

Towards ECAC wide implementation of ADS

‘The datalink decision process’

Pieter van der Kraan
Eurocontrol ADS Programme Manager
tel. +32 2 7293359
email: pieter.van-der-kraan@eurocontrol.int



Topics Discussed

- Why ADS
- Datalink Decision Process
- Local and ECAC-wide implementation
- The Role of the ADS Programme
- What needs to happen next
- Conclusions

Why ADS ?



Strong Strategic Fit demonstrated between ADS and EATMP Operational Improvements (OIs)

- ATC and Data Processing
 - Surveillance in areas with insufficient or no coverage
 - Improved automated support tools (e.g. safety nets)
 - Delegation of separation responsibility
 - Airborne Air Traffic Situational Awareness
 - Co-operative Separation
 - Autonomous Operations
- Airport ATC
- Others

ADS is the cornerstone for future Surveillance

- OI's require three levels of Surveillance
 - Basic Surveillance
 - Enhanced Surveillance
 - Intent-based Surveillance
 - ATM 2000+ requires:
 - Seamless Gate-to-Gate (i.e. including the Airports)
 - Consistent ground-based and airborne Surveillance
- } Ground-based and airborne

ADS-B is a critical enabler for airborne Surveillance and can also support or complement ground based Surveillance.

Note: ADS-C is within the Eurocontrol ADS Programme Scope



The Role of ADS in the future surveillance environment

- For the foreseeable future excluding for non-continental areas and some remote low density traffic areas:
 - ADS will not be used as sole means of surveillance, but will be used in combination with other types of Surveillance, such as, Primary radar (PR), MSSR, SSR Mode S, Multi-lateration etc.
- SDPD is needed as the surveillance interface to the applications to develop a seamless traffic situation picture of a required level of quality
 - Consistent TSP for pilots and controllers
- ADS-B will support traffic situation awareness, cooperative separation and autonomous operations
 - Operational and technical requirements are being developed

Datalink Decision Process



What is needed for a datalink decision?

- There is ongoing work to establish which link technologies ‘best’ meet given technical (safety and performance) requirements. Criteria include:
 - Cost effectiveness
 - Feasibility (e.g. enough space/power in aircraft)
- But what are the operational requirements....?
 - Over which timeframe (<2020?)
 - EATMP up to 2015+
- Technical requirements cannot be finalised before the operational requirements have been established
- Operational requirements particularly concerning airborne applications are still evolving

Data link decision process

- Many people focus on the datalink but the datalink is only a part of the overall ADS system
- Datalink selection depends on system requirements which are still evolving
- ADS system development can proceed while the datalink selection process is ongoing
- The objective for ECAC wide operational ADS implementation is 2008 [ECAC surveillance strategy]
 - some local ADS-B pre-operational implementations are already in progress or planned in Europe, based on local requirements
 - datalink selection must take into account existing infrastructures and offer upgrade paths to achieve regional and eventually ECAC wide interoperability



Local and ECAC wide implementation



Local/regional implementation

- Local requirements (e.g for increased capacity) based on local business cases
- Early local ADS implementation based on any of the candidate technologies is happening, e.g
 - ground based surveillance (e.g at specific airports or remote areas)
 - improve airborne traffic situational awareness (e.g for EVA in the TMA)
- equipage most likely to be incentive driven
- Currently most local ADS-B initiatives in Europe are based on VDL-4
- **Coordination of the various local initiatives is critical to facilitate future interoperability**

From Local to ECAC wide

- European Local implementations may use different technologies
 - Currently VDL Mode 4 and 1090 MHz Ext. Squitter
- As the TLAT report showed, traffic increases will eventually pose performance problems
- In order to overcome these problems, local links might be complemented by a second technology and later even a third
- Multi-link could also serve to provide interoperability between local implementations
- Gradual introduction of Multi-link could therefore be the key for interoperating diverse local implementations and overcoming the identified technology limitations



Multi-Link

- Multi-Link raises a number of issues, which the Eurocontrol ADS Programme plans to address
 - Validation of performance advantages

It has to be shown how the use of multiple links would overcome single link performance limitations especially in high traffic environments.
 - Cost and Technical Feasibility

The cost increment over single link implementations needs to be determined. The technical feasibility of implementing and installing multi-link solutions on a wide range of aircraft types must be established. Key concerns include the antennas, the size of the equipment, the power requirements, and co-site interference.
 - Selection of target technology combination and definition of upgrade plan

Multi-link can be implemented in different ways (ground based relays, multi-mode receivers, multi-mode transceivers). The optimum combination has to be identified. The time schedule of introducing multi-link equipage needs to be worked out.

Role of the ADS programme in the European ADS system development and implementation process



Role of the ADS programme in the preparation of ECAC-wide ADS implementation (proposed)

- Take into account early local implementations in Europe
- Promote interoperability at multiple levels (applications, links, networks)
 - within Europe
 - throughout the world
- start (as early as possible) the ENPRM procedure to ensure commitment from stakeholder to timescales
- Support standardisation of interfaces, and publish recommendations in order to assist implementors to anticipate the changes that will be needed for future global interoperability
- Co-ordinate closely with other European ADS related programmes



What's needs to happen next- 1?

- Consolidate operational and technical requirements (including military)
- develop and assess datalinks to meet future requirements (e.g through experimentation, test flights and fast/real time simulations)
 - multiple link studies
 - improvement of current links
 - investigate other candidate links
- Airline and Avionics Industry inputs are critical

What's needs to happen next -2?

- validate that applications enabled by ADS provide the claimed benefits
 - fast and real time simulations
 - validation tests of prototype/pre-operational infrastructure
- business case for ECAC wide implementation
- safety case for ADS/applications
- technical feasibility (e.g timescales, frequency spectrum)

Conclusions and Recommendations

- ADS enables a significant number of EATMP Operational Improvements and is therefore an essential part of the future Surveillance system
- Strong, early involvement of all stakeholders is required
 - including avionics industry
- ADS Programme is the most appropriate instrument to coordinate and prepare ECAC-wide ADS implementation
- Smooth transition from incentive-driven local implementations towards ECAC-wide implementation, based on common commitment
- Close Co-ordination with other ADS related programmes will be pursued
 - including the FAA

