

EUROCONTROL ADS PROGRAMME PROPOSED CRITERIA FOR ADS-B DATALINK TECHNICAL ASSESSMENT

1. Introduction

This note describes criteria for ADS-B data links that will be used to assist in the assessment of the performance of those links. The criteria are proposed in addition to the ones which are already used and are based on the ADS-B MASPS.

The purpose of these criteria is to provide input to the EUROCONTROL/FAA TLAT activity that is currently gathering information on ADS-B data link performance.

These proposed criteria reflect the EUROCONTROL ADS Programme current knowledge and expert opinion about factors that are of interest in ADS-B data link operation in Europe and therefore should be considered in the assessment. These criteria are meant to allow a margin for evolution of the ADS-B system to meet also future needs.

2 Applications

2.1 ATS Surveillance

This is the extension of the current classical Surveillance service in an ADS-B environment, e.g. Managed Airspace/Continental/Medium and Low-Density. The use of trajectory intent information is also foreseen.

	ATS SUR	Notes
TYPE OF AIRSPACE		
Managed Airspace/Medium and Low Density	✓ ¹	
FLIGHT PHASE		
TMA	✓	
En-Route	✓	
DATA ITEMS		
Identification		
Call Sign	✓	
24-bit Address	✓	
Time	✓	
3-D Position		
Latitude	✓	
Longitude	✓	
Altitude	✓	
Estimated Position Uncertainty	✓	
Status	✓	Based on the RTCA MASPS definition
Intent		To support intent based ATM, including MTCD, conformance monitoring etc.
Trajectory Change Point (TCP)	✓	
TCP+1	✓	

¹ ✓ : Required

	ATS SUR	Notes
TCP+2	✓	
TCP+3	✓	
Capabilities indication	✓	
Future Expansion	✓	
TRANSMISSION CHARACTERISTICS (Periodic/ Effective Update Period) Event Driven/Event Type for TCP changes)	Periodic 5 sec (TMA) & 10 sec (En-Route) for position 5 min for "no-change of TCPs" indication & Event driven for TCPs (On acquisition and on change) Allowing reception within 24 sec with 95% confidence	
Probability of update within period	>98%	
PERFORMANCE REQUIREMENTS		
Operational Range		60 nm for TMA 150 nm for En-Route per single ground station
Operational Traffic Densities (#a/v<Range (nm))		Based on the scenarios for 2005, 2010, 2015
Accuracy	At least equivalent to SSR accuracy	Calculations to be made based on EUROCONTROL Surveillance Std (Section 6.3.3) or RTCA MASPS, p. 57

2.2 ATS Enhanced Surveillance

This is an application based on the extension of the Mode S Enhanced Surveillance, as currently envisaged, for the core area of Europe.

	ATS Enh. SUR	Notes
TYPE OF AIRSPACE		
Managed Airspace/High-Density	✓	
FLIGHT PHASE		
TMA	✓	
En-Route	✓	
DATA ITEMS		
Identification		
Call Sign	✓	
24-bit Address	✓	
Time	✓	
3-D Position		
Latitude	✓	
Longitude	✓	

	ATS Enh. SUR	Notes
Altitude	✓	
Estimated Position Uncertainty	✓	
Velocity		
Ground Speed	✓	
Track Angle	✓	
Airspeed	✓	
Heading	✓	
Vertical Rate	✓	
Track Angle Rate	✓	
Status	✓	
Intent		To support intent based ATM, including MTCD, conformance monitoring etc.
Selected Altitude	✓	
Trajectory Change Point (TCP)	✓	
TCP+1	✓	
TCP+2	✓	
TCP+3	✓	
Capabilities	✓	
Future Expansion	✓	
TRANSMISSION CHARACTERISTICS (Periodic/ Effective Update Period - Event Driven/Event Type for TCP changes)	<p>Periodic 5 sec (TMA) & 10 sec (En-Route) for position, state vector 5 min for “no-change of TCPs” indication & Event driven for TCPs (On acquisition and on change) Allowing reception within 24 sec with 95% confidence</p>	
Probability of update within period	>99%	
PERFORMANCE REQUIREMENTS		
Operational Range		60 nm for TMA 150 nm for En-Route per single ground station
Operational Traffic Densities (#a/v<Range (nm))		Based on the scenarios for 2005, 2010, 2015
Accuracy	At least equivalent to SSR Mode S accuracy	Calculations to be made based on POEMS Specifications or RTCA MASPS, p. 57

2.3 A-SMGCS

This application is supposed to include runway incursion functionality and is not limited within the airport surface area.

	SMGCS	Notes
TYPE OF AIRPORT		
High-Density	✓	
Low-Density	✓	
FLIGHT PHASE		
Taxi	✓	
TMA	✓	
DATA ITEMS		
Identification		
Call Sign	✓	
24-bit Address	✓	
Emitter Category	✓	
Time	✓	
3-D Position		
Latitude	✓	
Longitude	✓	
Altitude	✓	Not required if there is "on-ground" indication
Estimated Position Uncertainty	✓	
Velocity		
Ground Speed	✓	
Track Angle	✓	
Vertical Rate	✓	Not required if there is "on-ground" indication
Estimated Velocity Uncertainty	✓	
Status	✓	
Capabilities	✓	
Future Expansion	✓	
TRANSMISSION CHARACTERISTICS (Periodic/ Effective Update Period - Event Driven/Event Type)	Periodic 1.5 sec for 0-5 nm range 3 sec for 5-10 nm range (95%)	
PERFORMANCE REQUIREMENTS		
Acquisition Range (nm)	10	
Operational Traffic Densities (#a/v<Range (nm))		Based on the scenarios for 2005, 2010, 2015
Accuracy	Si gma, hp= 2.5 m Si gma, hv= 0, 3 m/s	

2.4 Autonomous Operations

The number of TCPs to be transmitted² should be 4, i.e. up to and including TCP+3. The range should be the one which was used for the applications above, i.e. in the order of 150 nm.

3. Transmission Characteristics

As implied from the description of the relevant characteristics of the applications above, the proposed criteria include also the assessment of the potential of the candidate technologies to support an *event driven transmission*, e.g. in the case of TCPs. Individual technologies should opt for a periodic or an event driven TCP transmission, but in all cases they should meet the update requirements stated in the previous section.

² Based on the FREER simulations