



INTERNATIONAL CIVIL AVIATION ORGANIZATION

Western and Central African Office

Sixth Meeting of the APIRG Communications, Navigation and Surveillance Sub-group
(Dakar, Senegal, 18-22 May 2015)

Agenda Item 4: Aeronautical Mobile Service (AMS)*(Presented by the Secretariat)***SUMMARY**

This working paper reviews the performance and implementation of the Aeronautical Mobile Service (AMS) in the AFI Region, identifies deficiencies and remedial action for their elimination. The information in this paper is from AMS deficiency report from APIRG/19 and updated information from States.

Action by the meeting is at paragraph 3.

Global Air Navigation Plan GANP (**Doc.9750 4th Ed.**);
Annex 10- Aeronautical Télécommunications- Volumes 3 Communication systems.
Annex 11- Air Traffic Services;
 Manual of ATS Data Link Applications (**Doc 9694**);
 Manual on HF Data link (**Doc 9741**);
 Manual on VHF DL Mode 2 (**Doc 9776**);
 Manual on Mode S Specific Services (**Doc. 9688**);
 Technical Provisions for Mode S Services and Extended Squitter (**Doc. 9871**);
 Manual on Required Communication Performance-RCP (**Doc.9869**);
 Report on AFI /RAN /7 Meeting (**Doc 9702**)
 Report on Sp AFI/ RAN /8 Meeting
 APIRG Meeting Reports

Note: AFI meetings References can be downloaded from www.icao.int/wacaf.

Related ICAO Strategic Objectives: A: *Safety*; B: *Air Navigation Capacity and Efficiency*

Related ICAO ASBU Performance Improvement Areas and Block0 Modules: PIA1 (*B0-FICE*); PIA2 (*B0-DATM, B0-AMET*) PIA3 (*B0-FRTO, B0-NOPS, B0-ASEP, B0-OPFL, B0-SNET*);

1. Introduction

1.1 The Aeronautical Mobile Service in the AFI region is currently based on voice communication provided by legacy radio facilities (HF and VHF).

1.2 However the new data link based communication service is gradually introduced with the implementation of CPDLC through SITA ACARS communication system.

2. Discussion***HF Communication systems***

2.1 HF analog communication systems are widely used in a primary base within the AFI oceanic and continental remote airspace to provide bidirectional air ground communication.

Subjected to ionospheric conditions of propagation the Quality of Service (**QoS**) provided by this communication medium remains poor for most of the time.

2.2 The poor reporting from States and ANSPs on HF air ground operation did not make possible to the secretariat to present a consolidated list of detailed deficiencies. However it can be envisaged that the implementation of the following actions should help improve HF air ground communication in the AFI airspaces.

2.3 Analyzing the deficiencies on HF ground air operation, the Special AFI/RAN meeting held in Durban, South Africa from 24 to 29 November 2008 formulated **Recommendation 6/20** calling upon States and Air Navigation Service Providers (ANSPs) utilizing high frequency (HF) for air-ground communications to develop procedures for selection of operational frequencies taking into account ionospheric propagation forecasts in order to improve HF analog communications in the AFI Region. Although some ANSPs such as ASECNA reported to have purchased software on HF propagation forecast, it can be noted the low pace of implementation of this Recommendation.

2.4 HF Data Link (HF DL) has been identified by the ICAO Global Air Navigation Plan (GANP-Doc. 9750 4th Ed.) as a technology candidate for the provision of a more reliable bidirectional air ground communication. However in the AFI region the implementation of HF Data Link for air ground communication is not formally scheduled although this Region comprises huge oceanic and remote continental airspaces. It should be advisable to envisage the introduction of HF Data Link within the region as part of sub infrastructure components to support ATN ground air applications. This implementation should be based on the provision of the ICAO GANP derived from the ICAO Aviation systems blocks Upgrade (ASBU) concept and methodology and should inter alia take into consideration:

- Traffic characteristics (*volume, flow, profiles, growth...*) within AFI homogeneous Areas of Routing (A-R);
- users requirements (PBN constraints);
- fleet equipage (current and trend);
- Cost/benefit aspect.

VH Communication Systems

2.5 VHF communication is currently planned, implemented and operated where possible as the main Aeronautical air ground medium for all phases of flight.

Within the continental airspace the satellite C-Band VSAT based remote VHF networks implemented since the early 2000 seems to have reached its maturity cycle of life. Most of the AFI ANSPs have successfully implemented remote stations ensuring extended VHF coverage in their FIRs and some of them such as ASECNA and Roberts FIR are to implement redundant VHF remote facilities to increase service availability.

2.6 However some ANSPs were reported to be experiencing difficulties on the reliable operation of the new remote VHF stations.

NAMA (Nigeria) is experiencing lack of coverage in the center portion of the Kano FIR.

RVA (DRC) encountered power supply hurdles that were programmed to be solved by the installation of solar cells and ENANA (Angola) is facing many barriers related to power supplies, adapter interfacing the facilities on the ATCs desks, human factors affecting technical and operational staff.

Table in **Appendix A** below which needs to be revised provides a list of deficiencies for VHF communications.

2.7 Similar to HF DL, VHF Data Link (**VHF DL**) is a technology identified by the ICAO GANP as candidate to air ground applications. However in the AFI region the implementation of VHF Data Link for air ground communication is not formally scheduled although this Region comprises remote VHF stations currently providing analog voice air ground bidirectional communications. It should be advisable to envisage the introduction of VHF Data Link within the region as part of sub infrastructure components to support ATN ground air applications. This implementation should be based on the upgrade of the existing stations with regard to the provision of the ICAO GANP derived from the ICAO Aviation systems blocks Upgrade (**ASBU**) concept and methodology and the same conditions of implementation of HF DL should apply (*Ref. Paragraph 2.4*).

Controller Pilot Data link Communication

2.8 CPDLC is currently the data link application alternative to voice communications in particular for oceanic and continental remote air spaces.

The pace of implementation of CPDLC within the AFI Region has been increasing during the last past five years. This application enables the implementation of PBN with the introduction of random and flexible routing within homogenous Areas of Routing (A-R) such as AR-1 and AR-2.

In particular CPDLC is currently widely operating within the SAT region with remarkable benefit for all stakeholders and the performance assessment is guided by the provision of the Global Operational Data Link Document Gold (GOLD 2nd 26 April 2013) which can be downloaded at: <http://www.icao.int/WACAF/Pages/electronic-documents.aspx>.

The status of implementation of CPDLC within the AFI Region is reported in **Appendix B**.

Mode S Data Link

2.8 Secondary Surveillance Radars (**SSR**) Mode S capable are being deployed in the AFI Region. However in most cases the Mode S function enabling the air ground bidirectional Data Link has not been tested.

The SSR Mode S function is also a technology identified by the ICAO GANP as candidate to air ground applications. It should be advisable to envisage the introduction of SSR Mode S Data Link within the region as part of sub infrastructure components to support ATN ground air applications.

This introduction should be based on the same conditions that apply for HF and VHF Data Links (*Ref. Paragraph 2.4*).

Required Communication Performance (RCP)

2.9 Required Communication Performance (**RCP**) is a performance specification which serves as one possible safety net in airspace planning in order to ensure that the various infrastructural, operational and technological components blend the Aircraft systems and the Ground systems to deliver a safe, reliable and repeatable bidirectional air ground communication service.

APIRG/17 meeting Ouagadougou, July 2010 considered the concept of Required Communication Performance (**RCP**) as developed in the ICAO RCP Manual (**Doc. 9869**) and agreed through Conclusion 17/26 (**Implementation of RCP**) that the AFI Region should adopt RCP guidelines for planning towards the safe reduction in separation standards based on RNAV10 (RNP10) and RNP4 PBN navigation specifications.

This conclusion with its low pace of implementation remains valid and RCP concept should be considered as a concept aiming to guarantee an agreed level and Quality of Service required for air ground communication in support to ATM provision.

Action by the CNS Sub-group

3.1 The CNS Sub-group is invited to:

- a) Take note of the information provided in this paper;
- b) Review and update the Appendices to this paper (as required);
- c) Urge States concerned to endeavor to implement any available remedial solutions as soon as possible;
- d) Formulate any conclusion/ decision aimed at improving AMS availability, reliability efficiency in the AFI Region in particular the introduction of HF Data Link, VHL Data Link and mode S Data Link and the reinforcement of CPDLC as communication media to enable through air ground ATN application, the implementation of ICAO Block Upgrades Modules within the AFI Region in line with the guidelines of ICAO Manual on Required Communication Performance-RCP (**Doc.9869**).

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