



## INTERNATIONAL CIVIL AVIATION ORGANIZATION

### ICAO NACC REGIONAL OFFICE

#### ICAO/FAA Workshop on ADS-B and Multilateration Implementation (ADS-B/IMP)

Mexico City, Mexico, 19 to 22 May 2014

#### SUMMARY OF DISCUSSIONS

##### 1. Introduction

1.1 The workshop was conducted by ICAO and the United States Federal Aviation Administration (FAA). The objectives of the workshop were:

- a) Follow-up to previous ADS-B agreements (workshop) and regional related actions
- b) Provide a complete overview of ADS-B and Multilateration concepts
- c) Explain the importance of ADS-B and Multilateration as technical enablers for ICAO Aviation System Block Upgrades (ASBUs)
- d) Provide operational guidance and assistance for ADS-B and Multilateration surveillance techniques
- e) Promote ADS-B activities - trials and operational implementation – with identification of any concern/limitation for State implementation, and agreements for the regional implementation ADS-B target date
- f) Provide information on aspects to be considered in the planning and implementation of ADS-B surveillance and Multilateration systems

1.2 The 8 modules of the material used in the workshop were based on the ICAO-EUROCONTROL ADS-B/MLAT training documentation, customized and enhanced by the FAA and complemented with ICAO references, implementation status and guidance references. The event followed-up and supported the implementation of the Regional Performance Objectives (RPOs) of the NAM/CAR Regional Performance-Based Air Navigation Implementation Plan (NAM/CAR RPBANIP): RPO 4 - *Improve Situational Awareness*; RPO 6 - *Optimization and Modernization of Communication Infrastructure*; implementation of ICAO ASBUs B0 modules: B075/SURF - *Safety and Efficiency of Surface Operations*; B084/ASURF – *Initial Capability for Ground Surveillance*; B040/TBO - *Improved Safety and Efficiency through the initial application of En-Route Data Link*; and B102/SNET - *Increased Effectiveness of Ground-Based Safety Nets*, applying ICAO Standards and Recommended Practices (SARPs) and other ICAO reference material. The final event programme and presentations/documentation are available at: <http://www.icao.int/NACC/Pages/meetings-2014-adsbimp.aspx>

1.3 As part of the workshop, a visit to SENEAM/Mexico facilities was conducted, where the ADS-B data display and a general overview of the ADS-B Project for the Mexico Valley was provided. ATFM Control Units and the Mexico ACC were also included in the visit

1.4 The workshop/meeting was attended by a total of 45 participants, representing 13 NAM/CAR States/Territories, 1 SAM participant, 1 industry, 1 airline and 1 International Organization. The list of participants is attached as **Appendix**.

1.5 Mrs. Loretta Martin, Regional Director of the ICAO NACC Regional Office, welcomed the participants, highlighted the objectives of the event, the importance of the ADS-B and Multilateration as key enablers of the ASBU implementation and the operational benefits foreseen with these surveillance techniques, wished the participants a successful workshop and opened the event. Mr. Julio C. Siu carried out the coordination and facilitation of the event.

## **2. Workshop Development**

2.1 The first day started with Module 1 under P/01, where ICAO provided an overview of the event with the objectives, methodology and the workshop programme, including the introduction of ADS-B and Multilateration in the context of the ICAO ASBU as enablers for Block 0 Modules and other future operational improvements.

2.2 Following P/01 presentation by ICAO, the FAA continued the event presenting Module 2 and Module 3. Module 2 provided an overview on of surveillance to include different surveillance techniques and categories. Furthermore, the FAA provided information on the International mandates on ADS-B. Similarly, Module 3 provided an overview of the different ADS-B technologies for ADS-B Out and ADS-B In. The day concluded with an overview of ADS-B In applications being developed, and an overview of the regulations that govern ADS-B equipment.

2.3 On the second day, the floor was opened for questions on the topics covered in Module 2 and Module 3. Once questions were answered, the FAA continued the event presenting Module 4. The module contained an example of the ASDE-X surface multilateration implementation, Wide Area Multilateration (WAM) implementation, and the concept of time difference of arrival. The final topic consisted of an overview on the different detection and tracking techniques used by the WAM system. The day ended with a visit to the SENEAM facility located at the Benito Juarez International Airport.

2.4 The third day consisted of Modules 5, 6, and 7 presented by the FAA, and Module 8 under P/02, starting with the topics on Implementation. Module 5 provided information on the on-board avionics equipment, the certification process, messages generated by the aircraft, and differences between Version 0, 1, and 2 ADS-B equipment. Next, Module 6 presented an overview of the safety management system currently implemented by the FAA. The module further explained the safety risk management process to include the risk and safety analysis required for generating the Target Level of Safety (TLS). The final module of the day, Module 7, provided an overview of the FAA surveillance functional architecture, definition of ASTERIX and its categories, multi-sensor data Fusion, and security issues. P/02 provided a follow-up to the conclusions/recommendations made from the first ADS-B workshop, the global references, guidance material from Doc 9924 and CIR 326 for the implementation of ADS-B and MLAT, the valid regional CAR/SAM Guidelines and Strategy, the achievements and progress obtained by the NAM/CAR Working Group and the current implementation status of surveillance in the CAR/NAM Regions.

2.5 For the fourth day, continuing with Module 8 we had the following presentations:

- P/03: ICAO provided some considerations for developing an ADS-B Operational Concept.
- The FAA presented their ADS-B implementation experience under module 8, describing their Acquisition Management System (AMS), as well as FAA's Lifecycle Management Process.
- P/04: Mexico presented their ADS-B Programme consisting in the installation of 10 ADS-B receivers, initially for 2014-2015 for service to the Mexico Valley and the Gulf of Mexico including the ADS-B data sharing with the three FAA ADS-B receivers installed in Mexican territory and the upgrade of the ATM System in Mexico.
- P/05: Cuba presented their ADS-B and MLAT planning activities, highlighting the development of their Operational ADS-B Concept by 2015, ADS-B trial conclusion by May 2015, MLAT testing in MUVR by 2014, the current increase in ADS-B users up to 68.18% and their data evaluation tool.
- Under P/06, COCESNA presented their ADS-B trial results carried out from February to April 2014, including a graph of ADS-B equipped aircrafts per airline and the use of their data performance tool (SASS-C).
- P/07: Boeing provided their perspective for the ADS-B out and In services, the evolution of the manufacture of Aircraft for ADS-B In and ADS-B-out functionalities; the Air transport System Roadmap, several ADS-B implementation in different regions and the manufacturing of transponders DO-260B for ADS-B out services and the certification process for this avionics.
- P/08: Canada provided an overview of the implementation of Satellite-based ADS-B, which is expected to be operational by late 2017. The implementation is focused in the NAT Region and the Presentation identified the benefits, the implementation plan, the frequency protection for this use; and how this technique supports the ICAO ASBU implementation.
- Under P/10, the Meeting was informed of the objectives, terms of reference and deliverables assigned to the ANI/WG ADS-B Taskforce, in support of the implementation of ADS-B in the NAM/CAR Regions.
- For information for the Meeting the Presentations P/09 (ADS\_B implementation Progress in the Asia/PAC Region), P/12 (IATA Survey on ADS-B) and P/13 (Guide to Global Surveillance) were provided.

### **3. Conclusions/ Recommendations**

3.1 From the discussions and presentations, the participants agreed on the following conclusions and recommendations:

- For the implementation of air navigation matters, all the NAM/CAR States should follow the Global Air Navigation Plan (GANP), its Technology Roadmaps; the ICAO ASBU methodology and specifically the RPBANIP.
- ADS-B and MLAT as key enablers for ASBU B0 Modules such as SURF, ASUR, FRTO, ASEP, etC., and prime element for the achievements of regional priorities (Situational Awareness and COMM) under the RPBANIP. States should consider the use of MLAT/WAM for immediate benefits and ADS-B for medium term benefits as to improve/optimize radar coverage, and to cover existing radar coverage gaps.

- The Participants took note of the ADS-B/MLAT related Air Navigation targets under the RPBANIP, for Surface movement and situational awareness, and the commitment made by all S/T/IO for its accomplishment
- Harmonize the activities and actions by States/IO for accomplishing the targets dates for ADS-B implementation, and urge States to include ADS-B and MLAT in their national plans
- Dec 2018 as the target date for inclusion of ADS-B implementation in their AN Implementation Plan
- ADS-B implementation is heading towards the use of DO260 B
- ICAO and Implementation Group, to create an avenue of communication between member states to leverage lessons learned.
- States need to develop an airspace concept which would help in determining the operational needs with ADS-B. Need to identify the short term ADS-B implementation timelines, particularly for airports, lower non-radar airspace and RADAR Airspace. The regional ADS-B operational concept should be developed and monitored by the support of the ANI/WG ADS-B TF.
- The Meeting recognized several benefits of ADSB for Air Traffic Services from the lessons learned of some States:
  - Provides surveillance in areas of limited or non-existent RADAR coverage
  - Reduces separation standards
  - Increases efficiency of the operations
  - Increases thru-put
  - Facilitates in direct routings
  - Provides additional routing options during weather events
  - Reduces areas of congestion by allowing optional routing options
  - Facilitates in the Search and Rescue process
  - Allows for airspace to remain usable during weather deviations
  - Decreases the possibility of saturated airspace and the need for Traffic Management Initiative
  - Reduces delays
  - Traffic and traffic alerts are provided
  - Actual weather information can be issued to operators
- States, ANSPs and International Organizations conducting ADS-B trials foreseeing operational implementation, to coordinate their analysis and reporting results through the ADS-B TF and following the guidance of ICAO CIR 326 for a homogeneous evaluation criteria and a defined CONOPs.
- United States, IATA and States to share their information on ADS-B equipage, DO260 A and DO260B
- Mexico: ANSP and DGCA as model for ADS-B implementation for specific use in a particular Airspace

- Considering that training and development of the human resources is an essential factor for the success implementation and conduction of ADS-B and MLAT aspects, CAR States/Territories/International Organizations should identify training needs and their capacity to satisfy these needs.
- States are invited to join the ADS-B Trials and ADS-B TF implementation/planning, as to obtain the operational benefits identified by the workshop, and that those States that are not yet conducting trials, to acquire the equipment necessary to start them during the second half of this year.
- The equipment for the realization of the trials must meet the following requirements:
  - Meet the DO 260A or 260B preferably
  - To have the sensitivity required to ensure coverage of at least 200NM.
  - Allow the collection of all transmissions carried out in ADS-B within its coverage.
  - Allow processing, recording and statistical representation of the responses received.
  - The statistics that are obtained should contain the list of all the responses received from the aircraft indicating:
    - Flight number
    - 24-bit code
    - Position in latitude and longitude
    - Height
    - Criterion NIC
    - Criterion NUCp and NUCv
- States to continue carrying out ADS-B trials in a collaborative manner, share the information for analysis and coordination activities among users in order to improve the integrity of this data, also taking into consideration the experience achieved in United States, Australia and Asian Pacific.
- States and ANSPs should consider:
  - Internal evaluation of their surveillance service and identification of improvements with MLAT or Wide Area Multilateration (WAM)
  - Consider the operational benefits and opportunities with new surveillance by evaluating airspace and procedures, seeking to use new surveillance techniques to improve operations not possible with current surveillance infrastructure
  - States/Territories/International Organizations should follow-up the conclusions/recommendations resulted from this ADS-B and Multilateration Implementation workshop, and ADS-B TF Meeting to ADS-B planning and implementation
  - Based on the results on the analysis of ADS-B reports, Cuba offered all participants their application for analysis/comparison of ADS-B reports vs radar position reports. Any State interested in using this Application was invited to contact Cuba.
  - Following the good learned lessons of Cuba and IATA, States to conduct improvement activities with IATA/users for correcting ADS-B data provision by the aircrafts.



*International Civil Aviation Organization*

*Organización de Aviación Civil Internacional*

North American, Central American and Caribbean Office (NACC)

Oficina para Norteamérica, Centroamérica y Caribe (NACC)

**ICAO/FAA Workshop on ADS-B and Multilateration Implementation**

**Taller OACI/FAA sobre Implementación ADS-B y Multilateración  
(ADS-B/IMP)**

**Mexico City, Mexico, 19 to 22 May 2014 / Ciudad de México, México, 19 al 22 de mayo de 2014**

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