INTERNATIONAL CIVIL AVIATION ORGANIZATION

ICAO NACC REGIONAL OFFICE

ICAO Workshop on PBN Airspace Redesign and GNSS Implementation for the NAM/CAR Regions (Mexico City, Mexico, 27 to 30 August 2012)

SUMMARY OF DISCUSSIONS

1. Introduction

1.1 Further to ICAO Assembly Resolution A37-11 and NACC/WG Meeting Conclusion 3/1 on PBN implementation, ICAO organized a Workshop on PBN Airspace Redesign and GNSS Implementation for the NAM/CAR Regions, in the ICAO NACC Regional Office, Mexico City, Mexico, from 27 to 30 August 2012. The documentation and presentations are available at the ICAO NACC Regional Office webpage: http://www.mexico.icao.int/Meetings/PBNGNSS2012Workshop.html. The list of participants is presented in the **Appendix** to this summary.

1.2 The objective was to train, support and assist States´ operational and technical staff to develop PBN airspace redesign, GNSS implementation, PBN operational approval and aeronautical charts publication in accordance with ICAO Annexes 4, 10, 11 and 15, and Doc 4444, Doc 8071, Doc 8126, Doc 8168, Doc 8697, Doc 9613, Doc 9674, Doc 9750, Doc 9849 and Doc 9881.

2. Discussion

2.1 As a result of the Workshop, the participants had a better understanding of the relationship between the different elements, processes and activities to develop and implement a PBN airspace concept, such as:

- the establishment of direct routes between city pairs based on the gate-to-gate concept;
- to prioritize PBN implementation from high to lower air traffic density airspace;
- revision of the implementation feasibility of the new proposed area navigation (RNAV) and required navigation performance (RNP) routes;
- the implementation of standard instrument departure (SID) and standard instrument arrival (STAR) based on Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO) concepts, as required;
- the interface for SID and STAR of the terminal control area (TMAs) to the upper/lower RNAV route network;
- publication of RNP approach procedures according to Assembly Resolution A37-11;

- the allocation of PBN navigation specification to all air traffic service(s) (ATS) routes;
- the redesign of ATS airspace and sectors through the implementation of specific routes, to/from TMAs using specific departure and arrival sectors, and considering the air traffic density and air traffic control (ATC) workload;
- to implement emerging ATC procedures, methodologies and training programmes for the Airspace Organization and Management (AOM);
- the review of restricted areas should be based on the flexible use of airspace concept to meet necessities of the civil and military users; and
- Communication. Navigation and Surveillance (CNS) infrastructure evaluation (status and planning for new systems).

2.2 The outcome of the evaluation of the CNS infrastructure for the implementation of a PBN airspace concept is as follows:

- The CAR Region has a well-developed regional telecommunication infrastructure that satisfies operational requirements including the PBN implementation;
- aeronautical mobile service (AMS) very high frequency (VHF) communication achieved several improvements in voice quality and coverage to provide service in the CAR Region. However, concerned States need to review and improve the ATS communication in some areas (continental and lower airspace);
- significant improvements achieved for ATS surveillance in the CAR Region through regional radar data exchange collaboration;
- automatic dependent surveillance - broadcast (ADS-B) data activities are on-going with data collection and trials;
- significant improvements achieved on VHF omnidirectional radio range (VOR)/ distance measuring equipment (DME) for PBN en-route coverage;
- States should review their navigation infrastructure (DME/DME, VOR, etc.) to ensure air navigation coverage for PBN implementation in the TMAs and other improvements for en-route airspace; and
- initial evaluation activities have been carried out in the CAR Region for GNSS augmentation system (ground-based augmentation system (GBAS), satellite-based augmentation system (SBAS)).

2.3 The Workshop recognized that GNSS is a key enabler for PBN implementation and that GNSS planning/implementation should be made in accordance with the ICAO PBN provisions, based on the following aspects:

- the Global Satellite Based Navigation (GNSS) concept and elements;
- available ICAO Standards and Recommended Practices (SARPs) and guidance material;
- GNSS operational applications (PBN, ADS-B, automatic dependent surveillance – contract (ADS-C) and other time-based aeronautical and non-aeronautical applications);
- Implementation of GNSS-based services; and
- GNSS vulnerability and evolution.

2.4 The Workshop noted that for a successful PBN approval process, the key aspects that States need to work on and develop are:

- training for all staff concerned (Civil aviation authority/administration (CAA), ATS, airlines, etc.);
- understand PBN fundamentals;
- apply ICAO provisions;
- implement a PBN approval process;
- promote collaborative efforts for PBN issues involving all stakeholders; and
- carry out coordination with the ICAO NACC Regional Office for assistance.

2.5 ICAO Air Navigation Planning and the existing performance based planning were presented with the introduction of the ICAO Aviation System Block upgrade methodology and the need to work on the Block 0 and modules as required. A general overview of the 12th Air Navigation Conference (http://www.icao.int/Meetings/anconf12) and the ICAO PBN Symposium (http://www.icao.int/Meetings/PBN-Symposium) was provided.

2.6 The commitment to comply with the CAR Region PBN Airspace concept implementation and the CAR/SAM Navigation implementation Strategy was recalled, following the NAM/CAR RPBANIP regional objectives and its working groups tasks. States should develop their national PBN action plan in accordance with their particular needs and objectives. To design RNAV SIDs, STARs and RNP approach procedures, Air navigation service provider (ANSPs) should follow the criteria of obstacle clearance from Doc 8168, PANS/OPS – *Aircraft Operations*.

2.7 The Workshop recognized the importance of the need for high quality aeronautical information and data associated to the PBN aeronautical charts. Appropriate resources are required in order to integrate all WGS-84 surveys and e-TOD data sets for RNAV-RNP developments.

2.8 The current status of the Aeronautical Information Management (AIM) and Aeronautical Charts (MAP) can best be described as a semi-automated process which requires significant manual intervention and remains linked to the principle of a master, paper reference document, even though the information may in many cases be maintained and transmitted electronically.

2.9 The Workshop realized that the benefits and the improvements foreseen with the implementation of the PBN should be measured through the defined performance based metrics as established under the NAM/CAR Regional Performance based Air Navigation Implementation Plan (NAM/CAR RPBANIP).

2.10 The Workshop was briefed on the RLA/03/902 Regional Project “SBAS System for the Central, Caribbean and South America” (SACCSA), providing its current Phase III status and the progress on its SBAS study for the CAR/SAM Regions. The SACCSA Project highlighted the particular effort on the ionospheric evaluation on the equatorial region. Further details and references on the Project are provided in the SACCSA website (http://www.rlasaccsa.com/) and its 8th Coordination Meeting (http://www.mexico.icao.int/Meetings/SACCSA2012.html).

2.11 The United States FAA provided two lessons-learned presentations described as follows:

- Status of FAA PBN procedures in the US, including: the current process for development of en-route and terminal RNAV and RNP applications; the new NavLean process to streamline implementation; other new applications to encourage coordination, consolidation and rapid implementation of user benefits, as well as lessons learned. Additional coordination through the ICAO Regional Office would be required for United States to provide specific assistance concerning PBN.

- A briefing was provided on the operation of FAA GNSS and augmentation systems, operations and examples of technical GNSS operations. Based on the progress and modernization of the United States SBAS System, wide area augmentation system (WAAS), it was informed that improvements to the WAAS coverage for up to localizer performance with vertical guidance (LPV-200) operation performance will be analyzed using additional reference stations in the CAR Region. ICAO requested further details on this potential coverage improvements to the CAR Region, for which United States clarified that this improvement is not feasible today due to the ionospheric affectation to the correction signal, but this may be feasible in the future with the implementation of the L5 frequency.

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Appendix

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