



Agenda Item 3: Surveillance systems developments

3.2 Follow up to the surveillance systems planning/ implementation/ trials (ADS-C, ADS-B, Radar Mode S, multilateration)

ICAO APANPIRG ADS-B SERVICE PERFORMANCE PARAMETERS

(Presented by SITA)

Summary

This working paper presents SITA's recommendations on study of adoption of ADS-B service model provision, its main benefits and the baseline ADS-B service performance parameters as adopted by APANPIRG/18.

1. Background

1.1 In September 2003, the 11th Air Navigation Conference endorsed the use of ADS-B technology as an enabler for global ATM operational concept and encouraged States to support cost effective early implementation of ADS-B applications.

1.2 With many States regarding ADS-B as their next surveillance technology, it is timely to consider the implementation options available to States in the CAR/SAM region – and this includes the US FAA approach of adopting an ADS-B managed service model.

1.3 The US FAA has planned to use ADS-B as the backbone of their future ATM system that will reshape and revolutionize its air navigation and surveillance technologies. In August 2007, FAA signed a contract for an ADS-B managed service with the end objective of providing complete ADS-B coverage across the entire continental USA

2. Discussion

2.1 The Terms of Reference for the Surveillance Task Force refer to the development of a proposal on the regional surveillance systems implementation strategy by considering the ATM defined requirements for the CAR/SAM Regions and the ICAO SARPs; the studies based on the ICAO operational requirements and the experiences from other regions of SSR in Mode S, ADS-B, multilateration, ADS-C and other surveillance systems in order to develop proposals to establish a CAR/SAM planning for these systems and to structure an action plan to implement the most adequate systems in the CAR/SAM regions.

2.2 An ADS-B Managed Service is one in which an air navigation service provider contracts with a commercial ADS-B service provider who is responsible to own, deploy, operate and maintain the necessary ADS-B infrastructure (ie ADS-B ground stations, ground communication network and centralised operations center.) in order to deliver an ADS-B data stream to well defined service delivery points of the ANSP in accordance with a service level agreement. The SLA defines parameters such as required ADS-B coverage and service availability.

2.3 In consideration to the above, SITA recommends the States and the Surveillance Task force to consider the experience from Asia Pacific region that accepted SITA recommendations on ADS-B service model provision and advised the States about guidelines for various performance requirements of ADS-B Category (Tier) 1, 2 or 3 services that States may consider when acquisition of an ADS-B managed service agreement with a service provider. The baseline ADS-B Service Performance parameters are presented in the Appendix A to this working paper.

2.4 The benefits that States would receive from a managed service model operating regionally are as follows:

- a) Reduced acquisition, operational and maintenance costs
- b) Improved operational efficiency with less reliance on pilot position reporting, particularly over voice position communication.
- c) Quick surveillance safety net with improve data quality and integrity
- d) Improved planning for new systems and upgrades
- e) Ensured sustainability and maintainability of ADS-B systems that have been outsourced
- f) Guaranteed performance levels over the period of service
- g) Agreed levels of participation by States during site survey, installation, repair & maintenance and system monitoring.
- h) Promotes cross FIR data sharing with neighbouring States improving safety
- i) Optimised ADS-B coverage by avoiding fragmented or overlapping ground infrastructure deployment
- j) Provides maximum coverage of ATS air routes and supports seamless surveillance.
- k) Promoting standardisation and harmonisation in the region with uniform implementation across CAR/SAM region. Thus, efficient use of resources from a regional point of view.

3. Suggested action

3.1 The meeting is invited to:

- a) Review and take into consideration the information provided in the Appendix A to this working paper when evaluating the adoption of an ADS-B service model provision.
- b) Recommend that the surveillance task force dedicate efforts to study an ADS-B service model implementation for the Region.

APPENDIX

**APANPIRG/18
BASELINE ADS-B SERVICE PERFORMANCE PARAMETERS**

The following table provides guidelines for various performance requirements of ADS-B Category (Tier) 1, 2 or 3 services that States may consider when acquisition of an ADS-B managed service agreement with a service provider:

Service Parameter	Category 1 (Tier 1) 5nm separation capable commensurate with Radars (separation/vectoring/high performance with reliability, integrity & latency)	Category 2 (Tier 2) Situational awareness similar to ADS-C (safety net alerts, SAR, supports procedural separation without voice, not 5nm separation)	Category 3 (Tier 3) Position Reporting with Enhanced Flight Operation
Aircraft Updates	1 second < Rate < 5 seconds as Operationally required	1 second < Rate < 20 seconds as Operationally required	1 second < Rate < 60 seconds as Operationally required
Network Latency	95%: < 2 seconds of ground-station output	95%: < 15 seconds of ground-station output	95%: < 60 seconds of ground-station output
Reliability 1	2 autonomous ground-stations including antenna, each providing data, no common point of failure	1 unduplicated ground-station including antenna	1 unduplicated ground-station including antenna
Reliability 2 - MTBF	Each ground-station including antenna to have MTBF >10,000 hrs	Each ground-station including antenna to have MTBF >10,000 hrs	Each ground-station including antenna to have MTBF >10,000 hrs
Reliability – Communications Infrastructure	Completely duplicated, no common point of failure	Unduplicated, MTBF > 400 hrs	Unduplicated, MTBF > 200 hrs
Reliability – Total ADS-B Service	Total Service MTBF > 50,000 hrs	Total Service MTBF > 400 hrs	Total Service MTBF > 200 hrs
Availability – Total ADS-B Service	Total Service Availability > .999	Total Service Availability > .95	Total Service Availability > .90
Integrity – Ground Station	Site monitor, including GPS RAIM, monitored by RCMS	Site monitor, including GPS RAIM, monitored by RCMS	Site monitor, including GPS RAIM, monitored by RCMS
Integrity – Data Communications & Processing	All systems up to ATM system, errors < 1 x 10E-6	All systems up to ATM system, errors < 1 x 10E-6	All systems up to ATM system, errors < 1 x 10E-6

The choice of category (tier) could be based upon a number of factors including the following:

- a) The desired service
- b) The available budget
- c) The available ATC automation system & its capabilities and/or interim display systems
- d) ATC training and ratings
- e) Availability of appropriately tailored ATC procedures

States could initially choose one level and transition to another at a later time. For example, Category (Tier) 2 could be used to add additional safety nets/situational awareness and gain operational experience during the initial stage, moving later to a full separation service using Category (Tier) 1.