**Agenda Item 4: Assessment of operational requirements to determine the implementation of improvements in communications, navigation and surveillance (CNS) capabilities for operations in route and terminal areas**

## Follow-up to activities under the SAM ground-ground and ground-air applications project (Project D2)

(Presented by the Secretariat)

**SUMMARY**

This working paper presents updated information on the status of implementation of activities under the *ATN ground-ground and air-ground applications* Project (D2) of the SAM *Ground-ground/air-ground communication infrastructure* Programme.

**References**

- Third Meeting of the Programmes and Projects Review Committee (PPRC/3) (Mexico City, Mexico, 21-23 July 2016)
- Final report of the Sixteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/16) - Regional Project RLA/06/901 (Lima, Peru, 19-23 October 2016).
- Report on AMHS implementation follow-up teleconferences (29/3/2016 and 29/1/2016).
- NAM/CAR/SAM ATS data link implementation workshop (Philipsburg, Sint Maarten, 18-21 April 2016)

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| *ICAO strategic objectives:* | *A – Safety*<br>*B – Air navigation capacity and efficiency* |

## 1. Introduction

1.1 The SAM ground-ground/air-ground communication infrastructure programme consists of the GREPECAS organisational restructuring (Decision 16/45) under Project D1 SAM ATN Architecture, and Project D2, SAM ATN ground-ground and air-ground applications.

1.2 The implementation of the ground-ground and ground-air data communication infrastructure will contribute to reduce air traffic control incidents, increasing information transition capacity compared to the existing infrastructure based on analogue applications.

1.3 This project contributes to the implementation of ASBU modules B0 FICE, B0 TBO, B0 AMET, and B0 DATM, and PFF SAM CNS 01, CNS02, ATM 05, ATM 06, MET 03, MET 04, AIM 02 and ANRF B0 FICE, B0 TBO, B0 AMET, and B0 DATM of the SAM Performance-based air navigation implementation plan (SAM PBIP).

## 2 Discussion

***Follow-up to the interconnection of AMHS systems***

2.1 CAR/SAM AMHS requirements are specified in table CNS I of eANP Volume II, and were previously specified in FASID Table CNS 1 A (Vol II of the Regional Air Navigation Plan, Doc 8733). AMHS circuit requirements correspond to the same AFTN circuit requirements specified in eANP table CNS I. All SAM States, with the exception of French Guiana, have already installed AMHS.

2.2 The Bogota Declaration gives priority to implementing the AMHS interconnection, which allows for a greater data transmission capacity in shorter times. Accordingly, the Bogota Declaration stipulates that 26 AMHS interconnections must be implemented during the period 2014-2016.

2.3 With the implementation of AMHS, SAM States have implemented IP digital networks at national level and the REDDIG II IP network at regional level.

2.4 Upon analysing the implementation of AMHS systems and their interconnection in the CAR and SAM Regions, the PPRC/3 meeting noted that the AMHS application was not been being used to its full potential, and that it was operating like the AFTN, only with alphanumeric characters, without the delivery of attachments to messages, which could contain various information, such as tables and graphs.

2.5 In this regard, the PPRC/3 established a working group tasked with the development and implementation of a strategy for effective use of AMHS. The working group would consist of Brazil, United States, Dominican Republic, and the coordinators of CAR/SAM D programmes. In this regard, it formulated draft Decision 3/6 - Establishment of a working group to improve the operational use of AMHS.

2.6 The working group considered that OPMET exchange in XML/GML digital format, as recommended by Amendment 77 to Annex 3 – *Meteorological Service for International Air Navigation*, effective as of November 2016, would represent an effective use of AMHS, considering that the AFTN network did not meet the minimum requirements for the transmission of XML messages since it was limited to 2500 characters per message, which would result in message errors.

2.7 Therefore, the effective use of XML/GML for OPMET exchange as of November 2016 should expedite the implementation of AMHS interconnection. Since mid-December 2015 to date, positive trials have been conducted, resulting in several P1 connections between various MTAs of the Region, which are ready to move to the operational phase. One of these interconnections, between the Brasilia and the Lima MTAs, became operational in mid-December 2015. A summary of AIDC interconnection activities conducted since the SAM/IG/16 meeting appears in **Appendix A** to this working paper. The States are expected to report to this Meeting on progress made in the implementation of AMHS interconnection.

***Follow-up to, and review of, the plan of action for the implementation of AMHS interconnection, in accordance with the Bogota Declaration***

2.8 A review of AMHS interconnection trial dates was conducted at the teleconference held on 29 March 2016. The focal point of Colombia noted that they would proceed with the implementation of the AMHS interconnection according to the agreed dates, but that there might be a delay in view of the relocation of the REDDIG II node of Bogotá. The updated table of AMHS interconnections appears in **Appendix B** to this working paper.

***Proposed connection between a SAM AMHS system and SITA***

2.9 In this regard, Brazil is expected to report on progress made in the AMHS interconnection between the Brasilia AMHS and SITA.

***Follow-up to the implementation of the AIDC interconnection***

2.10 This issue is described in WP/10 of this Meeting.

***Follow-up to ground-air data link implementation activities***

2.11 In order to support States in data link planning, a NAM/CAR/SAM ATS data link implementation workshop was held in Sint Marteen on 18-21 April of this year. **Appendix C** to this working paper contains a preliminary summary of the respective conclusions and recommendations of the workshop.

## 3 Suggested action

3.1 The Meeting is invited to:

a) take note of the information contained in this working paper;

b) analyse the aspects contained in section 2 and the corresponding appendices to this working paper, and propose actions to conduct the proposed activities; and

c) discuss any other matters it may deem appropriate.

## APPENDIX A

## PROGRESS MADE IN THE IMPLEMENTATION OF AMHS INTERCONNECTION SINCE THE SAM/IG/16 MEETING

1.1 The progress made in the implementation of AMHS interconnection since the SAM/IG/16 meeting is reported below. In this regard, there has been a significant progress in the implementation of AMHS interconnection with respect to previous years.

*Brasilia - Lima*

1.2 On 14 December 2015, the AFTN circuit between the Brasilia MTA and the Lima MTA was migrated to an AMHS circuit using protocol P1. Thus, Peru has implemented its third operational AMHS, becoming the State with the largest number of AMHS interconnections.

1.3 In this sense, the Secretariat commended all the technical and operational personnel of Brazil and Peru that participated in the implementation of the new AMHS circuit between Brazil and Peru through the REDDIG II for the excellent job done. Initially, some errors have occurred in the messages through this new circuit, which are being analysed in order to find a prompt resolution.

*Brasilia - Madrid*

1.4 It was noted that all AMHS trials between Brazil and Spain (Brasilia MTA-Madrid MTA) through the CAFSAT satellite network had been successfully completed on 14 January 2016. In this regard, all the technical, operational, and managerial personnel of Brazil and Spain involved in the implementation of the interconnection and the trials was commended. It was also reported that Brazil and Spain were coordinating as necessary for the commissioning of this AMHS connection, which would be the first inter-regional AMHS interconnection of the SAM Region.

*Brasilia - Ezeiza*

1.5 It was noted that the final Argentina-Brazil interconnection trials, scheduled for 26 January 2016, would be conducted after completing the installation of the new REDDIG II node in Brasilia, which was completed in mid-April 2016.

*Ezeiza - Montevideo*

1.6 On 3 March 2016, Uruguay began initial coordination with Argentina for AMHS interconnection between Ezeiza and Montevideo. AMHS trials between the Ezeiza and Montevideo MTAs started on the week of 21 March 2016. The focal point of Argentina, Mr. Javier Vittor, reported on 22 March that P1 connectivity between Ezeiza and Montevideo had been achieved from Ezeiza to Montevideo, and that trials from Montevideo to Ezeiza were still pending.

*Brasilia - Montevideo*

1.7 In March 2016, the focal point of Uruguay started to coordinate the implementation of the AMHS interconnection with Brazil. The interconnection will be between the Brasilia and the Montevideo MTAs.

*Ezeiza - Lima*

1.8 Trials were resumed on the week of 21 March. In this regard, the focal point of Argentina reported that P1 connectivity between the Ezeiza and the Lima MTAs had been established. The person designated by Argentina to be in charge of the working group for the conduction of the trials is Mr. Antonio González (+54 11 4480 2362 / 2376).

1.9 In order to complete trials between Argentina and Peru, it was coordinated that they would be resumed on 31 March 2016.

*Lima - Caracas*

1.10 On 10 March 2016, AMHS trials between Peru and Venezuela were resumed, attaining P1 connectivity between the Maiquetía and Lima MTAs. P1 connectivity between Peru and Venezuela was achieved with the support of Brazil. Initial message exchange trials through the AMHS (P1) circuit were conducted on 15 March, without satisfactory results. In this regard, the focal point of Peru requested Venezuela to make the necessary corrections so that messages could be processed and delivered to the user without any problems. Trials were conducted on 20 and 21 March, in which some progress was noted, expecting a successful completion as soon as possible.

*Lima - Santiago*

1.13 Coordination started for the implementation of the AMHS interconnection between Chile and Peru. In this regard, the focal point of Peru sent to the focal point of Chile a copy of the Quito MTA configuration to be used by Chile as reference, taking into account that the Santiago AMHS is also from Thales. AMHS interconnection trials between Chile and Peru would be resumed on the week of 21 March 2016.

*Brasilia – United States*

1.14 On 13 January, the focal points of Brazil and United States started coordinating the implementation of the AMHS interconnection through the MEVAIII-REDDIG II interconnection. In this regard, Brazil reviewed a technical letter required by the United States (FAA) for interconnections with other countries. The technical letter covers administrative and operational aspects for the completion of the AMHS interconnection. At present, the technical letter is being reviewed by the United States. Once the technical letter has been finalised and signed, interconnection trials will start. Copy of the technical letter is contained in the **Attachment to this Appendix** to this working paper.

*Remaining interconnections of Brazil*

1.14 The remaining AMHS interconnection trials of Brazil would be conducted once the new Brasilia node is fully completed. The REDDIG II node of Brasilia is to be completed in mid 2016. From there on, Brazil would start final interoperability trials with the MTAs of the States with which it has AMHS requirements.

## APPENDIX B

## AMHS INTERCONNECTION REQUIREMENTS AND IMPLEMENTATION DATES

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| Argentina | Bolivia | Mar 2016 | |
| | Brazil | Dec 2015 | Pending operational implementation |
| | Chile | Dec 2016 | |
| | Paraguay | Mar 2012 | Implemented |
| | Peru | Feb 2016 | |
| | Uruguay | Jun 2016 | |
| | Venezuela | Mar 2016 | |
| Bolivia | Argentina | Mar 2016 | |
| | Brazil | Abr 2016 | |
| | Peru | May 2016 | |
| Brazil | Argentina | Dec 2015 | Pending operational implementation |
| | Bolivia | Abr 2016 | |
| | Colombia | Jul 2016 | |
| | Guyana | Mar 2016 | |
| | French Guiana | TBD | AMHS pending implementation |
| | Paraguay | Dec 2015 | |
| | Peru | Dec 2016 | Implemented 14 Decembre 2015 |
| | Suriname | Dec 2016 | |
| | Uruguay | Dec 2015 | |
| | Venezuela | Dec 2016 | |
| Chile | Argentina | Dec 2016 | |
| | Peru | Jun 2016 | |
| Colombia | Brazil | Jul 2016 | |
| | Ecuador | Jul 2016 | |
| | Panama | Dec 2016 | |
| | Peru | Sep 2010 | Implemented |
| | Venezuela | Jun 2016 | |
| Ecuador | Colombia | Jul 2016 | |
| | Peru | Julio 2012 | Implemented |
| | Venezuela | Dec 2016 | |
| French Guiana (France) | Brazil | TBD | AMHS pending implementation |
| | Venezuela | TBD | AMHS pending implementation |
| Guyana | Brazil | Mar 2016 | |

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| | Suriname | Jun 2011 | Implemented |
| | Venezuela | Dec 2016 | |
| Panama | Colombia | Dec 2016 | |
| Paraguay | Argentina | Mar 2012 | Implemented |
| | Brazil | Dec 2015 | |
| Peru | Argentina | Feb 2016 | |
| | Bolivia | May 2016 | |
| | Brazil | Dec 2015 | Implemented 14 December 2015 |
| | Chile | Jun 2016 | |
| | Colombia | Sep 2010 | Implemented |
| | Ecuador | Jul 2012 | Implemented |
| | Venezuela | Jun 2016 | |
| Surinamee | Brazil | Dec 2016 | |
| | Guyana | Jun 2011 | Implemented |
| | Venezuela | Jun 2016 | |
| Uruguay | Argentina | Jun 2016 | |
| | Brazil | Dec 2015 | |
| Venezuela | Argentina | Mar 2016 | |
| | Brazil | Dec 2016 | |
| | Colombia | Jun 2016 | |
| | Ecuador | Dec 2016 | |
| | Guyana | Dec 2016 | |
| | French Guiana | TBD | AMHS pending implementation |
| | Peru | Jun 2016 | |
| | Suriname | Jun 2016 | |

**APPENDIX C**

# NAM/CAR/SAM ATS DATALINK IMPLEMENTATION WORKSHOP

(Philisburg, Sint Maarten, 18-21 April 2016)

## Summary of Discussions

# International Civil Aviation Organization

## NACC and SAM Regional Offices

# NAM/CAR/SAM ATS DATALINK IMPLEMENTATION WORKSHOP

(Philisburg, Sint Maarten, 18-21 April 2016)

## Summary of Discussions

Presented by the Secretariat

April 2016

# NAM/ CAR/ SAM ATS DATALINK IMPLEMENTATION WORKSHOP

## SUMMARY OF DISCUSSIONS

| | |
|---|---|
| **Date:** | 18 to 21 April 2016 |
| **Venue:** | Philisburg, Sint Maarten |
| **Participants:** | The workshop was attended by 47 representatives of 15 NAM/CAR/SAM States, 4 International Organisations of the Regions and 3 industry representatives. The list of participants appears in the **Attachment** to this document. |

**1. Introduction**

1.1 The workshop was conducted by ICAO and had the following objectives:

a) provide participating States and Air Navigation Services Providers (ANSPs) the necessary technical knowledge and guidance to effectively implement air-ground and ground-ground ATS data link.
b) present a networking and knowledge-sharing opportunity through which participants can exchange best practices and lessons learned.
c) support the implementation of adopted Aviation System Block Upgrade (ASBU) B0 modules.
d) Provide opportunities to make recommendations in support of regional implementation of the above-mentioned ASBU modules for Implementation Groups and GREPECAS

1.2 This event supported the implementation of ASBU B0 modules mainly: B025/FICE - Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration; and B040/TBO – Improved Safety and Efficiency through the initial application of En-Route Data Link. All presentations are posted on the following website http://www.icao.int/NACC/Documents/Meetings/2016/ATS

1.3 Mr. Julio Siu, Deputy Regional Director of the ICAO NACC Regional Office welcomed the participants. He highlighted the importance of the event in supporting the implementation of air ground and ground ground Aeronautical Telecommunication Network (ATN) applications, and invited all participants to take advantage of the expertise in the workshop with the experts of the OPDWG of ICAO and States. Mr. Larry Donker, Deputy Manager Director of Sint Maarten Princess Juliana International Airport, together with the Sint Maarten Civil Aviation Authority informed on the achievements by Sint Maarten PJIA and their current works on data links and officially opened the Meeting. Mr. Julio Siu and Onofrio Smarrelli, CNS Regional Officer of the ICAO SAM Regional Office, acted as Secretary of the event.

**2. Conduction of the Workshop**

2.1 The workshop was conducted in 6 sessions, as proposed during the introduction:

**SESSION 1 - UNDERSTANDING DATALINK PLANNING AND IMPLEMENTATION STATUS / INTRODUCTION TO WORKSHOP**

2.2 ICAO presented an introduction to the workshop (P/1 - Understanding Datalink Planning and Implementation Status) and informed the results of the survey made to understand the needs and expectations of the workshop and the status of implementation of the data link applications. Finally providing the current status of implementation of Controller-Pilot Data Link Communication - Automatic Dependent Surveillance – contract (CPDLC/ADS-C); Air Traffic Services Inter-facility Data Communication (AIDC) and Aeronautical Message Handling System (AMHS) implementation in the NAM, CAR and SAM regions.

**SESSION 2 INTRODUCTION TO AIR-GROUND DATA LINK / *GLOBAL AND REGIONAL PLANS/ ICAO PROVISIONS***

2.3 Under P/02 – ICAO informed the meeting of the Provisions for Data Link Implementation currently valid for the planning, implementation and monitoring of the services, including the latest amendments to the ICAO Standards and Recommended Practices (SARPs) and guidance material and the focus on performance-based approach and ASBU methodology aspects for the ATS Datalink applications.

2.4 With P/03 – Regional Air-Ground Data Link consideration on planning and implementation on the eANP, regional plan based on performance in the NAM CAR and SAM and GREPECAS and implementation status of CPDLC/ADS C in the NAM CAR SAM Regions were presented by ICAO.

**SESSION 3 PREPARATION FOR AIR-GROUND DATA LINK IMPLEMENTATION (ANSP)**

2.5 With P/04 – Nav Canada Data Link Implementation, Nav Canada provided an overview of Nav Canada organization and of their datalink services in Domestic and Oceanic airspace as well as Air Traffic Control Towers, describing how datalink progressed to its current level in Canada and the importance of planning. The development of the concept of operations (CONOPS) was stressed. The presentation reminded participants to use the GOLD to guide any implementation.

2.6 Under P/05 – Preparation for Air-to Ground Data Link – United States commented on the importance of CPDLC from the ANSP Perspective, explaining their CPDLC application in the Oceanic and domestic Airspace with the available operational platform (Oceans 21/ATOP system).

2.7 Under P/06 - Preparing for Data Link Implementation – The European implementation Perspective was informed, covering the introduction of CPDLC in continental Europe. It described the Link 2000+ programme (scope, strategy and governance) as well as the follow on actions being performed by the European Commission and the EUROCONTROL Central Reporting Office.

2.8 With P/07 - Controller-pilot data link communications (CPDLC) and automatic dependent surveillance – contract (ADS C) United States provides an overview of the amendments to ICAO Annex 10, Volume II, and PANS-ATM (Doc‑4444) to align the operational part of the CPDLC / ADS‑C provision with current implementation using FANS 1/A and ATN Baseline 1 (ATN B1), and to create a framework for the “next generation” data link provision, referred to as Baseline 2 ( B2). It then reviews supporting guidelines contained in the Global Operational Data Link Document (GOLD), which ICAO is transforming into the Global Operational Data Link

(GOLD) Manual (Doc 10037) and the Performance-Based Communications and Surveillance PBCS) Manual (Doc 9869). The presentation focused on GOLD manual content from the Operator's perspective and what operators need to do to prepare to use CPDLC /ADS‑C. It covered guidelines for establishing policies and procedures, filing flight plans, training and qualification programs, and maintaining CPDLC / ADS-C systems. It stressed the importance of operator participation in regional/State monitoring agencies

2.9 With P/08 - Performance-based communication and surveillance (PBCS) United States provided an overview of the amendments to ICAO Annex 6 (all parts), Annex 11, Annex 15, PANS-ATM (Doc-4444) and PANS-ABC (Doc 8400) to include the PBCS provision, which is applicable to communication and surveillance that are required for certain ATM operations, such as applying performance-based separation minima. Air traffic is increasing and there is a need to optimize the use of available airspace. By taking advantage of emerging technologies, such as CPDLC / ADS-C and satellite voice (SATVOICE), separation minima are being reduced and this will help to optimize the use of available airspace. This progression calls for a need to quantify the enhancements to communication and surveillance performance, with sufficient guidance to optimize costs for developing and maintaining commercially available services, without which it is doubtful that the required performance would be achieved and maintained. The PBCS provision satisfies this need. As a shared responsibility, the presentation reviews the guidance from ANSP and operator perspectives specifically for CPDLC / ADS-C implementation, contained in the Performance-Based Communications and Surveillance PBCS) Manual (Doc 9869). This material is based on material contained in the inter-regional GOLD, Appendices B, C and D.

**SESSION 4 AIR-GROUND DATALINK IMPLEMENTATION ISSUES, CHALLENGES, LESSONS LEARNED**

2.10 Under P/09 – Challenges and Lessons Learned Nav Canada highlighted the importance of sharing experiences and reaching out to any and all contacts that you have. It spoke of challenges encountered and lessons learned, most importantly to understand that everything won't be perfect and patience is required. It is important to start slow and to focus as much energy as possible on training and educating the users (controllers and pilots) when and where possible.

2.11 With P/10 - Air ground datalink implementation issues and lessons learned - European experience stemming from Link 2000+ Programme- EUROCONTROL described the issues arising during the deployment of the LINK 2000+ programme and some lessons learned from this experience as well as the next steps being planned by the European Commission. There was some discussion about the different needs/approaches to regulation. For the implementation of CPDLC over the ATN a mandate was required in order to stimulate the development of the systems to support it whereas for the NAT FANS mandate the majority of aircraft were already equipped before the mandate was developed.

2.12 With P/11 - Data Link Implementation - Lessons Learned - An ANSP Perspective United States described some of the challenges that will be faced by ANSP's when implementing Datalink and the systems associated with its use based considering the experience of the FAA on deploying ADS-C/ CPDLC .

2.13 Under P/12 - A view of CPDLC from a pilot's perspective IFALPA presented their position and good practices for successfully implementing CPDLC/ADS-C

2.14 With P/13 - Air-ground data link deployment – A/C manufacturer perspective - Airbus presented the aircraft manufacturer perspective with regards to ATS datalink services

deployment. The introduction of the worldwide context provided an overview on the ongoing initiatives and mandates in the different ICAO regions, based on the two existing ATS data link capabilities, i.e. FANS 1/A and ATN B1. Airbus informed on the fact that FANS 1/A and ATN B1, under deployment in different regions, are not interoperable, which created the need for aircraft manufacturers to provide a dual capability to airlines flying both technologies on long-haul flights, pushing a significant increase of complexity onboard the aircraft.

2.15 With P/14 - SITA Data Link- Information about SITA activities on Data Link as aircraft cockpit service, implementation of ICAO VDL (VHF Data Link), ATS data link, VHF Data Link Network Partnerships with ANSPs and Caribbean Region and Air Traffic Control Data Link Opportunities were presented

2.16 Similarly with P/15 – ARINC Data Link- ARINC informed of their Datalink media, ACARS coverage, global link HFDL, global link ATS services as AFN, CPDLC, ADS-C, CADS/CFRS, PDC, DCL and D-ATIS services.

***STATE EXPERIENCE***

2.17 Under P/16 – Argentina described its implementation on: ATM Automation Center (Ezeiza and Cordoba (2005), Mendoza (April 2016) and Resistencia and Comodoro (May 2016), AIDC/ ADS C in Comodoro and Ezeiza ACC, ADS B CPDLC, AIDC, AMHS and IP national network and described the functionality of automation system.

2.18 With P17- Brazil Data Link, Brazil provided information regarding the Brazilian data link planning consideration (SIRIUS programme), the VHF data link implementation (51 Station), the concession of operation and maintenance of VDL, pre FANS implementation (DCL, D ATIS and DVOLMET) and CPDL/ADS C on Atlantic ACC.

2.19 Under P/18 – COCESNA ADS-C/CPDLC Implementation, COCESNA commented the current status of implementation of their ADS-C/CPDLC and the problems to make operation this service.

2.20 The P/19 - Haiti Datalink Planning and Expectations was a exposure of Haiti's effort and commitment to modernize their Air Navigation service as planning to implement AMHS and surveillance system.

2.21 Under P/20 – Air Ground Data Link In South Atlantic Region, the use and service performance of FANS 1/A, and the potential problem identified in the South Atlantic region were presented.

2.22 In P/21 - Data Link Operations Piarco FIR, Trinidad and Tobago presented the CPDLC/ADS C and AIDC processes of implementation, challenges encountered and expectations. AMHS tests with the FAA were informed.

**SESSION 5 - INTRODUCTION TO GROUND-GROUND DATA LINK/ *GLOBAL AND REGIONAL PLANS/ ICAO PROVISIONS***

2.23 Under P/22 - Regional Ground-Ground Data-Link Implementation, Regional Air-Ground Data Link consideration on planning and implementation on the eANP, regional plan based on performance in the NAM CAR and SAM and GREPECAS and implementation status of CPDLC/ADS C in the NAM CAR SAM Regions were presented.

**SESSION 6 - GROUND-GROUND DATA LINK IMPLEMENTATION ISSUES**

***STATE AIDC IMPLEMENTATION EXPERIENCE***

2.24 In P/23 Jamaica explained their ATS challenges (A- G radio and surveillance coverage, coordination. human resource and training), solution of déficiences (radar sharing, AIDC, CPDLC) and their implementation plan to cover the challenges and déficiences were presented.

2.25 With P/24 Colombia described the implementation of the automation system in the Bogota and Barranquilla ACC and four APPs and the implementation and pre operational use of AIDC between the ACC of Bogota with Lima, Guayaquil and Panama ACCs.

2.26 Under P/25 – Cuba AIDC Implementation Progress, Cuba presented the advance on the AIDC implementation with the adjacent ACCs (Miami, Merida, Cenamer, Kingston) and the lesson learned in the AIDC implementation. This presentation showed the importance and benefits of AIDC use in the FIR Cuba, taking into account the air traffic increase. The implementation status of adjacent FIRs was showed, and the steps taken for the implementation with CENAMER are described as an example. Lessons learned from acquired experiences and recommendations were given.

2.27 With P/26 – Dominican Republic AIDC Implementation Progress, Dominican Republic informed on their AIDC implementation in order to improve verbal coordination. Finally it was informed that their first AIDC interface will be with Miami/San Juan, through the AMHS link. The AIDC Task Force was formed during the first ANI/WG meeting in 2014. It is one of the many task forces of this working group, and has the responsibility of streamlining the implementation of AIDC in all FIRs in the region, as well as reporting the progress to the working group. The task force has held several teleconferences and meetings, and has developed an implementation checklist, example LOAs as reference for adding AIDC agreements to operational LOAs, as well as the AIDC regional plan and evaluation of interface implementations, among other activities and deliverables. The Task Force also has an ad hoc group for guiding the mitigation of flight plan errors, which has done three phases of data collection to analyse the situation of flight plan errors. These analysis have permitted to reduce significantly the occurrence of duplicate flight plans in the region. The Task Force has met the goal of 50% of FIRs with applicable interfaces implemented (86%), and has established a goal of 9 interfaces in the CAR region by December 2016.

2.28 In P/27 COCESNA informed of their 3 phases implementation of the AIDC service between the adjacent FIRS but also within the Central American FIR APPs with the use of the NAM and AIDC ICDs.

2.29 Under P/28 – AIDC Experience in Peru, Peru informed of their AIDC implementation process, including the implementation status of AIDC operation with all the adjacent ACCs, the AIDC performance, the problems encountered for the operation of AIDC and the challenges to be solved. Special emphasis was done about the importance of the operational test phase, where all the ATC personnel must be involved in order to troubleshoot any technical and operational issues, and contribute with ATC familiarization and confidence in the system before AIDC final implementation. Emphasis has also been done about the role of the Flight Plan quality and integrity in AIDC performance.

2.30 With P/29 - Ground - Ground Datalink – AIDC, Nav Canada informed on the reason why to use AIDC, the AIDC messages used, the lessons learned and implementation consideration for AIDC. This presentation gives an overview of the AIDC operations in Gander Oceanic. It discusses the advantages of AIDC, the current implementation and lessons learned from the recent expansion to a larger message set. It also emphasizes the importance of coordination with adjacent units in the early stages of development.

***AMHS INTERCONNECTION***

2.31 Under P/30 – United States AMHS interconnection and Automation System, United States informed on the status of implementation of AIDC with adjacent ACCs in the NAM. NAT and APAC Regions, comparison between AFTN and AMHS, current situation of international AMHS /AFTN and project deployment of AMHS.

2.32 With P/31 – United States AMHS Implementation and MET XML Testing, the workshop was informed on the AMHS implementation process conducted by United States, including the MET XML tests with AMHS (Hong Kong, UK, USA and Singapore).

## 3. CONCLUSIONS/ RECOMMENDATIONS

3.1 Based on the presentations and discussion, the participants agreed on the following conclusions and recommendations:

***AIR-Ground Data Link Implementation***

a) ATS Data Link is a fundamental enabler for realizing the concept of future operations (FF-ICE, TBO and SWIM)

b) There are a number of ICAO Annexes, PANS and Manual concerning ATS Data Link (Service/Message and Media) and they are evolving: Mature ICAO documents and SARPS for air ground data link addressed for messages, services and media are ready as the PANS ATM (Document 4444 Chapter 4,5 and 14), the GOLD manual (Document 10037 Edition 1) ; Doc 9880: Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols,Doc 9896: on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocols, Doc 9776: *Manual on VHF Digital Link (VDL) Mode 2*, Doc 9925: *Manual on Aeronautical Mobile (Route) Service*, Doc 10044: *Manual on Aeronautical Mobile Airport Communications System (AeroMACS) (to be published in 2016)* Annex 10 Volume II and III, Doc 9869 (Performed based communication and surveillance PBCS)

c) Data Link provides the following benefits:
- Safety improvements by reducing reception of erroneous message
- Reduction of congestion of voice communications
- Reduction of radiotelephony work load for the pilot and controller
- More availability of voice communications
- Reduction of delayed transfer of communications
- Reduction of retransmissions generated by misunderstood communications
- Less stress for the controller
- Reduction on the required time for controller communication

***Planning and installation***

d) The establishment of an ATM operational concept in a State is the starting point for data link implementation. The States are not isolated and in the seamless airspace concept, regional and global initiatives (in that order) must be considered. The NAM/CAR (RPBANIP) and SAM (SAM PBIP) Perfromance-based regional Plans and the Global Air Navigation Plan (GANP) (Doc 9750) should be taken into account from the beginning.

e) To ensure global standardization, it is important that development is done using recommendations in the ICAO Doc 10037 (GOLD) (guidelines for service provision, aircraft preparation, controller procedures, flight crew procedures and State aircraft procedures) to ensure any particular needs are considered, documented and shared with all stakeholders and to make sure implementations comply to the applicable standards and guidance materials (avoid misinterpretations).

f) The institutions related to air traffic management (CAA, ANSP) should develop an evolutionary strategy aimed at providing benefits to the ATM community, through an orderly, safe, and cost-efficient implementation. It should be noted that the evolutionary implementation of the concept is related to the installed capacity on board aircraft.

g) ICAO CPDLC / ADS-C "operational" can be supported by either FANS 1/A and ATN B1 but they are not interoperable. However, the GOLD Manual provides guidance to prepare for and establish the policies and procedures to use either technology within a global standardization operational framework. Operators always stress the importance of global harmonization of CPDLC / ADS–C procedures and the GOLD Manual is the best resource to facilitate achieving this goal.

h) Other challenges that need to be considered for an effective implementation of CPDLC/ADS-C are the correction and accurate filing of the flight plan information, delays in messages (FPL, RCL, AFN) and the appropriate CPDLC/ADS-C performance monitoring (active evaluation of problems and timely recommend solutions).

i) Take the time to carefully plan any datalink implementation and only implement those services for which there is an operational need and where the service will meet safety objections.

j) Continued participation at the regional and international level adds to the pool of experience and knowledge. It is important to share the learnings and solutions discovered, to lend support to other states wherever possible and seek guidance from the different groups when required.

***Monitoring***

k) Per Annex 6, operators will need to establish policies and procedures to support PBCS monitoring program for CPDLC and ADS-C operations.

l) PBCS is essential to ensure ATC systems, operator systems, communication service provider systems and aircraft systems together will provide reliable CPDLC and ADS-C service suitable for advanced ATM operations. ANSPs should plan for PBCS implementation at the same time when it plans for CPDLC and ADS–C implementation. States will need to establish PBCS policies for its operators even if they are not implementing CPDLC, ADS-C or PBCS in their airspace.

m) CPDLC and ADS–C systems are very complex systems for use by pilots and controllers to ensure smooth operations, these systems require to be supported by monitoring agencies that investigate reported problems. These monitoring agencies function under the PBCS monitoring program provision contained Annex 11.

**Training**

n) It is important to invest time and effort into training before implementation and anticipate interoperability tests campaigns with aircraft systems (Setup large scale trials with multiple partner Airlines for pre-operational validation of the datalink services when possible and participate to in-service monitoring agencies).

**Support COCESNA CPDLC AIDC implementation**

o) The Meeting noted that CPDLC and ADS-C service in the Central American FIR is on trials since 2014 where the percentage of aircraft equipped is still low. IATA and FAA expressed their support to COCESNA to seek ways of promoting this service with improve safety/ business cases and an equipped-best served principle.

***Ground-Ground Datalink Implementation***

p) Data link implementations must be involved the participation of all involved stakeholders (users, regulator, ANSPs, CSP, etc.) and supported by a business case and/or a positive operational assessment. An implementation by phased is recommended to ensure the transition of new technology and procedures less problematic and leaves room for adaptation focused in the operational improvements.

q) For air navigation implementation, all CAR/SAM States should follow the Global Air Navigation Plan (GANP), its technological roadmaps, the ICAO ASBU methodology, CAR/SAM regional plans, and align their implementation activities by developing their respective national air navigation plans.

r) The staff in charge of the datalink air-ground and ground-ground system planning should have at their disposal all ICAO documents and annexes published on the topic.

***AIDC***

s) In order to optimize AIDC implementation, States should consider taking action to mitigate/resolve filed flight plan (FPL) issues. It was recommended that regional efforts be consolidated in order to coordinate mitigation actions between the CAR and SAM Regions. This aspect includes the total update of FPL converters

t) Close cooperation is required among States in order to achieve the interconnection of automated systems, for instance, the agreement of the ICD to apply, amendment to operational agreement letter, and definition of common aspects to be implemented.

u) AIDC implementation has shown its advantages in terms of safety and efficiency:
- ✓ significantly reduces the need for oral coordination between ATS units
- ✓ reduces controller workload
- ✓ reduces repetition/readback errors during coordination
- ✓ reduces coordination errors and "controller-to-controller" language barrier issues
- ✓ mitigates LHDs, thus avoiding mid-air collisions

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| greater support to performance-based navigation initiatives and emerging technologies through automation |

v) It was recognized the importance of evaluating each operational scenario involving AIDC implementation and management of desirable messages, and subsequently assessing its impact on controller workload and its end results in order to select the most appropriate AIDC ICD for implementation.

w) The preferred ICD for the CAR and NAM Regions is the NAM ICD, and the PAN ICD for the SAM Region.

x) AIDC implementation represents the initial phase towards ground-ground integration and FF/ICE implementation (FPLs exchange, coordination and radar handover).

y) The non-compliance with the AIDC procedures established by ICAO to manage flight plans and associated messages brings increased flow of unnecessary messages in system operation.

***AMHS***

z) Eventhough AMHS implementation had a good implementation rate in SAM region, just a few States in CAR Region are actually operational.

aa) The Meeting took note of the experience on the use of MET data using the XML format as described by United States, and the Meeting recommended to use these experiences for the CAR/SAM testing and assessment of XML using the AMHS System.

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