



WORKING PAPER

**SPECIAL AFRICA-INDIAN OCEAN (AFI)
REGIONAL AIR NAVIGATION (RAN) MEETING**

Durban, South Africa, 24 to 29 November 2008

Agenda Item 6: Development of a set of comprehensive work programmes in the air navigation field, aimed at improving efficiency of the air navigation system (Efficiency Committee)

MODERNIZATION AND HARMONIZATION OF VSAT NETWORKS

SUMMARY

This paper discusses the importance of harmonization and eventual integration of subregional very small aperture terminal (VSAT) networks supporting aeronautical communications. It also re-emphasizes the need to modernize a major subregional network in the region which has reached the end of its useful life.

Action by the meeting is in paragraph 2.

1. INTRODUCTION

1.1 Safety and efficiency of air navigation cannot be achieved without appropriate air-ground and ground-ground communications. In the Africa-Indian Ocean (AFI) Region, it has long been recognized that ground networks based on very small aperture terminal (VSAT) technology offer the best means of providing aeronautical fixed services (AFS) connectivity as well as relaying air-ground communications between air traffic services (ATS) centres and remote ground stations.

1.2 VSAT networks are inherently flexible, scalable, cost-effective and easy to install, maintain and reconfigure. On the other hand, since there are many different ways a VSAT network can be implemented and almost every VSAT vendor uses some proprietary signal protocols, providing interconnectivity between nodes belonging to different VSAT networks is relatively difficult, costly and suboptimum in terms of performance. It is therefore prudent that all VSAT plans in any given region be coordinated from an early stage to avoid unnecessary proliferation and mounting costs.

1.3 In the current situation, when an existing VSAT network is due for upgrade, consideration should be given to integrate the network with adjacent one(s) where sufficient satellite coverage and system capacity so permits. These points were addressed by the fifth meeting of the All Planning and Implementation Regional Group (ALLPIRG) (Montreal, 23 to 24 March 2006) where the following conclusion was made:

Conclusion 5/16 – Implementation of very small aperture terminals (VSATs)

That PIRGs:

- a) discourage the proliferation of VSAT networks where one/some of the existing ones can be expanded to serve the new areas of interest;
- b) work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP); and
- c) give due consideration to managed network services (e.g. a virtual private network (VPN)), subject to availability and cost-effectiveness.

1.4 In the AFI Region, positive steps have already been taken to integrate subregional VSAT networks in line with the aforementioned conclusion. Specifically, the Southern African Development Community (SADC/2) and NAFISAT networks have essentially become one network, although with a degree of distributed operational control and monitoring. As such, any new link or reconfiguration of existing ones between existing nodes of those networks in the footprint of the satellite can be easily achieved without the need for additional equipment or concerns about degradation of performance. The recent decision in Middle East (MID) to implement additional NAFISAT nodes in that region, instead of implementing a new VSAT network, is along the same lines as well. These are major accomplishments which should be commended.

1.5 The other major VSAT network in the region is AFISNET which has reached the end of its useful life since spare components for some of its nodes are no longer available and as a result, the availability of some key AFS circuits in parts of the AFI Region have been drastically reduced. In this connection, the sixteenth meeting of the Satellite Network Management Committee (SNMC/16, Dakar, 17 to 19 December 2007) formulated the following conclusion:

Conclusion 16/07 – AFISNET technical evaluation and re-engineering project

That AFISNET member Administrations and Organizations undertake to implement a joint technical evaluation of the network in view of its re-engineering, in accordance with SNMC Conclusion 15/06. In this connection:

- 1) AFISNET member Administrations and Organizations should implement a joint technical evaluation of the network. In so doing, they should establish a team of qualified experts to:
 - a) conduct a comprehensive assessment of the network potential for current and future requirements and applications;
 - b) identify technical and operational deficiencies of the current network and propose short term solutions for their mitigation;
 - c) develop user requirements and basic specifications for the re-engineering of the network, to be submitted for formal approval by members;
 - d) participate in the request for proposals (RFP) process referred to in 2) hereunder; and
 - e) prepare a report for consideration by the next SNMC meeting;

- 2) a RFP for upgrading/re-engineering of AFISNET, including technical, operational, financial and institutional aspects should be initiated through the ICAO technical cooperation mechanism based on a comprehensive assessment of current and future requirements and applications to be supported by the network; and
- 3) the ICAO regional office should propose the timescales for the RFP process and related steps based on 1) hereabove for consideration by the next SNMC meeting.

1.6 It is extremely important for the aforementioned conclusion to be followed up so that the availability of communication links in the region can be restored and capacity can be created for future CNS systems. In this regard, the upgrade of AFISNET should be undertaken with due regard for eventual integration with SADC/2 and NAFISAT in order to obtain all benefits of a truly regional AFI-wide communication network. Of course, as done with those networks, a distributed monitoring and control scheme can be implemented to address possible institutional concerns as necessary.

1.7 Another important aspect of VSAT networks is cost-effectiveness. For example, the conventional way of establishing dedicated circuits between fixed points for aeronautical fixed telecommunication network (AFTN) or direct speech circuits over a satellite channel that is only used for a fraction is not cost-effective. Modern VSAT networks make a pool of satellite resources (e.g. a number of carrier or time slots) available to all users with the objective of achieving an agreed quality of service (QoS). Plenty of VSAT products that are based on the Internet Protocol (IP) are available in the market place to facilitate the provision of aeronautical voice and data services according to a reasonable QoS. Noting that ICAO provisions on the use of IP in aeronautical communications are forthcoming, starting with Amendment 83 to Annex 10 — *Aeronautical Telecommunications*, applicable in November 2008 and Conclusion 5/16 of ALLPIRG/5, such products should be duly considered as part of upgrades to existing VSAT networks.

1.8 As stated earlier, there are many ways a VSAT network can be implemented to provide links between certain fixed points. In general, there is a direct relationship between cost of the network and the type of performance it is required to provide. It is therefore quite important to keep the performance requirements to a reasonable limit to avoid unnecessary costs. In this respect, entities charged with planning and implementation of VSAT networks can use the guidelines that have been sent by the Director of the Air Navigation Bureau to all Regional Directors on 24 November 2006.

2. ACTION BY THE MEETING

2.1 The meeting is invited to adopt the following recommendations:

Recommendation 6/x — AFISNET follow-up

That as a matter of urgency, ICAO and States involved in AFISNET follow-up on Conclusion 16/07 of SNMC/16.

Recommendation 6/x – Planning, implementation and operation of VSAT networks in the AFI Region

That all entities involved with planning, implementation and operation of VSAT networks in the AFI Region hold regular joint meetings under the auspices of ICAO regional offices in the region for the purpose of harmonization and eventual realization of a seamless AFI communication network supporting all present and future CNS systems.