



ADS-B Industry Day Rockwell Collins Perspectives

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Agenda

- Rockwell Collins Overview
- The Role of Surveillance in the Next Generation Airspace
- The Role of ADS-B
- The Value of ADS-B
- Customer Perspectives
- Global Perspectives
- The System Perspective
- Challenges
- ADS-B Today at Rockwell Collins
- Going Forward

Commercial Systems

Customers

- Commercial Airlines
- Cargo Carriers
- Business Jet Operators
- Manufacturers of Commercial Air Transport, Business and Regional Aircraft

Solutions

- Flight Deck Systems
- Communication Systems
- Navigation Sensors
- Safety/Surveillance Systems
- Displays
- Flight Management Systems
- Flight Control Systems
- Cabin Electronics
- Total Service
- In-flight Entertainment Systems
- Information Management Systems



Government Systems

Customers

- U.S. Department of Defense
- Foreign Militaries
- Manufacturers of Military Aircraft and Helicopters

Products

- Communication Systems
- Military Data Link Systems
- Navigation Systems
- Displays Systems
- Integrated Flight Deck Systems



The Future Flight Deck



Large “Windowed” Display

- 14% More Graphics Area
- Improves Reversion and Growth For New Features

Graphical User Interface

- Situational Awareness
- Reduced Training
- Eases Future Growth

Terrain and Graphical Wx

- Situational Awareness

Maps and Charts

- Situational Awareness
- Crew Workload
- Paperless Operation

Enhanced EICAS, Checklists and Maintenance

- Situation Awareness
- Crew Workload Reductions

Human-Centered Flight Deck; Situational Awareness; Operational Efficiency; Enhanced Residual Value

What is the Role of Surveillance in the Next Generation Airspace?

- What is the System of Systems perspective of surveillance?
 - How does it fit with RNP operations of the future?
 - How will it affect future communications requirements?
- Are we continuing to automate today's airspace or are we embracing a new concept of operations?
 - Autonomous Airspace
 - Flow Managed Airspace
 - Advanced Surface Operations
- What operational improvements are we allocating to improved surveillance?

The Role of ADS-B – Setting Expectations

- How will ADS-B be used?
 - Alternative to Secondary Surveillance Radar?
 - Supplement to Secondary Surveillance Radar?
- Will ADS-B provide the same level of services? Enhanced services?

The Value of ADS-B

- ADS-B, in the right context, promises to enable many of the next generation operations
 - SWIM Concepts
 - Surveillance data – both air/ground and air/air
 - Embedded path data – intent, trajectory change points, etc.
 - Airborne conflict detection and resolution
 - Distributed system principles
- But air-to-air applications, with no procedural process, will offer no benefit.
 - Delegated/assigned responsibility
 - Enhanced situational awareness
 - Separation Assurance
 - Fully coupled operations – sequencing and merging, In-Trail Procedures, Surface Operations, etc.

The Customer Perspective

- Minimal value in ADS-B Out
- Enhanced situational awareness is seen as very positive – if there are procedures in place to take advantage of the capability
- Can't afford multiple changes – need to minimize the change cycle
- Every user has their preferred application – can't develop them all at once AND develop the enabling procedures!
- Struggling with the retrofit case
 - When will ADS-B be real?
 - When will old aircraft retire?
 - Already starting from a position of waivers against the rulemaking
 - Display availability?
 - EFB affordability? Complexity?

Lack of clearly defined operational benefits and payback is challenging how ADS-B will develop

The Global Perspective – Divergent Paths?

- US is focusing on highly available solutions with the need for strong backup strategies based on national policy
- Europe has stated that ADS-B will be the foundation of their future surveillance environment with appropriate PSR/SSR/Multilateration/surface detection overlays
 - Future position source will be an integrated GPS/Galileo system
 - ADS-B is a stated requirement for >50% of their Operational Improvements
- Australia will use ADS-B Out for 5nm enroute operations with SSR overlays for terminal operations

How do we resolve this?

The Systems Perspective

- How do we ensure that ADS-B, as a function, is not over-specified?
- If the path is managed using RNP (including aircraft managed conformance monitoring) – how does this affect surveillance?
- If space based navigation sourcing is good enough for RNP operations (including RNP-1, RNP-0.3, etc.), shouldn't it good enough for ADS-B applications?
- What credit do I get for air-to-air capabilities, when the air/ground system fails?
- Can I reduce my communications systems costs if I have RNP and ADS-B?
 - Is there still a need for “instantaneous” intervention?

Challenges

- ADS-B Out is a difficult sell – but what is ADS-B Out?
 - How many flavors of ADS-B Out?
 - Intent Information
 - Trajectory Change Points – how many?
- Need to describe benefits in terms of ADS-B In
- This is also difficult because every user has their own preferred application
- Need to change the paradigm to provide optimized services for the capable aircraft
 - Current design is for the airspace to be managed to the least capable aircraft
- Need to define “critical mass” for ADS-B
- What is the role of surveillance in the future airspace?

ADS-B Today at Rockwell Collins

- Federated Solutions
 - Air Transport – TPR-901 = DO-260
 - Business and Regional = DO-260A
- Integrated Surveillance Systems
 - Air Transport – DO-260A (Change 1)
 - Business and Regional – DO-260A (Change 1)
- Display Systems
 - Advanced display and user interface development
- Automation
 - Significant research on human factors, conflict management, decision support algorithm development, etc.

Going Forward

- Must be cost effective
- Must offer benefits
- Must maintain a global perspective
 - US cannot be different from the rest of the world
- We need to focus on the development of necessary procedures to enable the appropriate applications
 - Air-to-Air Applications are not user described – they require coordination