Airbus Status on ADS-B Out / In

Automatic Dependent Surveillance – Broadcast (ADS-B)
ADS-B Airbus roadmap

Step 1. ADS-B Out
A/C information broadcasted for ground use in a first step

Step 2. ATSAW
Display of other aircraft ADS-B Info in the cockpit

Step 3. ASAS SPACING
A/C instructed to maintain Spacing with target aircraft

Step 4. ASAS SEPARATION
A/C instructed to maintain Separation with other aircraft

Air Traffic Control

ADS-B Receiver

AFR6512
A320 M
323 +11

AAL1255
+30
↓
ADS-B Step 1 : ADS-B OUT on A320/A340

• Transponder installations with ADS-B capability have been certified on a non-interference basis.

• Certification ongoing on A318/319/320/321, A330/A340 family, for Non Radar Operations (with DO-260)
  ‣ No change in current installations expected
  ‣ Target date : End 2007

• Close cooperation between Eurocontrol, Airservices Australia and Airbus
ADS-B Step 1 : ADS-B OUT on A380

• A380 is the first aircraft certified for Non Radar Operations, in compliance with EASA AMC (DO-260A compliant)
  ‣ SIA first delivered A380 certified as EASA AMC compliant (Aug 2007)
  ‣ AFM update provided by Airbus

• SIA A380 recorded for its first commercial flight from Singapore to Sydney
  ‣ “SIA A380 approved by CASA for receipt of ADS-B based services in Australia”
Europe / Australia / Canada implementation

• Eurocontrol & Airservices Australia key participant to international standardisation and harmonization process

• Pragmatic approach:
  ‣ Use existing installations as far as possible (DO-260)
  ‣ ADS-B used for separation services

• Incentives for qualified a/c (through better Flight Levels or Pioneer phase)

• RAD implementation in Europe may require updates in ADS-B set of messages/performance
USA implementation

• Specific ADS-B RAD application (mandate for 2020)
  ‣ High Density area
  ‣ New set of messages required (DO-260A or above??)
    – Mode A code, Emergency, Accuracy, Length/Width code…
  ‣ High level of NAV performance required. NAV system architecture upgrade to be considered

• This approach will require a/c and equipment modifications
  ‣ Wiring change
  ‣ Software upgrades to Mode S transponders (e.g. DO-260X)

• Considered as a next step for Airbus (after 2010)
Certification purpose

- ADS-B capability implemented on a non-interference basis.
- Implementation of Enhanced Surveillance has brought ADS-B OUT capability in the a/c
  - No formal certification activities
- On-going certification exercise aims at verifying the installation and assess conformity with AMC 20-24 draft
  - Approval from EASA expected for end of 2007 on A320/A340
- “Capability declaration” document referenced in Aircraft Flight Manual to support airline operational approval
- Update of FCOM to indicate ADS-B OUT capability
Program offerability

- Applicability: A320 family, A330, A340, A380

- Forward fit
  - ADS-B OUT certification will be proposed as an option on production a/c

- Retrofit (A320/A330/A340)
  - Airbus Service Bulletin for EHS transponder installation and EHS wiring already available
  - Airbus Service Bulletin for ADS-B OUT certification should be available by early 2008

- Note: EHS certification is not a prerequisite to ADS-B OUT certification
Target configuration

• A320 family, A330 and A340 a/c with the following installation can apply for ADS-B OUT certification:
  ‣ ADS-B OUT capable transponder
    ‧ Collins TPR-901 P/N -021, Honeywell TRA-67A P/N -1402, ACSS XS-950 P/N –10005A
  ‣ EHS wiring
  ‣ MMR (any vendor) OR GPSSU from Honeywell
  ‣ Hybrid IRS

• Non eligible configurations:
  ‧ Autonomous IRS
  ‧ Litton/Northrop Gruman GPSSU (no output of integrity)
  ‧ Case by case study to be foreseen for a/c without this minimum configuration

• Note: A380 a/c can all apply for ADS-B OUT certification
Parameters required in EASA AMC (1/2)

GPS latitude: 39°34' N
GPS longitude: 2°39' E
GPS integrity

Barometric standard altitude: 29,000 ft

Velocity vector

FL300

FL290

FL280

39°34N 2°39E

400 kts E 10 kts N

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Parameters required in EASA AMC (2/2)

Flight ID: AB1234

MCDU init page

SPI (IDENT)
Emergency indicator

ATC/TCAS control panel
ADS-B Step 2 : ATSAW

• ATSAW step 2A: **Airborne applications**
  ‣ End 2009 on A320/A340
  ‣ 2011 on A380
  ‣ Available at Entry Into Service on A350
  ‣ ATSAW project launched in Airbus on SA/LR
    – Certification activities on-going with EASA
    – ATSAW concept and HMI well appreciated

• Traffic Computer prototypes currently tested in Airbus lab and on Flight Test a/c (A320, A340-600)

• ATSAW step 2B: **Surface applications**
  ‣ 2010 (TBC) on A320/A340
  ‣ TBD on A380 and A350
ATSAW in A320/A340 cockpit

- Fully integrated solution
- Traffic displayed on the primary field of view
- No new equipment

ADS-B
Traffic on Navigation Display

Traffic Selector

Additional information on MCDU
ATSAW in A380 cockpit

Multipurpose display

KCCU (pointing device)

Navigation display

Strong commonality with A320 / A330 / A340 families

Same cockpit philosophy on A350
ADS-B Step 2A : ATSAW In Flight

By default

- Position
- Orientation
- Relative Altitude
- Vertical Tendency

More info using traffic selector or KCCU

- Default information
- A/C ident
- Ground Speed
- Wake Vortex category
ATSAW and ACAS software are partitioned within TCAS equipment.
**CRISTAL ITP : In Trail Procedures (ITP)**

*Under the frame of Eurocontrol CASCADE*  
NATS, ISAVIA, Alticode, Airbus  
- Shanwick / Airbus simulations : Oct 2007  
- Flight Test over Iceland : Feb/Mar 2008  
- Pioneer airlines trials : 2009
ADS-B Step 2B: ATSAW on Airport Surface

MOVING MAP
(provided by On-board Airport Navigation System/OANS)

+ TRAFFIC
Airbus Status on ADS-B : Conclusion

**Step 1. ADS-B Out**
A/C information broadcasted for ground use in a first step

**First aircraft certified for Non Radar Operations**

**Step 2. ATSAW**
Display of other aircraft ADS-B Info in the cockpit

**Development launched**
Already flying (tests)
Target date : 2009

- Pioneer phase in Europe, Separation in Australia/Canada, Trials in China... will help gaining experience on ADS-B, and capture operational requirements

- Airbus objective is to implement the best ADS-B products, while limiting the number of retrofit
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