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WORKING PAPER

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ASSEMBLY — 38TH SESSION

TECHNICAL COMMISSION

Agenda Item 35: Air Navigation – Implementation Support

IMPLEMENTATION OF EXTENDED VHF COVERAGE USING VERY SMALL APERTURE TERMINAL (VSAT) FOR THE ENHANCEMENT OF THE AIR NAVIGATION SAFETY IN THE AFI REGION

[Presented by the Agency for Air Navigation Safety in Africa and Madagascar (ASECNA)]

EXECUTIVE SUMMARY

Following the recommendation 10/8 of LIM AFI meeting, Lome, 1988 and, the recommendation 9/2 of AFI RAN/7 meeting, Abuja, 1997, AFI States and/or Organizations have adopted from the 90s, the use of satellite technology to improve the aeronautical telecommunications services. Since then, ASECNA has undertaken important projects in terms of mastery, ownership and operation of this technology for the improvement of the air navigation services provision.

This paper reviews the main actions undertaken by ASECNA within the framework of the improvement of the aeronautical mobile service, particularly in the field of the extension and of the densification of VHF coverage, using remote VHF via VSAT and draws the attention of the meeting on a better consideration of this technology for the AFI Region.

Action: The Assembly is invited to:
a) take note of the improvement and the enhancement of the VHF coverage in the airspaces managed by ASECNA; and
b) encourage States and/or organizations to develop and propose adapted mechanisms of cooperation for the management of Extended VHF and ADS/B coverage, among ANSPs.

Strategic objectives:	This working paper relates to the Strategic Objectives of Safety, and Environmental Protection and Sustainable Development of Air Transport.
Financial implications:	The activities referred to herein will be undertaken through the resources of ASECNA Services and Equipment Plan and/or from extra budgetary contributions.

[1] English and French versions provided by ASECNA.

References:	• Annex 10 — *Aeronautical Telecommunications* • Doc 9750, *Global Air Navigation Plan* (fourth draft) • Doc 9882, *Manual on Air Traffic Management Systems Requirements* • Doc 9883, *Manual on Global Performance of the Air Navigation System* • 12th Air Navigation Conference, Recommendation 1/12 – Long-term very small aperture terminal spectrum availability and protection • LIM AFI, Lome, 1988, Recommendation 8/10 – Satellite utilization • AFI RAN /7, Abuja, 1997, Recommendation 5/12 – Use of VSAT Technology • RAN AFI /7, Abuja, 1997, Recommendation 9/2 – Use of VSAT Technology • SP AFI/RAN 08, Recommendation 6/21 – Frequency Spectrum • APIRG 17, Conclusion 17/34 – ICAO position for the ITU (WRC-12) • APIRG 18, Conclusion 18/30 – Implementation of the Resolution COM6/24 (154) (WRC-12)

1. INTRODUCTION

1.1 The efficient provision of the air navigation services in the AFI region relies basically on available, reliable and integrated communications, navigation and surveillance systems. Taking into account the specificity of the AFI region characterized by low density of telecommunications infrastructure on the one hand, and extent of airspace areas (desert, ocean and forest) on the other hand, the provision of aeronautical telecommunications services according to the ICAO requirements, require the implementation and operation of appropriate infrastructure.

1.2 In accordance with LIM AFI Recommendation 10/8 and AFI RAN/7 Recommendation 9/2, AFI States and/or organizations have developed, since the 90s, the use of satellite technology to improve the provision of the aeronautical telecommunications services including the extension of VHF aeronautical air ground communication.

1.3 In 1997, ASECNA experimented successfully its first remote VHF aeronautical air ground communication using VSAT with the operational implementation of remote VHF station in Tambacounda, FIR Dakar. Since then, ASECNA managed to extent, densify and enhanced the VHF coverage managed in its various FIRs and built up a solid experience in the implementation and the operation of Remote VHF air ground communication, using VSAT technology.

1.4 This paper presents the actions undertaken by ASECNA within the framework of the improvement of the aeronautical mobile service, including remote VHF air ground communication using Very Small Aperture Terminal (VSAT).

2. DISCUSSION

2.1 As most the airspaces of AFI Region, the airspaces managed by ASECNA are characterized by extent and inhospitable areas (desert, ocean, forest) where the implementation and operation of aeronautical telecommunications infrastructure requires technical and operational major challenges.

Very early, ASECNA has noted the need to be in control and to take over the satellite VSAT technology in order to improve significantly the provision of air navigation services, through the implementation of a dedicate satellite telecommunications infrastructure.

2.2 That is the way the first remote VHF aeronautical air ground communication stations, using VSAT was installed from 1997 to 2000 to **Tambacounda** (Dakar FIR), **Dire & Amtiman** (Ndjamena FIR), **Ouesso** (Brazzaville FIR), **Mahajanga & Antsiranana** (Antananarivo FIR) and allowed to take over and to overcome technical difficulties: climax, power supply, supervision, environment, climate and the remote maintenance.

2.3 Since then, we are witnessing the extension and the progressive improvement of VHF coverage in the whole FIRs managed by ASECNA through important programs of investment with the main phases as follows:

	Period	Number of remote VHF station	Operational objective
Phase 1	1996-2000	10	Experimentation, technical and operational validation of the remote VHF coverage in the Dakar, Ndjamena and Brazzaville and Antananarivo FIRs
Phase 2	**2001**	11	Extension of VHF coverage in the FIRs Niamey, N'Djamena, Brazzaville, Dakar and Antananarivo
Phase 3	**2002-2006**	15	Continuation of the extension of the coverage in the whole of the FIRs
Phase 4	**2007-2010**	16	Extension and densification of VHF in the whole of the FIRs coverage
Phase 5	**2011-2013**	28	Extension, densification and reliability of VHF in the whole of the FIRs coverage

Up to today, ASECNA has deployed a VHF air ground communication infrastructure, with more than fifty remote nodes, built on the aeronautical telecommunications VSAT network AFISNET, that provide a good VHF coverage of the continental FIRs airspaces. At the same time, ASECNA got also a solid experience in the operation, maintenance and extension of Remote VHF stations using VSAT. At some exception depending of situations that may arise, the status of VHF coverage is presented as follows (see annex).

2.4 At the operational level, the benefits of these improvements have been unanimously recognized by the users (IATA) both at the Regional level and through the regular technical meetings ASECNA/IATA.

2.5 Joint ASECNA-IATA assessment surveys are regularly conducted. The results of these surveys jointly analyzed by IATA and ASECNA led to an identity of views on the State of the VHF coverage characterized by:

a) a continuous improvement of VHF air ground communications in all the FIRs with a reduction in the use of the HF;

b) the improvement of the Controller Pilot Data link Communication;

c) a fair good VHF air ground communications with a medium level quality of between 4 and 5; and

d) a good range of remote VHF stations with the exception of some few cases initially identified with the upgrade ongoing.

2.6 By the end of the year 2014, the full implementation of VHF coverage extension project will improve significantly the VHF coverage in Antananarivo, Brazzaville, Dakar, Niamey and N'Djamena FIRs with the extension and densification of VHF coverage, to provide as much as possible the duplication of coverage and secure further the provision of aeronautical mobile VHF in the continental airspace.

2.7 The extension of VHF coverage is also an opportunity for the improvement of surveillance services with the implementation of ADS-B where stations will be co-implemented with the current remote VHF stations. In this context, ADS-B data sharing experience was conducted successfully among the Seychelles, Reunion and the Antananarivo FIRs.

2.8 As part of the Aviation Systems Block Upgrade (ASBU), including Module B0 40 "Improved Safety and Efficiency through the initial application of Data Link En-Route", ASECNA is already preparing itself for the new technological challenges in terms of migration of the aeronautical air ground communications sub network currently voice type to a network data to improve the safety and the efficiency.

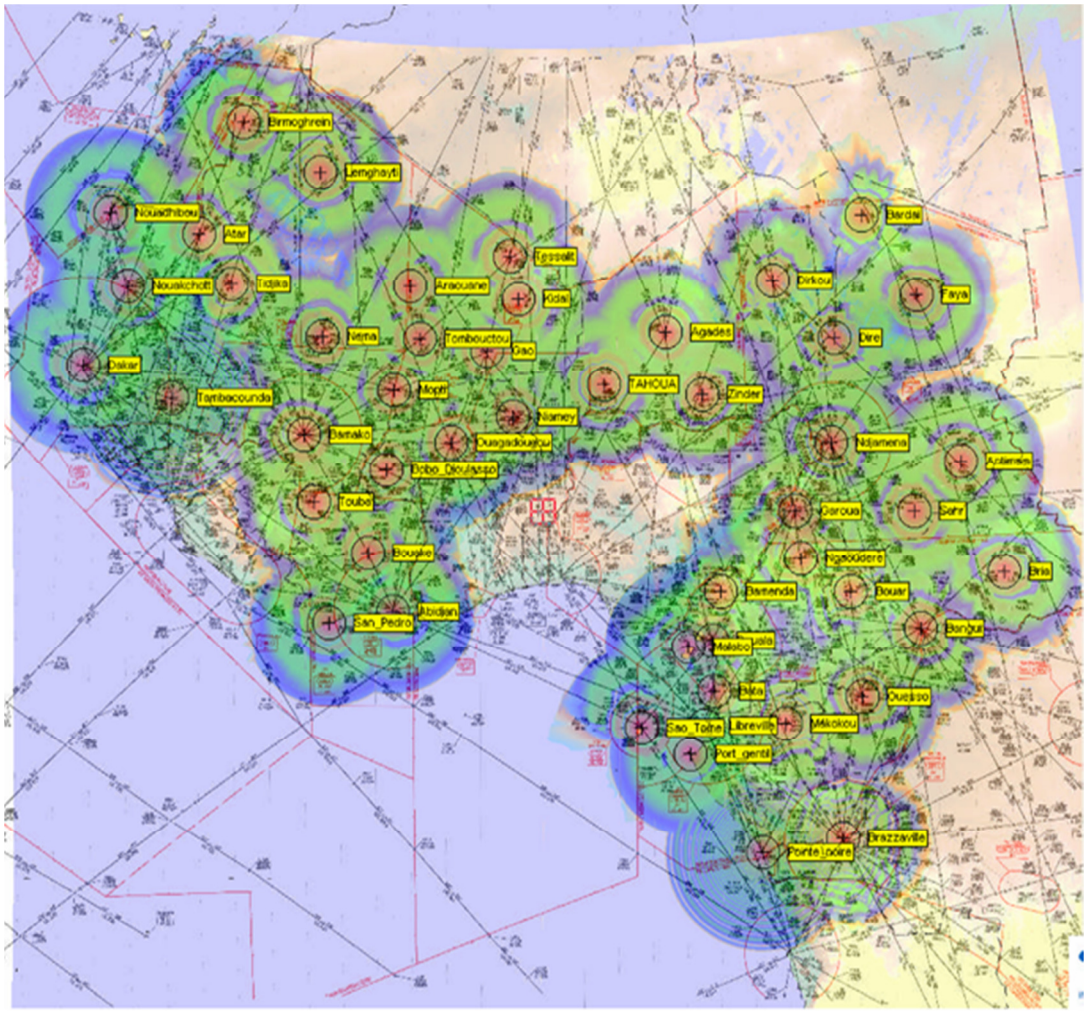
2.9 The importance and criticality of the services provided by the VHF Sub network for the air navigation safety, requires particular attention from the aviation community to standardize the use of VSAT to support these services. Already, for example, the AFI Region may consider, identify and adopt the performance of Communications required (RCP) to support ATM.

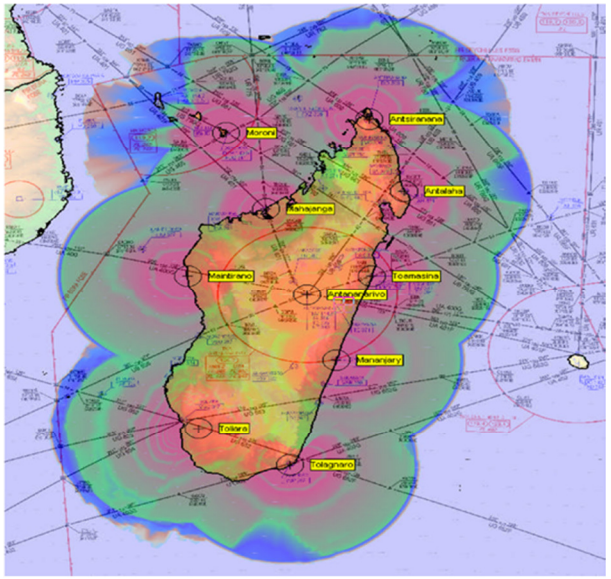
3. CONCLUSION

3.1 The extension of VHF coverage over all the continental area of the FIRs managed by ASECNA has allowed a very significant improvement in communications between the pilots and the controllers, as recognized during the various technical and/or regional meetings with the users (IATA).

3.2 The aeronautical VSAT infrastructure implemented to support VHF extended coverage remains an opportunity to improve the safety of air navigation in the AFI region through the rapid implementation of new services including ADS-B, exchanges, surveillance data sharing and the evolution towards new technologies as part of the Aviation Systems Blocks Upgrade (ASBU).

Annex
Extension of the cover VHF of spaces ASECNA





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