



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**  
**AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP**  
**SEVENTEENTH MEETING (APIRG/17)**  
(2-6 August, 2010)

**Agenda Item 3: AFI Regional Air Navigation Planning and Implementation Issues**

**3.3 Communications, Navigation and Surveillance (CNS)**

**UPDATE ON THE WORK OF ICAO ON SURVEILLANCE AND COLLISION AVOIDANCE**

*(Presented by the Secretariat)*

| <b>SUMMARY</b>  |
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| This paper provides an update on the work of ICAO in the areas of surveillance and collision avoidance, for consideration by APIRG when reviewing the CNS/SG/3 Report on Aeronautical Surveillance Strategy for the AFI Region.   |
| Action by the meeting is at paragraph 3.  |
| References :<br>[1] – Report of the CNS/SG/3 Meeting (Principal reference)<br>[2] – Report of the CNS/SG/2 Meeting<br>[3] – Report of the APIRG/16 Meeting<br>[4] – Report of the ICAO Special AFI RAN Meeting (2008) (Doc 9930)<br>[5] – Annex 10 to the Convention on International Civil Aviation— Aeronautical Telecommunications, Volume IV — Surveillance and Collision Avoidance Systems<br><i>Note: References [1], [2], [3] and [4] can be downloaded from: <a href="http://www.icao.int">http://www.icao.int</a>.</i> |
| Related ICAO Strategic Objectives: A, D.  |

**1. INTRODUCTION**

1.1 This paper provides an update on the work being carried out by ICAO in the areas of surveillance and collision avoidance.

**2. DISCUSSION**

**2.1 Current developments**

2.1.1 Amendment 85 to Annex 10 — *Aeronautical Telecommunications*, Volume III — *Communication Systems* and Volume IV — *Surveillance and Collision Avoidance Systems* which was finalized at the first meeting of the Working Group of the Whole (WGW/1) of the Aeronautical Surveillance Panel (ASP) in December 2008 and later adopted by the ICAO Council in March 2010 for applicability in November 2010 contains the following components relating to surveillance and collision avoidance:

- a) updates to the Table of 24-bit aircraft address allocations to States and the associated Standards and Recommended Practices (SARPs);

- b) updates to existing SARPs on secondary surveillance radar (SSR), automatic dependent surveillance — broadcast (ADS-B) and airborne collision avoidance system (ACAS) in light of operational experience;
- c) introduction of new requirements for forward fit (from 1 January 2014) and retrofit (by 1 January 2017) of aircraft ACAS installations with an upgraded collision avoidance logic (known as TCAS Version 7.1);
- d) introduction of new chapter in Volume IV entitled “Multilateration Systems” that contains system and functional requirements with an emphasis on the protection of the 1 030/1 090 MHz radio frequency environment from excessive interrogations; and
- e) introduction of a new chapter in Volume IV entitled “Technical Requirements for Airborne Surveillance Applications” that contains system –level and functional requirements for onboard systems/equipment used for processing and displaying other traffic/aircraft based on information received from ACAS and ADS-B IN.

2.2 **Other major products** of the ASP GWG/1 were the following:

- a) the new Aeronautical Surveillance Manual (Doc 9924) which combines the updated and relevant parts of outdated *Manual of the Secondary Surveillance Radar (SSR) Systems* (Doc 9684) and *Manual on Mode S Specific Services* (Doc 9688) with new guidance material on systems such as multilateration, ADS-B, surveillance data sharing and so on in a single document. The new manual is posted on the ICAO-Net pending its publication in the ICAO languages. Once the new manual is published, the aforementioned old manuals will be taken out of circulation; and
- b) information and /or guidance on “*sustainability of the 1 030/ 1090 MHz RF environment*”, “*incorrect SSR practices by some military authorities*” and “*guidance on ground testing of SSR transponders*” that were sent out via State letter SP 44/1-09/88 dated 2 December 2009.

2.3 The ASP is expected to finalize the data formats of a new set of 1 090 MHz extended squitter (ES) messages used for automatic dependent surveillance — broadcast (ADS-B) and traffic information service — broadcast (TIS-B) at its next working group meeting in October 2010. The new set of messages (called Version 2) that are in line with the latest industry standards (essentially the RTCA DO-260B, Minimum Operational Performance Standards (MOPS) for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B) issued in December 2009 and the EUROCAE ED-102A - MOPS for 1090 MHz Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) & Traffic Information Services - Broadcast (TIS-B) - Issued in December 2009 ) will be included in the second edition of Doc *Manual on Technical Provisions for Mode S Services and Extended Squitter* (Doc 9871).

2.4 The respective changes to SARPs invoking Version 2 of ES messages will be proposed at the second meeting of the Working Group of the Whole (WGS) in October 2011 and are expected to be incorporated in Annex 10 — *Aeronautical Telecommunications, Volume IV — Surveillance and Collision Avoidance Systems* as part of Amendment 86 for applicability in November 2013. It should be noted that current plans for the implementation of ADS-B in the United States and Europe are based on the new ES data formats.

2.5 **Other major topics being studied and developed by ASP are:**

- a) increasing the capacity of 1 090 MHz ES by introducing additional phase modulation;
- b) guidance on flight testing of ADS-B and Multilateration systems (MLAT);
- c) multistatic primary radar (using emissions from sources like radio and TV transmitters);
- d) possible need for a new generation of ACAS; and
- e) sense & avoid (in terms of avoiding collision with other aircraft) for unmanned aircraft system (UAS).

2.6 The Aeronautical Communications Panel (ACP) will soon be finalizing a new set of messages for the universal access transceiver (UAT) (in line with Version 2 of 1 090 MHz ES messages) for incorporation in *Manual on the Universal Access Transceiver (UAT)* (Doc 9861) in harmony and coordination with the ASP.

2.7 The newly established Airborne Surveillance Task Force (ASTAF) had its first meeting in Montreal from 26 to 28 May 2010 mainly to organize itself for carrying out the work. It was agreed that the first product of the task force should be a manual containing guidance material for initial applications enabled by the use of ADS-B IN. The approved work programme of the ASTAF is shown below:

*“In coordination with relevant external and internal bodies, develop appropriate ICAO provisions and procedures to support safe, efficient and harmonious implementation of the following operational capabilities by the end of 2011:*

- *air traffic situational awareness (ATSA)-in-trail procedure (ATSA-ITP) in oceanic airspace (e.g. enhanced crossing and passing operations);*
- *identification of the reference aircraft in radiotelephony (e.g. ICAO three-letter designator versus call sign);*
- *air traffic situational awareness (ATSA) in cruise/approach and on the aerodrome surface (e.g. enhanced traffic situational awareness during flight operations and enhanced traffic situational awareness on the airport surface (ATSA-SURF)); and*
- *merging and sequencing (M&S) in terminal control area (TMA) taking into account continuous descent operations (CDO) requirements (e.g. enhanced visual acquisition for see and avoid and enhanced successive visual approaches).”*

2.8 On the operational side, Separation and Airspace Safety Panel (SASP) completed the development of guidance material to support In-Trail Procedure (ITP) which included the planned proposed amendments to *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) in 2009. The material will be presented to the Air Navigation Commission during the fall of 2010. The draft circular entitled “*Safety Assessment for the Development of Separation Minima and Procedures for In-Trail Procedure (ITP) using ADS-B (Version 1.5.3)*” which contains, among other things, the planned proposed amendments to PANS-ATM is currently being subjected to coordination by various bodies of experts.

2.9 Finally, SASP and Operational Data Link Panel (OPLINKP) will be developing provisions (SARPs, Procedures for Air Navigation Services (PANS) and/or guidance material) in the 2012/2013 timeframe on the following subjects:

- a) a new automatic dependent surveillance — contract (ADS-C) application as part of a package to support 4D- Trajectory Management (4D-TRAD);
- b) surveillance capability extended to wide area multilateration systems;
- c) in-trail clime using ADS-B and controller-pilot data link communications (CPDLC); and
- d) criteria for the use of ADS-B and MLAT for the provision of 3 NM separation.

**3. ACTION BY APIRG**

3.1 The meeting is invited to:

- a) Note the information provided in this paper; and
- b) Request the CNS Sub-group through the AFI Aeronautical Surveillance Implementation Task Force, to monitor the developments in the areas of Surveillance and Collision Avoidance Systems, and accordingly update the regional Surveillance Strategy as required, based on operational requirements.

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