATSA



# ADS-B Explained: ADS-B OUT



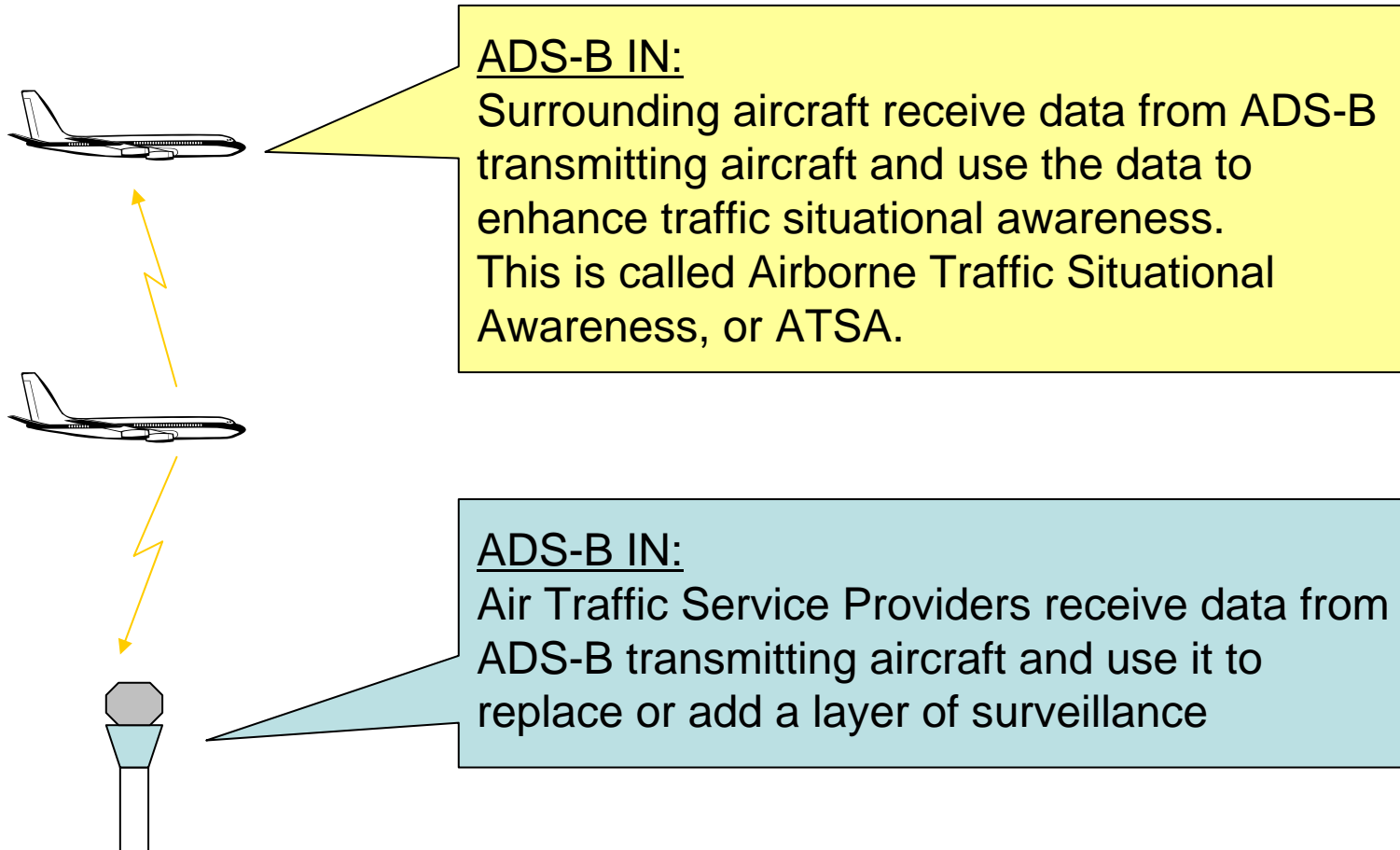
## ADS-B OUT:

Once every second, the aircraft transmits (“squitters”) ownship data:

- ICAO 24 bit Aircraft Address
  - Horizontal Position (LAT/LON)
  - Barometric Altitude
  - Aircraft Identification (‘Callsign’)
  - Special Position Indicator
  - Ground Velocity



# ADS-B Explained: ADS-B IN





# ADS-B in Europe: Timeline

## ➤ Prior to 2008:

- No requirements, ADS-B on aircraft but not certified for intended function

## ➤ May 2008:

- AMC 20-24 Published: Intended to support Non Radar Applications (NRA)

## ➤ November 2008:

- ENPRM/08-009: Single European Sky Mandate on Surveillance Performance and Interoperability Requirements

## ➤ 2015:

- ADS-B OUT mandated in European Airspace
- No requirement for ADS-B IN (e.g. ATSA)



# ADS-B in Europe: Overview

ADS-B OUT TRANSMISSIONS (AMC 20-24 / AMC 20-XY)

GROUND ADS-B IN APPLICATIONS:

- ADS-B RAD
- ADS-B NRA
- ADS-B APT
- ADS-B ADD

AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- ATSA VSA
- ATSA AIRB
- ATSA SURF

EASA DOMAIN



# ADS-B OUT: AMC 20-24

- Non RADAR Applications (NRA)
- Used over remote areas, e.g. Hudson Bay, Canada; North Sea
- Supports 5 NM Separation

- Data Transmission Requirements:
  - ICAO 24 bit Aircraft Address
  - Horizontal Position (LAT/LON)
  - Horizontal Position Quality Indicator (Accuracy / Integrity)
  - Barometric Altitude
  - Aircraft Identification ('Callsign')
  - Special Position Indicator
  - Emergency Status & Emergency Indicator
  - Version number (DO-260A only)
  - Ground Velocity (Recommended)



# ADS-B OUT: AMC 20-XY

- AMC 20-XY in works. Joint effort between Eurocontrol & EASA
- Supports RADAR Applications (RAD): Back-up to Mode-S RADAR, replaces or adds one layer of surveillance
- Supports upcoming EU mandate
- Supports 3 NM Separation
- Supports ATSA applications

Harmonised with  
FAA AC 20-165

- AMC 20-XY Requirements:
  - Additional parameters to be transmitted
  - ED-102A/DO-260B and ED-73C/DO-181D compliant systems
  - Only transponder based ADS-B transmission systems
  - More stringent latency requirements
  - ADS-B Failure indications
  - Validated Air/Ground status



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- **ATSA ITP**
- ATSA VSA
- ATSA AIRB
- ATSA SURF

## ATSA IN TRAIL PROCEDURES (ITP)

- The ATSA-ITP application enables aircraft that desire flight level changes in procedural airspace to achieve these changes on a more frequent basis, thus improving flight efficiency while maintaining safe separation from other aircraft.
- ED-159 (DO-312): Safety, Performance and Interoperability Requirements Document for ATSA-ITP Application



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- **ATSA ITP**
- ATSA VSA
- ATSA AIRB
- ATSA SURF

## ATSA IN TRAIL PROCEDURES (ITP)

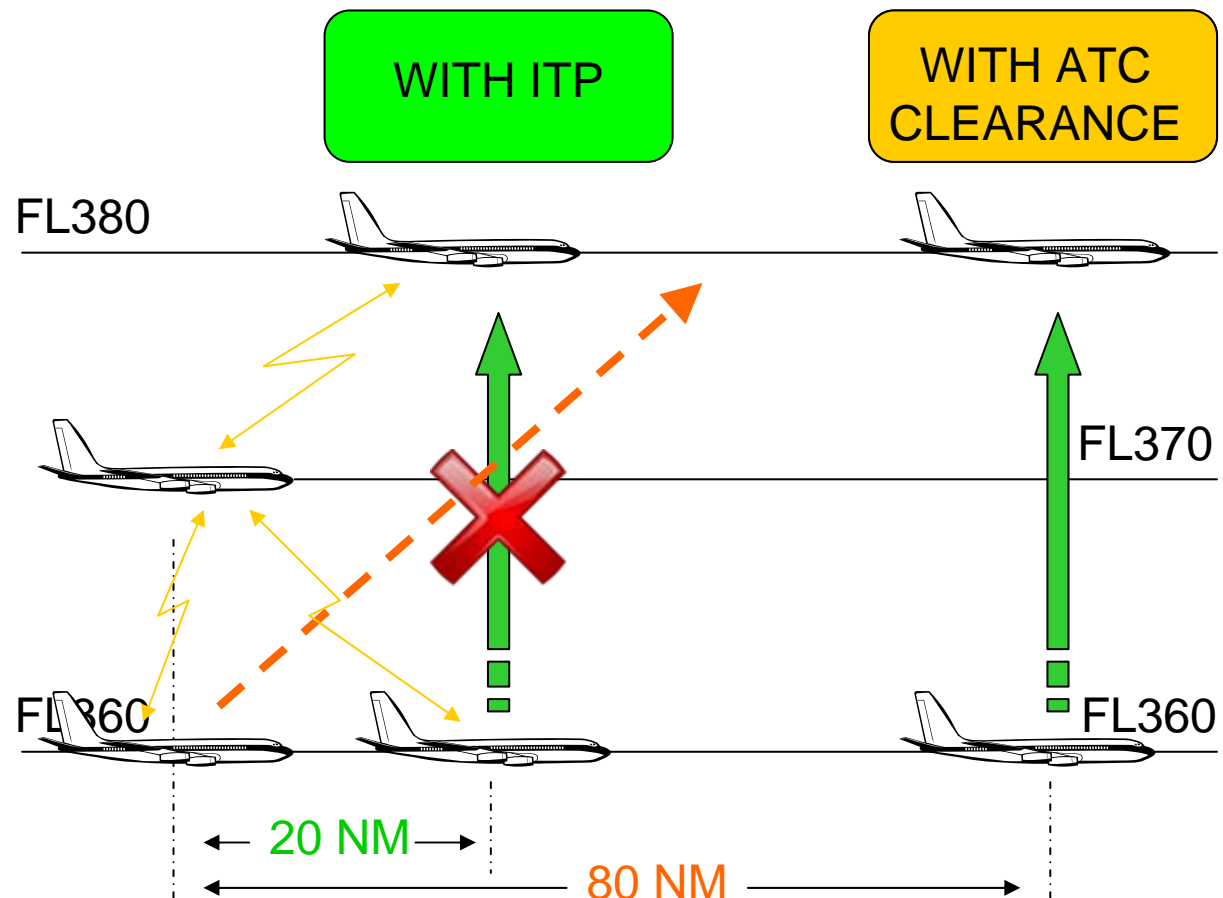
- With ATSA ITP, the procedural longitudinal separation required for a Flight Level change may be reduced from 80 NM to 20 NM.
- Surrounding traffic needs to transmit ADS-B data in order to achieve the benefits of ITP.



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- ATSA VSA
- ATSA AIRB
- ATSA SURF





# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- **ATSA VSA**
- ATSA AIRB
- ATSA SURF

## ATSA VISUAL SEPARATION ON APPROACH (VSA)

- The objective of the ATSA-VSA application is to safely perform approach procedures with the flight crew of the succeeding aircraft while maintaining own visual separation from the preceding aircraft.
- ED-160 (DO-314): Safety, Performance and Interoperability Requirements Document for ATSA-VSA Application



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

AIRBORNE  
ADS-B IN  
APPLICATIONS:

- ATSA ITP
- **ATSA VSA**
- ATSA AIRB
- ATSA SURF

TRAFFIC SELECTOR SWITCH



ADS-B TRAFFIC on ND

ADDITIONAL  
INFORMATION  
ON MCDU

Picture © Airbus France S.A.S.



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- ATSA VSA
- **ATSA AIRB**
- ATSA SURF

## ATSA AIRBORNE SITUATIONAL AWARENESS (AIRB)

- The ATSA-AIRB application assists flight crews in building their traffic situational awareness through the provision of an on-board graphical display of surrounding aircraft
- ED-164: Safety, Performance and Interoperability Requirements Document for ATSA-AIRB Application



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- ATSA VSA
- **ATSA AIRB**
- ATSA SURF



Picture © Airbus France S.A.S.



# Airborne Traffic Situational Awareness (ADS-B IN / ATSA)

## AIRBORNE ADS-B IN APPLICATIONS:

- ATSA ITP
- ATSA VSA
- ATSA AIRB
- **ATSA SURF**

## ATSA SURFACE TRAFFIC AWARENESS (SURF)

- The ATSA-SURF application provides the flight crew with a display of surrounding traffic position and identity overlaid on a map of the airport, improves the flight crew traffic situational awareness
- ED-165: Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application



# APPLICATIONS

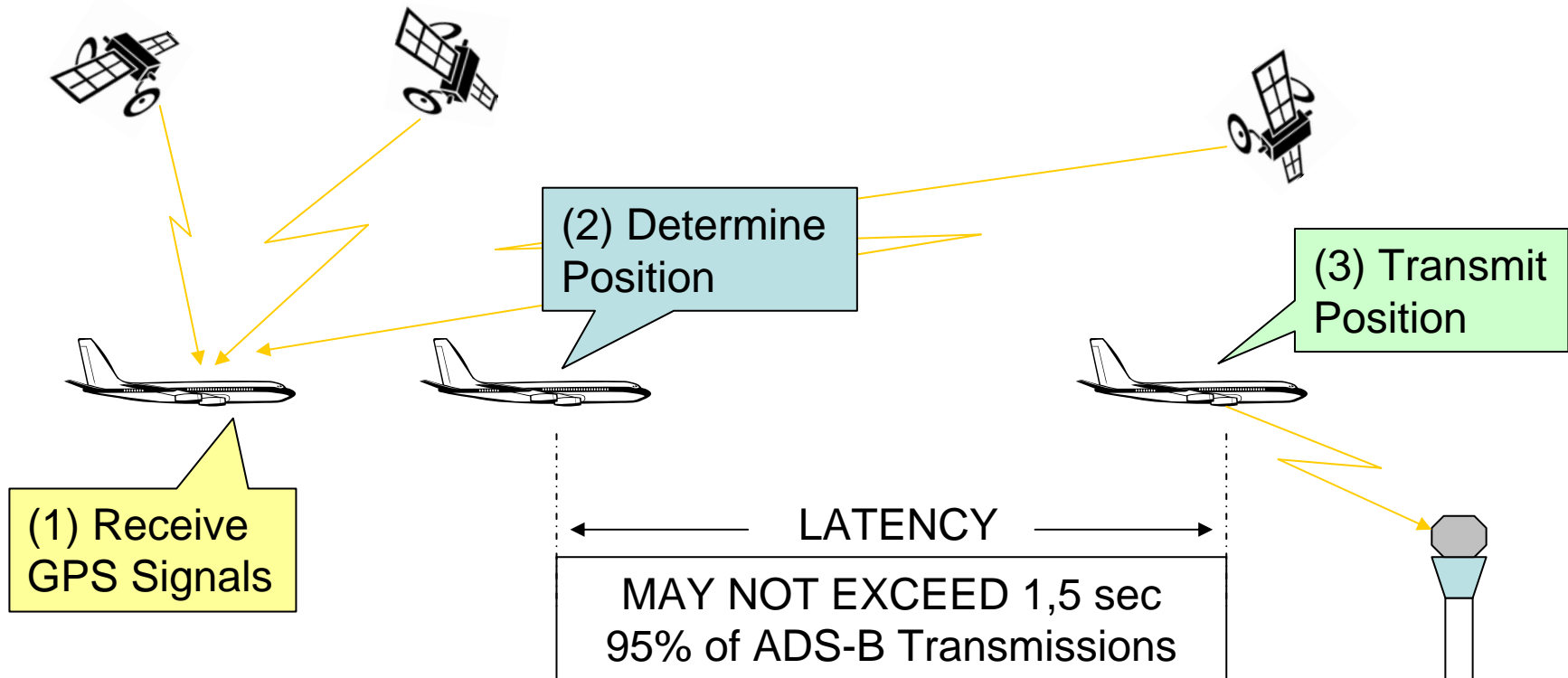
## ADS-B OUT (AMC 20-24): EASA Experience

- Various applications
- In general, EASA considers the classification of a change that introduces ADS-B is a MAJOR change.
- However, the change may be classified as a minor change if certain conditions are met, e.g.
  - Transponder is ETSO-2C112b approved and complies with the requirements of ED-102/DO-260 or DO-260A
  - GNSS receiver approved under ETSO C-129A, TSO C-129, TSO C-129A, ETSO C-145/C-146 or TSO C-145A/C146A
  - Direct interface between Transponder and GNSS Receiver
- Latency (1,5 seconds / 95%) issues are a major concern.



# APPLICATIONS

## ADS-B OUT (AMC 20-24): Latency





# APPLICATIONS

## ADS-B IN / ATSA Certification: EASA Experience

- Pre-application discussions with one applicant on STC approval of ATSA system on Boeing 737 / 767 / 777 aircraft.
- Continuing certification effort with a leading aircraft manufacturer:
  - A Certification Review Item (CRI) with Interpretative Material (IM) has been issued on two projects.
  - The CRI covers ATSA-ITP, ATSA-VSA and ATSA-AIRB.
  - ATSA-SURF not considered



# APPLICATIONS

## ADS-B IN / ATSA Certification: CRI

- Requirements:
  - CS 25.1301, 25.1302, 25.1309, 25.1322, 25.1459(e) and 25.1581, EUROCAE Safety, Performance and Interoperability Documents, JAA TGL-8 Rev. 2
- CS 25.1301:
  - Definition of Intended Function (Interoperability): Reference to chapters 1 and 4 of EUROCAE Safety, Performance and Interoperability documents ED-159 (ITP), ED-160 (VSA) and ED-164 (AIRB).



# APPLICATIONS

## ADS-B IN / ATSA Certification: CRI

- CS 25.1302:
  - Depending on the novelty, complexity and integration, compliance with CS 25.1302 should be adequately demonstrated.
- CS 25.1309:
  - FHA and SSA in accordance with AMC 25.1309
  - Safety and Performance: Consistent with requirements of chapter 3 of EUROCAE Safety, Performance and Interoperability documents ED-159 (ITP), ED-160 (VSA) and ED-164 (AIRB).



# APPLICATIONS

## ADS-B IN / ATSA Certification: CRI

- CS 25.1322:
  - ATSAW alerts should meet the requirements of CS 25.1322. Further guidance may be found in AMC 25.1322.
- CS 25.1459(e):
  - Novel feature → Assess the need for FDR recording
- CS 25.1581:
  - Flight Manual Procedures



# APPLICATIONS

## ADS-B IN / ATSA Certification: CRI

- JAA TGL-8, Rev 2:
  - Continued compliance with the requirements of JAA TGL-8, Revision 2 (ACAS-II) needs to be demonstrated.



# APPLICATIONS

## ADS-B IN / ATSA on Electronic Flight Bag (EFB)

### ➤ EASA Position:

- Airborne ADS-B IN / ATSA applications would be classified as EFB Type C software applications. Consequently, these may only be hosted on a Class 3 platform.
- ATSA SURF (on ground) on Airport Moving Map Display:  
EASA Position still to be determined.



End of Presentation.