Airports Authority of India

Automatic Dependent Surveillance-Broadcast (ADS-B)

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JCD: 2663

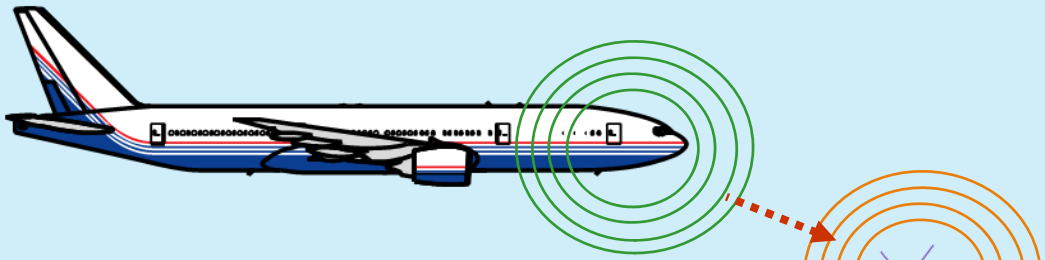
Topics

- ADS-B: An Airplane's Perspective
- ADS-B Equipage
- Next Steps to Implement ADS-B

1: Mode S

Mode S: Transmitting a signal Out on interrogation

- Altitude, Code, AC Addr
- Flight ID
- Selected Altitude
- TAS, IAS, GS, Mach
- Magnetic Heading
- Roll Angle
- Track Angle, Track Angle Rate

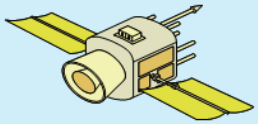


ATC Transponder /Antenna

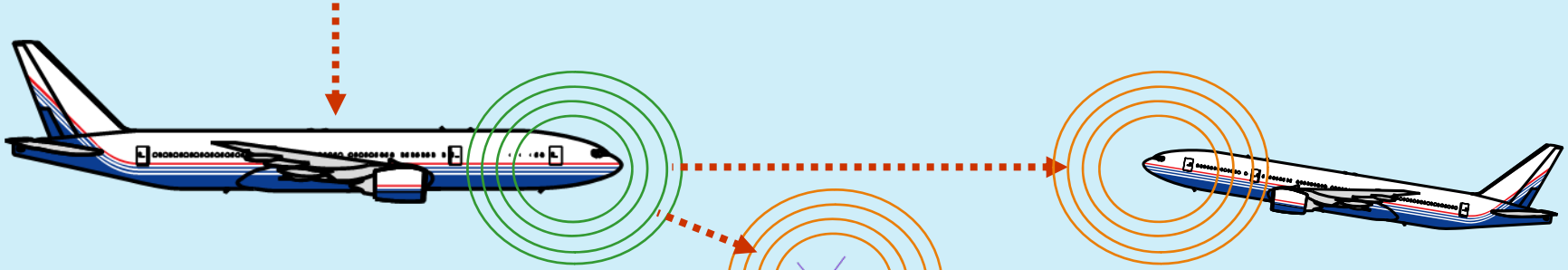
2: ADS-B Out and 3: ADS-B In

ADS-B Out: Transmitting a signal Out (position, velocity, ID)

ADS-B In: Receiving a signal In and displaying relative position to pilot



Global Navigation Satellite System



GNSS Receiver/Antenna

ATC Transponder /Antenna

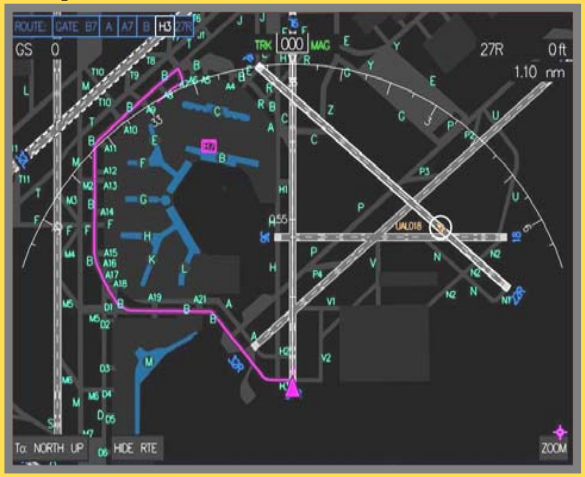
ATC Transponder/ Antenna or ACAS/TCAS/Antenna

Cockpit Display of Traffic Information (CDTI)

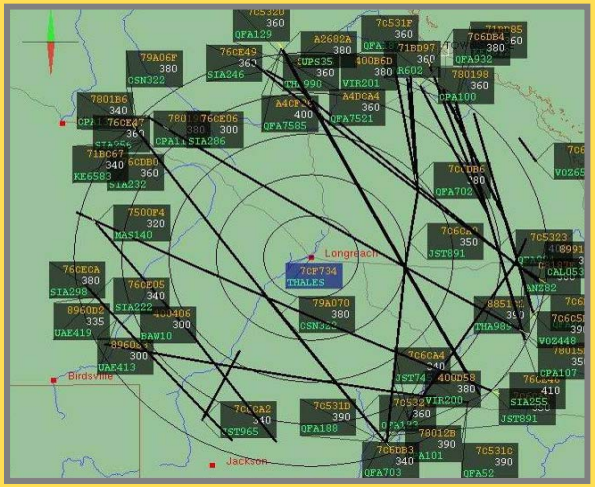
Benefits

- Reduced separation in radar and non-radar areas
- Enhanced airport surface surveillance
- Airborne traffic Situational Awareness
- Airborne spacing applications

Airport Surface Surveillance



Enhanced positional accuracy and positive control



Flight Deck Situational Awareness

ADS-B Equipage

Boeing Production Status

Mode S

Interrogated data

Mode A /C Mode S

Altitude
Code
AC Addr

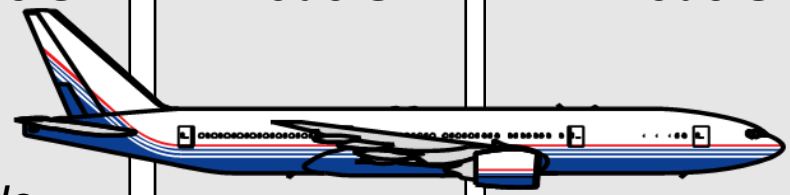
Interrogated data

Elementary Mode S

Flight ID

Enhanced Mode S

Selected Alt . *TAS*
Mach No . *IAS*
Mag. Hdg. *GS*
Roll Angle *VS*
Track Angle
Track Angle Rate



Production Configuration

ADS-B Out

Broadcast data

Extended Squitter

Position
Velocity
Flt ID

Production Configuration (AFM Limitation)

ADS-B In

ADS-B/CDTI Applications

- *Surface Surveillance*
- *In Trail Procedures*
- *Sequencing & Merging*
- *Etc. (Package 1)*

Not yet in production.

ADS-B Out Being Mandated

Nav Canada is mandating ADS-B Out for Hudson Bay between FL350 and FL400 inclusive in Nov 2010

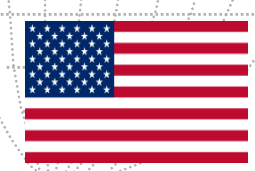
- Current production equipage meets requirements

Eurocontrol/EASA draft rule mandates ADS-B Out in production on 1 Jan 2012 and for entire European airspace (retrofit) on 5 Feb 2015

- Publicly stated production mandate will not be before 2013
- Requires new transponder standard (DO-260B)

CASA (Australia) rule mandates ADS-B Out for upper airspace (≥FL290) in Dec 2013

- Current production equipage meets transponder requirements
- GPS requirements may require receiver upgrade



FAA draft rule mandates ADS-B Out (DO-260B) for airspace on 1 Jan 2020

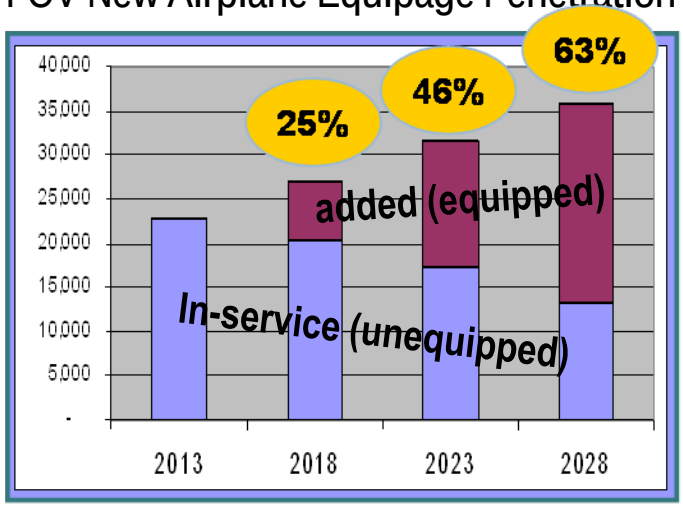
- FAA final rule published in Apr 2010

ADS-B In Has a Longer Road Ahead

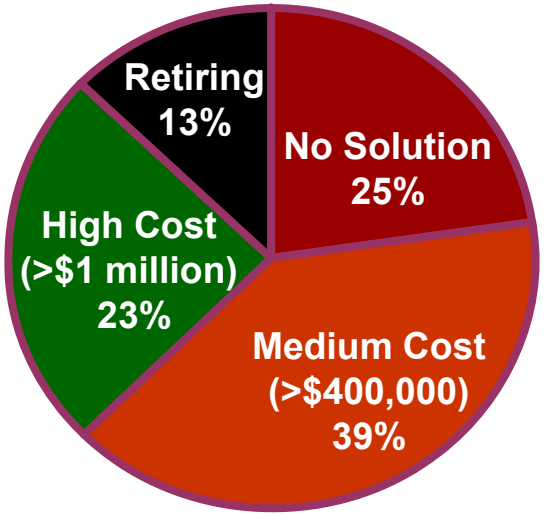
- Significant ADS-B In equipage levels are required to achieve benefits.
- Integrated Forward Field of View (FFOV) displays are preferred.
- Yet, even if ALL airplanes coming off the production line were ADS-B In equipped with integrated FFOV displays, equipage penetration is slow
- And, retrofit solutions, with integrated FFOV, are expensive

Other display options must be considered to achieve necessary equipage rates

FFOV New Airplane Equipage Penetration



Estimated Per Airplane Cost for Integrated FFOV Displays Upgrade (Year 2018)



Potential Option: Electronic Flight Bag

	Class 1	Class 2	Class 3
			
Key Features	• COTS-Specs provided • Power Outlet SB	• Power Bus • ARINC 429 • Network File Server • TWLU • ACARS • Printer	• Power Bus • ARINC 429 • Network File Server • TWLU • ACARS • Printer • Avionics-Grade H/W • Highly Integrated
Airplane Models	All	Production: 737NG Retrofit: 737NG, 747*, 757*, 767*, MD-xx* *offerability subject to market demand	Production: 777, 787, 737NG, 747-8 Retrofit: 777, 737NG, 747, 757, 767, MD-xx* *offerability subject to market demand

Next Steps to Implement ADS-B

Boeing Position on ADS-B

- Supporting ADS-B Out. We will meet ADS-B Out mandates.
- Supporting ADS-B In. We must maximize the value of equipage solutions, while recognizing that retrofit equipage upgrades are complex and expensive.
- Coordinating with ANSPs (Canada, Australia, Eurocontrol, US) to ensure common airborne requirements for Non-radar application using current equipage.
- Actively supporting DO-260B installation.
- Targeting Situational Awareness and Separation ADS-B In Applications in the near term.
- Working aggressively to find retrofit equipage solutions.
- Engaging with airlines and industry partners on rulemaking around the world.
- Continuing industry standards support.

Thank You

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