INTERNATIONAL CIVIL AVIATION ORGANIZATION

**Fourth Meeting of the APIRG Communications, Navigation and Surveillance Sub-group
(Dakar, Senegal, 25-29 July 2011)**

Agenda Item 4: **Aeronautical Fixed Service (AFS)**

VSAT networks – Performance monitoring

(Presented by the Secretariat)

SUMMARY
This working paper proposes to the CNS Sub-group the adoption of the monitoring methodology recently developed by the SAT Informal Group to assess VSAT networks performance against ICAO guidelines which are aimed to ensure that implementation activities are harmonized between the regions.
Action by the meeting is at paragraph 3.
References :   - SP AFI RAN 2008, Report (ICAO Doc 9930)   - APIRG/16, Report   - AFI VSAT/1, Report   - APIRG CNS/SG/4, WP/25   Note: References can be downloaded from **www.icao.int**
Related ICAO Strategic Objective A: Safety and C: Environmental Protection and Sustainable Development of Air Transport.

1.   Introduction

1.1.   As part of ICAO work on the harmonization of implementation activities relating to the use of VSAT networks, and following Conclusion 5/17 of the ALLPIRG/5 meeting, guidelines on performance of VSAT networks were prepared for use by States to establish a basis for planning and basic system design of such networks in support of aeronautical ground-ground communications. These guidelines were discussed at APIRG/16 (2007) and endorsed by SP AFI RAN/08 (2008).

2.   Discussion

Guidelines for VSAT networks

2.1.   The minimum performance targets stated in Table 2.1 below are generally suitable for aeronautical ground-ground communication and can be achieved with "reasonable" resources and cost. The stated performance parameters apply to the overall communication service as seen by the end user of a digital VSAT network.

Table 2.1: Minimum performance targets for VSAT network performance

1.	Parameter	Value	Explanatory notes
2.	**Availability**	**>= 99.8%**	The required overall availability of the communication service to the end user. It includes the consideration of all scheduled/non-scheduled maintenance and sun outages.
3.	**Bit error rate (BER)**	**<= 1 in 10^{-7}**	BER is applicable to the physical layer of communications. Forward error correction (FEC) may be employed to achieve this figure.
4.	**One-way latency**	**< 400 ms**	This implies that for voice communications, only a single satellite hop should be used.
			The major contributor to the latency is the propagation delay of approximately 240 ms (a single hop).
			Voice compression and encoding also introduce additional delays.
5.	**Call blocking probability**	**<= 2.5 x 10^{-3}** **(or 1 in 400 attempts)**	This applies to a normal switched voice communications environment. In certain operational scenarios, it may be necessary to guarantee the availability of a voice circuit upon demand by employing priority/pre-emption techniques or dedicated satellite resources.
6.	**Call set-up time**	**<= 2 s**	

2.2.   The Informal Coordination Meeting of Air Traffic Services over the South Atlantic (SAT) has recently developed a monitoring methodology to assess the performance of Aeronautical Fixed Services (AFS) supported by VSAT networks (WP/25 of this meeting refers). The proposed methodology is based on the use of performance data collection forms shown at **Appendix A** and **Appendix B** to this working paper.

2.3.   The meeting may wish to review the attached forms and amend them as necessary, and recommend their use in the AFI Region. In so doing, due consideration should be given to APIRG/17 Conclusion 17/15, requesting States to provide COM centres with statistics software for the automation of data collection.

3.   Conclusion

3.1.   The meeting is invited to:

1) review and make amendment proposals (as necessary) to the developed by the SAT Group to monitor the performance of Aeronautical Fixed Services (AFS) supported by VSAT networks, using the performance data collection forms shown at **Appendix A** and **Appendix B** to this working paper; and

2) request that, when finalized, the Secretariat circulate these forms to the States and entities charged with planning and implementation of VSAT networks in order to harmonize related performance measurement methodology between ICAO regions.

-END-

Appendix A:
Collection of Data on Fixed Parameters, Global Dynamic Parameters and Carrier Parameters for VSAT Stations (Draft Templates developed by SAT/16 Meeting)

Center:

Date/

Parameters	Values	Remarks
Fixed Parameters		
Intelsat link Name	IS 901 @°E	
Transponder Number	36/36	
Satellite Earth Station Coordinates	LONG = ddd, mm O/E LAT = dd, mm N/S	Under WGS 84 Format
	AZ = ddd, mm O/E EL = dd, mm N/S	
Antenna Type and Size	….m	
Antenna Gain	Tx : …dBi Rx : …dBi	
SSPA type	X W	
Up Converter Frequency	MHz	
Down Converter Frequency	MHz	
Global Dynamic parameters		
EIRP		
G/T		
C/N0		
BER		
MTBF		
MTTR		
Parameter for Carrier Performance		
Carrier failure rate		
C/N0		
BER		

Appendix B:

Characteristics and Statistical Data on the Performance of AFS Links supported by VSAT Networks (Draft Templates developed by SAT/16 Meeting)

Performance of AFTN

Centre : Atlántico
Date /

Country	Terminal I	Terminal II	Support	COM Protocol	Speed	Transit Time	Routing	Monthly Availability 2011													½ Annual Average Availability	
								01		02		03		04		05		06		1		
								TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX		RX
Brazil	Atlántico	Dakar	CAFSAT																			

Qualitative performance of ATS/DS

Centre :
Date /

Country	Terminal I	Terminal II	Support	Connexion Time	Nb of Attemps	One Way Latence Time	Call set up time	Voice Quality (1 to 5)	Monthly Availability 2011						½ Annual Average Availability
									01	02	03	04	05	06	
Brazil	Atlántico	Dakar	CAFSAT												

Qualitative performance of Future CNS Services

Country	Terminal 1	Terminal II	Support	Provided Service	COM Protocol	Speed	Transit Time	Routing	Availability 2005-2010						Remarks
									05	06	07	08	09	10	
Brazil	Atlántico	Dakar	CAFSAT	AIDC											
Spain	Las Palmas	Sal	CAFSAT	AMHS											