INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP
EIGHTEENTH MEETING (APIRG/18)
Kampala, Uganda (27 – 30 March 2012)

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation
3.4 Communications, Navigation and Surveillance (CNS)

COMMUNICATIONS - AERONAUTICAL VSAT NETWORKS

(Presented by the Secretariat)

SUMMARY
This working paper reports on the implementation of ICAO SP AFI RAN Recommendation 6/19, and other issues related to AFI Aeronautical VSAT networks, for consideration by APIRG/18.
Action by the meeting is at **paragraph 3**.
REFERENCES : • ICAO SP AFI RAN 2008, Report (Doc 9930) • First and Second Joint Meetings of the AFI Aeronautical VSAT Networks Managers Note: References can be downloaded from ***www.icao.int***
Related ICAO Strategic Objective(s): C

1. INTRODUCTION

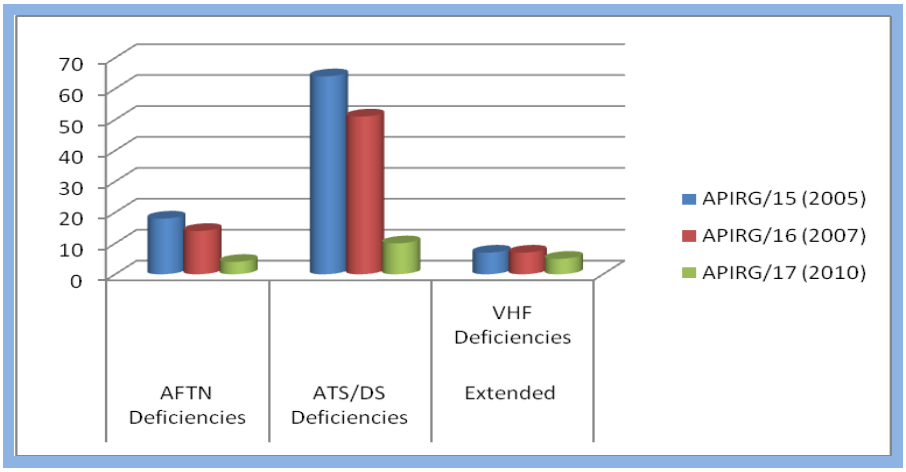
1.1 This working paper discusses issues related to AFI Aeronautical VSAT networks, including follow up action taken by States on ICAO SP AFI Recommendation 6/19, as well as the outcome of the ITU World Radiocommunication Conference 2012 (WRC-12).

2. DISCUSSION

*Review of the report of the First and Second Joint Meetings of the AFI Aeronautical VSAT Networks Manag*ers

2.1 The CNS Sub-group noted that, as a follow up to ICAO Special AFI RAN/08 Recommendation 6/19 calling for regular joint meetings between VSAT networks managers, the First Joint Meeting of the AFI Aeronautical VSAT Networks Managers (AFI VSAT/1) was held in Kwa-Zulu Natal, South Africa, from 13 to 15 June 2011, at the kind invitation of the *Air Traffic and Navigation Services Company Limited of South Africa (ATNS).* The Second Joint Meeting of the AFI Aeronautical VSAT Networks Managers (AFI VSAT/2 was held in Douala, Cameroon, from 28 February to 1 March 2012, at the kind invitation of the *Agence pour la sécurité de la navigation Adrienne en Afrique et a Madagascar (ASECNA).*

2.2 Networks managers recognized the positive impact of VSAT technology in the resolution of air navigation deficiencies within the AFI Region as illustrated in the graph below - *Communications deficiencies between APIRG/15 (2005) and APIRG/17 (2010):*



Challenges

2.3 AFI VSAT Networks Managers noted a number of issues to be addressed to ensure that the existing aeronautical VSAT networks are technically and financially sustainable, and continue to operate satisfactorily meeting performance requirements and operational objectives. These included maintenance capabilities, modernization of network components, funding arrangements for the networks and related cost recovery mechanisms, and integration of VSAT networks as recommended by the Fifth meeting of All Planning and Implementation Regional Groups (ALLPIRG/5, 2006). ALLPIRG/5 particularly requested PIRGs to work towards integrated regional/interregional digital communication networks, with a centralized operational control and preferably based on the Internet Protocol (IP) (Conclusion 5/16 refers); and the Fourth Meeting of Directors-General of Civil Aviation (DGCA/4, 2010) accordingly called upon the African Civil Aviation Commission (AFCAC), ICAO and other relevant institutions, including financial institutions, to support the implementation of such integrated programmes in the AFI Region, in order to enhance the regional air navigation infrastructure.

Comparative analysis

2.4 The various elements of existing VSAT networks (AFISNET, CAFSAT, NAFISAT and SADC VSAT 2) were thoroughly analyzed, including membership, system architecture, operations, performance assessment methods, working arrangements, interconnection with other networks, and development plans. Similarities and dissimilarities between the networks were identified and an initial set of applicable best practices associated with VSAT networks elements and features was discussed, based on ICAO Standards and Recommended Practices (SARPs) and guidance material, as well as industry best practices. The agreed best practices are shown at **Appendix B** to this paper. With respect to satellite access techniques, ASECNA and Roberts FIR indicated that they were using frequency division multiple access (FDMA) technique as the most suitable technique for extended VHF voice communications. VSAT Networks Managers using such legacy practices were therefore requested to develop transition plans towards the implementation of these agreed best practices in order to achieve the required harmonization and interoperability. Comparative analyses of networks features were carried out as

required based on cost-effectiveness considerations[1], and documented recommendations were formulated, including amendment proposals to the AFI Aeronautical Telecommunication Network (ATN) Architecture. *(Draft decision 4/02 and draft conclusions 02, 03, 04, 05, 06 and 07).*

Development of a regional project

2.5 The CNS Sub-group acknowledged the need for a coordinated regional plan for the migration of the AFI AFS infrastructure towards an integrated regional/interregional digital communication network as a multinational facility/service *(AFI/7, Conclusion 10/6c)*, and established a dedicated task force with the terms of reference shown at **Appendix C** to this paper. *(Draft decision 4/08 and draft conclusion 4/09).* Appendix C also provides a Gantt Chart showing the activities carried/to be carried out by VSAT Networks Managers through the established Task Force.

VSAT networks – Performance monitoring

2.6 The CNS Sub-group recalled that, as part of its work on the harmonization of implementation activities relating to the use of VSAT networks, and pursuant to Conclusion 5/17 of the ALLPIRG/5 meeting, ICAO had developed minimum performance targets for VSAT networks in support of aeronautical ground-ground communications. These minimum performance targets were endorsed by ICAO SP AFI RAN (2008).

2.7 The CNS Sub-group endorsed the monitoring methodology developed by the Informal Coordination Meeting of Air Traffic Services over the South Atlantic (SAT) in order to assess the performance of Aeronautical Fixed Services (AFS) supported by VSAT networks. This methodology is based on the use of performance data collection forms (PDCFs) shown at **Appendix D** to this paper. The CNS Sub-group requested the Secretariat to finalize and 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. *(Draft conclusion 4/12).*

Outcome of WRC-12 - VSAT C-Band protection

2.8 The CNS Sub-group will recall that support received from States to ICAO position at ITU WRC-07 had led to Recommendation 724 (WRC-07) - Use by civil aviation of frequency allocations on a primary basis to the fixed-satellite service **(Appendix E),** which calls administrations, in particular in developing countries and in countries with remote and rural areas to:

- Recognize the importance of VSAT operations to the modernization of civil aviation telecommunications systems;
- Encourage the implementation of VSAT systems that could support both aeronautical and other communication requirements; and
- Expedite, to the maximum extent possible and as necessary, the authorization process to enable aeronautical communications using VSAT technology.

[1] As an example, a detailed comparative analysis was conducted on satellite access techniques: Time Division Multiple Access (TDMA) versus Frequency Division Multiple Access (FDMA).

2.9 Considering the critical role of VSAT technology in the provision of all air navigation services in the AFI Region and other ICAO regions, further work was carried out through the AFI Frequency Management Group (FMG), regional workshops, WRC-12 preparatory meetings and the Aeronautical Communications Panel (ACP) Working Group on Frequency Spectrum issues, toward an international protection of the C-band (3.400-4.200 MHZ). Subsequently, the synergy developed between ICAO, regional organizations (ASECNA, ATU, IATA) and AFI States in preparation for, and at ITU WRC-12 lead to the attached Resolution COM6/24 (WRC-12)[2] - *Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3 400-4 200 MHZ, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in ITU Region 1.* Resolution COM6/24 (WRC-12) is shown at **Appendix F** to this paper.

3. CONCLUSION

3.1 The meeting is invited to:

1) Note the implementation of ICAO Special AFI RAN 2008 Recommendation 6/19, commend and encourage the work carried out by the AFI Aeronautical VSAT Networks Managers as presented in this working paper;
2) Adopt draft conclusions and draft decisions at **Appendix A** to this paper; and
3) Considering the critical role of VSAT technology in the provision of air navigation services within the AFI Region and its adjacent ICAO regions, request States to support the implementation of Resolution COM6/24 (WRC-12), aimed at securing international protection of aeronautical frequency spectrum, by participating in related studies, surveys and meetings.

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[2] According to the Provisional Final Acts of the ITU WRC-12.

APPENDIX A

LIST OF CONCLUSIONS AND DECISONS

Draft Conc./Dec. No.	Title/Text
Agenda Item 4 - Aeronautical Fixed Service (AFS)	
Draft Conclusion 4/02	**Contingency planning for AFI VSAT networks operations** That AFI aeronautical VSAT networks managers develop contincency plans in coordination with their space segment provider (Intelsat) to ensure continuity of service in case of disruption or failure of their operated satellites.
Draft Conclusion 4/03	**Adoption of best practices for AFI VSAT networks** That the AFI States and Air Navigation Services Providers (ANSPs) operating aeronautical VSAT Networks adopt the best practices stated at **Appendix B**, as well as any other best practices to be developed or adopted by APIRG.
Draft Conclusion 4/04	**Implementation of AFISNET and CAFSAT networks' management and control systems** That AFISNET and CAFSAT participating States and Organizations should establish common network management and control systems with shared responsibilities, and harmonize their maintenance policies in to enhance systems' availability and reliability.
Draft Conclusion 4/05	**Modernization of VSAT networks** That AFI States and Organizations pursue their activities aimed at achieving modernized networks that continue to meet regionally/inter-regionally agreed performance requirements.
Draft Conclusion 4/06	**Management of interconnections between aeronautical VSAT networks** That States and Organizations operating inter-network stations establish formal arrangements to improve efficiency in the management of VSAT networks interconnections.
Draft Conclusion 4/07	**Arrangements to ensure sustainability of NAFISAT and SADC VSAT/2 networks** That, based on experience gained and available capabilities NAFISAT and SADC VSAT/2 participating States should establish administrative and funding arrangements in a timely manner to ensure that AFS requirements continue to be met.
Draft Decision 4/08	**Establishment of a Task Force for the Regional Project** That a Task Force be established to address issues related to the development of a regional project aimed to enhance the overall performance of AFI aeronautical VSAT networks, and converge towards a consolidated regional ATN infrastructure, with the terms of reference shown at **Appendix C**.
Draft Conclusion 4/09	**Application of the concept of multinational facility/service to an integrated AFI Aeronautical Telecommunication Network (ATN) infrastructure.** That the AFI integrated IP-based regional/interregional digital communication network be considered as a multinational facility/service as defined in the Regional Air Navigation Plan (Doc 7474), including its evolution towards a consolidated AFI Aeronautical Telecommunication Network (ATN) infrastructure.

Draft Conc./Dec. No.	Title/Text
Draft Conclusion 4/12	**VSAT networks – Performance monitoring** That the Secretariat circulate the performance data collection forms shown at **Appendix D,** for use by AFI States and entities managing VSAT networks, in order to harmonize related performance measurement methodology within and between ICAO regions.

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APPENDIX B

VSAT NETWORKS BEST PRACTICES

		Best practices	Guidance material	Network compliance status			
				AFISNET	CAFSAT	NAFISAT	SADC
1.	**Year of completion**			1995	TBC	2008	2007
2.	**Period of Inception**			TBC	TBC	TBC	TBC
3.	**Membership**	N/A					
4.	**Satellite used**	Contingency planning required to ensure continuity of service in case of disruption or failure of operated satellite States shall provide the degree of facility reliability and availability consistent with their operational requirement.	ICAO, Annex 11 – Air Traffic Services, Section 2.30 ICAO, Annex 10, Volume I, Section 2.5 and Attachment F ICAO, Doc 9859 - Safety Management Manual.	No	No	No	No
5.	**Transponder (Up/Down)**	Contingency planning required to ensure continuity of service in case of disruption or failure of operated satellite States shall provide the degree of facility reliability and availability consistent with their operational requirement.	ICAO, Annex 11 – Air Traffic Services ICAO, Annex 10, Volume I, Section 2.5 and Attachment F ICAO, Doc 9859 - Safety Management Manual.	No	No	No	No
6.	**Frequency band**	In accordance with ITU Radio Regulations	ITU, Radio gulations	Yes	Yes	Yes	Yes
7.	**Topology**	Meshed network		Yes	Yes	Yes	Yes
8.	**Satellite access method**	Multiple Frequency – Time Division Multiple Access	ICAO, Annex 10, Aeronautical Telecommunicatio	Yes	No	Yes	Yes

		Best practices	Guidance material	Network compliance status			
				AFISNET	CAFSAT	NAFISAT	SADC
		(MF-TDMA)	ns, Volume III ICAO, Doc 9776, Manual on VHF Digital Link Mode 2 ICAO, Doc 9805, Manual on VHF Digital Link Mode 3				
9.	**Lease Bandwidth**	Available bandwidth should accommodate current and future services	ICAO, Annex 10, Aeronautical Telecommunications, Volume II ICAO, Annex 11, Air Traffic Services ICAO, Doc 4444 – PANS/ATM ICAO, Doc 9880- Detailed Technical Specifications on ATN ICAO, Doc 7474 (ANP/FASID)	Yes	Yes	Yes	Yes
10.	**Administrative arrangements**	States commitment should be formalized and documented, including delegation of operational, technical and financial authority (as applicable).	ICAO, Doc 7474 (ANP/FASID) – Guidelines for multinational facility/service	No	No	Yes	Yes
11.	**Technical arrangements (Maintenance Management)**	Network control centre (NCC) should be implemented for all networks.	ICAO, ALLPIRG/5, Conclusion 5/16	No	No	Yes	Yes
12.	**Network control centre (NCC)**	Network control centre (NCC) should be implemented for all networks. Dedicated Engineering Service Channels recommended	ICAO, ALLPIRG/5, Conclusion 5/16	No	No	Yes	Yes
13.	**Dedicated engineering service channel**	A dedicated service channel is recommended to facilitate	ICAO Annex 10, Volume I, Attachment F	Yes	Yes	No	No

		Best practices	Guidance material	Network compliance status			
				AFISNET	CAFSAT	NAFISAT	SADC
		coordination of maintenance between networks' stations					
14.	**Services supported**	Aeronautical fixed services (AFTN, ATS/DS) Aeronautical mobile service (AMS) – Extended VHF radio coverage Aeronautical Telecommunication Network (ATN) applications (AMHS, AIDC)	ICAO, Annex 10, Aeronautical Telecommunications, Volume II ICAO, Annex 11, Air Traffic Services ICAO, Doc 4444 – PANS/ATM ICAO, Doc 9880- Detailed Technical Specifications on ATN ICAO, Doc 7474 (ANP/FASID)	Yes	Yes	Yes	Yes
15.	**New Services to be supported**	To be defined.		N/A	N/A	N/A	N/A
16.	**Funding mechanism for the networks**	Sustainable funding mechanism required for all networks.	ICAO, Doc 9082 – Policies on user charges	Yes	Yes	No	No
17.	**Connecti-vity (internal connectivity and interconnections with other networks)**	Full connectivity required within and between all the networks ICAO to address all the identified non-technical issues.	ICAO, Doc 7474 – Air Navigation Plan (FASID) Connectivity Matrices for ATS/DS and AFTN AFI AFTN Routing Directory	No	No	No	No
18.	**Manage-ment of interconnections**	Formal agreements recommended to address interconnection issues	ICAO Annex 10, Aeronautical Telecommunications, Vol.II, Paras. 2.4.1 and 2.4.4	No	No	No	No
19.	**Base band transmis-sion protocols**	Use of standardised bit-oriented protocols Internet Protocol Suite (IPS) recommended X25 to be discontinued	ICAO, Annex 10, Aeronautical Telecommunications, Volume III ICAO, Doc 9896 – Manual on ATN using IPS Standards and Protocols AFI/7 - Recommendation 9/6				

		Best practices	Guidance material	Network compliance status			
				AFISNET	CAFSAT	NAFISAT	SADC
			APIRG Conclusion 13/10 APIRG Conclusion 16/13 APIRG Conclusion 16/14				
20.	**Transmis-sion speed**	AFTN main circuits: 1200 bauds ATN circuits: 9.6 Kbps ATN backbone circuits: 64 Kbps	APIRG Conclusion 12/13 APIRG ATN/TF/2 Report	Yes	Yes	Yes	Yes
21.	**AFTN circuit availability**	Circuit availability should be monitored and provided to ICAO Regional Office on monthly basis. Minimum requirement is: 97%	ICAO, Doc 7474, ANP (AFI/7 Recommendations 9/3 and 9/4)	Yes	Yes	Yes	Yes
22.	**Message transit times**	Message transit times should be monitored and provided quarterly to ensure that operational requirements are met.	ICAO, Annex 11, Air Traffic Services, Chapter 6 ICAO, Doc 8259, Manual on the Planning and Engineering of AFTN APIRG Conclusion 12/13	No	No	No	No
23.	**AFTN circuit loading**	Performance evaluation of AFTN circuits is required on the basis of statistics collected for a period of minimum three days at the interval of six months from 23 to 25 April and October. These include traffic volume, traffic statistics and circuit occupancy, which are needed to assess the suitability of the modulation rate of AFTN circuits.	ICAO, Doc 8259, Manual on the Planning and Engineering of AFTN	No	No	No	No

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APPENDIX C1

TASK FORCE ON THE DEVELOPMENT OF REGIONAL PROJECT ON AN AFI INTEGRATED AERONAUTICAL TELECOMMUNICATION INFRASTRUCTURE TERMS OF REFERENCE

1. Vision

a) Continue to improve safety within the AFI region.
b) Enhance AFI Aeronautical Infrastructure safety.
c) Improve the contribution of infrastructure in AFI safety endeavours.
d) To enhance contribution of aeronautical communications infrastructure in the AFI region.
e) Enhancement of safety through elimination of deficiencies associated with AFI aeronautical infrastructure.

2. Objectives

a) Develop a sustainable and integrated/interoperable VSAT networks to provide aeronautical telecommunications services in AFI region;
b) Upgrade technical capabilities of the networks to comply with the ICAO SARPs and guidance material, user requirements and global best practices;
c) Ensure financial sustainability of the networks through equitable and fair allocation of costs to states and users;
d) Create harmonious and seamless administrative oversights for the networks;
e) Enlist states' commitment to this initiative;
f) Achieve the ATN concept for AFI; and
g) Apply appropriate costs-effective technologies.

3. Deliverables

The deliverables expected from the Task Force include:

3.1. Technical:

TECHNICAL	P**urpose of the multinational air navigation facility/service and its operational and technical justifications.** This should include the overall plan and targets for the development and the establishment of the facility/service. The likely implications if any, on regulations, working routines, equipment, premises and maintenance should be included. Information on the expected consequences on the overall AFI air navigation system or any part thereof should also be included. ***Deliverables*** *a) Detailed gap analysis based on ICAO SARPs and guidance material, user requirements and global best practices;*

	b) Architectural requirements; Recommendations for a road-map, to be implemented by States; and **c)** *Maintenance.*
	Need for an amendment to the AFI Regional Air Navigation Plan. Assess the need if the establishment of a multinational facility/service will necessitate an amendment to the AFI Regional Air Navigation Plan, to be carried out in accordance with established procedures. ***Deliverable*** *Amendment proposal to the Air Navigation Plan as appropriate*.

Composition of the Technical Team:

- Egypt, ATNS (South Africa, **Team Leader**), Tanzania, ASECNA, Roberts FIR, Botswana, Mozambique, Nigeria, IATA, Rwanda, France/Reunion, Swaziland, Uganda, SITA, CACAS

3.2. Financial:

FINANCIAL	F**inancial implications and cost-effectiveness.** Related information should include estimates of the total costs of the multinational facility/service covering, as required, research and development, implementation, operation and maintenance, administration, and capital costs. how all costs incurred prior to the operational phase will be financed; assessing savings which may accrue from the implementation of the facility/service and comparing these savings to the total cost estimates; proposals as to how cost shares of States participating in the provision of the project are to be determined. Also, assessment needs to be provided on impact on users from charges for the facility/service concerned. **Financial aspects** The participation of States in the provision of a multinational facility/service is based on the assumption that any State having supported and agreed to the implementation of such a facility/service and making use of it should also shoulder its respective share of the costs involved. ***Deliverables*** *a) Cost estimates;* *b) Funding (project teams and integrated network model);* *c) Cost recovery methods (cost sharing amongst states, billing); and Maintenance.*

Composition of the Financial Team:

- ATNS (South Africa), ASECNA (**Team Leader**), IATA, France, Kenya, Uganda

3.3. Administrative:

ADMINISTRATIVE	**Managerial implications and other contractual aspects** The participating States would need to formalize in an agreement the terms under which the multinational facility/service is to be provided. A primary aim of the agreement should be to ensure that the costs involved are shared among the participating States in a fair and equitable manner. ***Deliverables*** *a) Oversight model;* *b) States' commitment;* *c) Legal issues; Governance; and* *d) Maintenance.*

Composition of the Administrative Team:

- ATNS (South Africa), ASECNA, Egypt, IATA, Namibia, Kenya (**Team Leader**), Tanzania

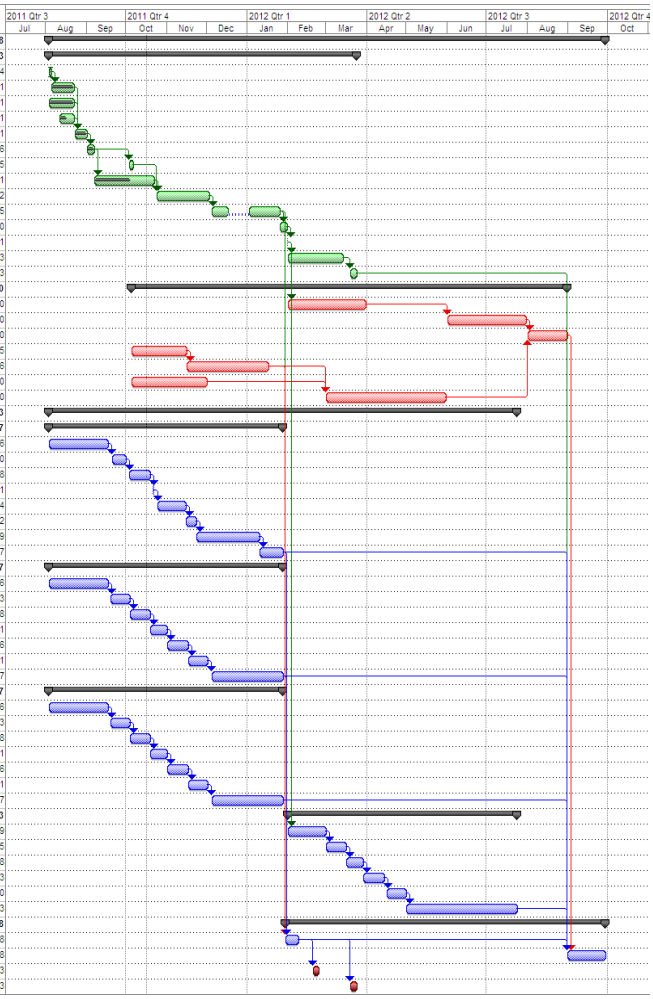
3.4 Administrative:

LEGAL	**Agreement.** The various basic provisions that would normally have to be covered are addressed below in the sequence they would usually appear: a) *Objective of the agreement*. b) *Obligations of States party to the agreement*. c) *Definition and description of the facility/service*. d) *Establishment and operation of the facility/service*. e) *Legal responsibility*. f) *Liability aspects*. g) *Managerial aspects:* 1) *Governing bodies and decision-making arrangements*. 2) *Organization and staffing.* 3) *Consultation*. h) *Financial aspects:* 1) *Pre-implementation considerations*. 2) *Cost determination*. 3) *Cost sharing*. 4) *Recovery of costs from users*. 5) *Budgeting*. 6) *Authority to approve the budget*.

	7) *Financial auditing*. 8) *Taxation and other government levies*. i) *Procedures for settlement of disputes*. j) *Accessions, withdrawals, amendments to and termination of agreement*. ***Deliverables*** *Draft agreement*

Appendix C1

ID	Task Name	Duration	Start	Finish
1	**AFI VSAT Network Study - Revision A (17-10-2011)**	**304 days?**	**Wed 11/08/03**	**Fri 12/09/28**
2	**Time Frame for Technical Team**	**169 days?**	**Wed 11/08/03**	**Fri 12/03/23**
3	Draft Management & Communication Plan	2 days	Wed 11/08/03	Thu 11/08/04
4	Submit to VSAT Service Providers/Members for Acceptance	12 days	Fri 11/08/05	Sun 11/08/21
5	Draft Questionnaire	14 days	Wed 11/08/03	Sun 11/08/21
6	Draft technical description of present networks	8 days	Thu 11/08/11	Sun 11/08/21
7	Submit to VSAT Service Provider/Members for Comments (4&5)	7 days	Tue 11/08/23	Wed 11/08/31
8	Update Draft Questionnaire & Submit to VSAT Service Providers	4 days	Thu 11/09/01	Tue 11/09/06
9	First AFI VSAT Review Meeting	3 days?	Mon 11/10/03	Wed 11/10/05
10	Receive feedback/inputs from VSAT Service Providers	33 days	Wed 11/09/07	Fri 11/10/21
11	Compilation of feedback/Inputs Received	30 days	Mon 11/10/24	Fri 11/12/02
12	Draft Report to VSAT Service Providers/Members	28 days	Mon 11/12/05	Wed 12/01/25
13	APIRG/18 Prepatory Meeting (AFI VSAT/2-Feb 2012)	3 days	Thu 12/01/26	Mon 12/01/30
14	Submit pertinent Information to Financial & Admin. Group	1 day	Tue 12/01/31	Tue 12/01/31
15	Preparation of Report for APIRG/18	30 days	Wed 12/02/01	Tue 12/03/13
16	APIRG/18 Meeting	5 days	Mon 12/03/19	Fri 12/03/23
17	**Time Frame for Financial Team**	**237 days?**	**Wed 11/10/05**	**Thu 12/08/30**
18	Cost Evaluation Tasks	43 days?	Wed 12/02/01	Fri 12/03/30
19	Funding Tasks	42 days?	Fri 12/06/01	Mon 12/07/30
20	Positive Business Case	22 days?	Wed 12/08/01	Thu 12/08/30
21	Short Term Funding for the Project	30 days?	Wed 11/10/05	Tue 11/11/15
22	Appointment of Financial Consultant	44 days?	Wed 11/11/16	Mon 12/01/16
23	Evaluation of 3 Current Cost Recovery Models	41 days?	Wed 11/10/05	Wed 11/11/30
24	Cost Recovery Model	65 days?	Thu 12/03/01	Wed 12/05/30
25	**Administrative Team (provisional)**	**255 days?**	**Wed 11/08/03**	**Mon 12/07/23**
26	**WP1 - Oversight Model**	**129 days?**	**Wed 11/08/03**	**Fri 12/01/27**
27	Summarize Existing models and those referred to in Task Force	34 days	Wed 11/08/03	Fri 11/09/16
28	Receive Feedback from Team Members	9 days	Tue 11/09/20	Fri 11/09/30
29	Re-distribute for Comments to Members	12 days	Mon 11/10/03	Tue 11/10/18
30	Receive comments back from Members	1 day?	Fri 11/10/21	Fri 11/10/21
31	Develop Questionnaire (advantages/disadvantages)	15 days	Tue 11/10/25	Mon 11/11/14
32	Distribute Questionnaire for editing by Members	6 days	Tue 11/11/15	Tue 11/11/22
33	Ciculate finalized Questionnaire	34 days	Wed 11/11/23	Mon 12/01/09
34	Get results, analyse & prepare draft report for AFI VSAT/2	14 days	Tue 12/01/10	Fri 12/01/27
35	**WP2 - States Commitment**	**129 days**	**Wed 11/08/03**	**Fri 12/01/27**
36	Summary of Existing Commitments & Forward to Members	34 days	Wed 11/08/03	Fri 11/09/16
37	Receive feedback from Members	11 days	Mon 11/09/19	Mon 11/10/03
38	Re-distribute for comments to Members	11 days	Tue 11/10/04	Tue 11/10/18
39	Receive Feedback from Members	9 days	Wed 11/10/19	Mon 11/10/31
40	Circulate updated document to ANSPs for comments	12 days	Tue 11/11/01	Wed 11/11/16
41	Get feedback from Members	11 days	Thu 11/11/17	Thu 11/12/01
42	Get results, analyse & prepare draft report for AFI VSAT/2	40 days	Mon 11/12/05	Fri 12/01/27
43	**WP3 - Legal & Governance Issues**	**129 days**	**Wed 11/08/03**	**Fri 12/01/27**
44	Summaries Existing Ones & circulate to Members for perusal	34 days	Wed 11/08/03	Fri 11/09/16
45	Receive Feedback from Members	11 days	Mon 11/09/19	Mon 11/10/03
46	Re-distribute for comments to Members	11 days	Tue 11/10/04	Tue 11/10/18
47	Receive Feedback from Members	9 days	Wed 11/10/19	Mon 11/10/31
48	Circulate updated list to ANSPs for comments	12 days	Tue 11/11/01	Wed 11/11/16
49	Get feedback from Members	11 days	Thu 11/11/17	Thu 11/12/01
50	Get results, analyse & prepare draft report for AFI VSAT/2	40 days	Mon 11/12/05	Fri 12/01/27
51	**WP4 - Maintenance**	**124 days**	**Wed 12/02/01**	**Mon 12/07/23**
52	Evaluate and analyse input from Technical Team	21 days	Wed 12/02/01	Wed 12/02/29
53	Re-distribute for comments to Members	11 days	Thu 12/03/01	Thu 12/03/15
54	Receive Feedback	9 days	Fri 12/03/16	Wed 12/03/28
55	Circulate updated list to ANSPs for comments	12 days	Thu 12/03/29	Fri 12/04/13
56	Get feedback from Members	11 days	Mon 12/04/16	Mon 12/04/30
57	Get results, analyse & prepare draft report for AFI VSAT/2	60 days	Tue 12/05/01	Mon 12/07/23
58	**AFI VSAT Reporting Targets & meetings**	**175 days**	**Mon 12/01/30**	**Fri 12/09/28**
59	Progress Report to AFI VSAT/2-Feb 2012 - APIRG/18	8 days	Mon 12/01/30	Wed 12/02/08
60	Finalise Report for AFI VSAT	21 days	Fri 12/08/31	Fri 12/09/28
61	Tentative dates for CNS/SG/5	4 days	Mon 12/02/20	Thu 12/02/23
62	Tentative dates for APIRG/18	5 days	Mon 12/03/19	Fri 12/03/23



APPENDIX D

VSAT NETWORK
PERFORMANCE DATA COLLECTION FORMS

(Template for CAFSAT Node)

Centre:

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 D

1: Performance of Aeronautical Fixed Service supported by CAFSAT

Performance of AFTN

Centre : Atlántico
Date /

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

2: Qualitative performance of ATS/DS

Centre :
Date /

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

3: 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											

APPENDIX E

RECOMMENDATION 724 (WRC-07)

Use by civil aviation of frequency allocations on a primary basis to the fixed-satellite service

The World Radiocommunication Conference (Geneva, 2007),

considering

a) that remote and rural areas often still lack a terrestrial communication infrastructure that meets the evolving requirements of modern civil aviation;

b) that the cost of providing and maintaining such an infrastructure could be expensive, particularly in remote regions;

c) that satellite communication systems operating in the fixed-satellite service (FSS) may be the only medium to satisfy the requirements of the International Civil Aviation Organization's (ICAO) communication, navigation, surveillance and air traffic management (CNS/ATM) systems, where an adequate terrestrial communication infrastructure is not available;

d) that the use of VSAT systems, operating in the FSS and being deployed on a large scale in aeronautical communications, has the potential to significantly enhance communications between air traffic control centres as well as with remote aeronautical stations;

e) that establishing and utilizing satellite communication systems for civil aviation would also bring benefits for developing countries and countries with remote and rural areas by enabling the use of VSAT systems for non-aeronautical communications;

f) that in the cases identified in *considering e)* it is necessary to draw attention to the importance of aeronautical communications as opposed to non-aeronautical communications,

noting

a) that the FSS is not a safety service;

b) that Resolution **20 (Rev.WRC-03)** *resolves to instruct the Secretary-General* "to encourage ICAO to continue its assistance to developing countries which are endeavouring to improve their aeronautical telecommunications ...",

recommends

1 that administrations, in particular in developing countries and in countries with remote and rural areas, recognize the importance of VSAT operations to the modernization of civil aviation telecommunications systems and encourage the implementation of VSAT systems that could support both aeronautical and other communication requirements;

2 that administrations in developing countries be encouraged, to the maximum extent possible and as necessary, to expedite the authorization process to enable aeronautical communications using VSAT technology;

3 that arrangements should be made to provide for urgent service restoration or alternative routing in case of a disruption of a VSAT link associated with the aeronautical communications;

4 that administrations implementing VSAT systems in accordance with *recommends* 1 to 3 should do so in satellite networks operating in frequency bands with a primary allocation to the satellite services;

5 to invite ICAO, noting Resolution **20 (Rev.WRC-03)**, to continue its assistance to developing countries to improve their aeronautical telecommunications, including interoperability of VSAT networks, and provide guidance to developing countries on how they could best use VSAT technology for this purpose,

requests the Secretary-General

to bring this Recommendation to the attention of ICAO.

APPENDIX F

RESOLUTION COM6/24 (WRC-12)

Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3400-4200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1

The World Radiocommunication Conference (Geneva, 2012),

considering

a) that remote and rural areas often still lack a terrestrial communication infrastructure that meets the evolving requirements of modern civil aviation;

b) that the cost of providing and maintaining such an infrastructure could be expensive, particularly in remote regions;

c) where an adequate terrestrial communication infrastructure is not available, fixed-satellite service (FSS) earth stations are the only viable option to augment the communication infrastructure in order to satisfy the overall communications infrastructure requirements of the International Civil Aviation Organization (ICAO) and to ensure distribution of meteorological information under the auspices of the World Meteorological Organization (WMO);

d) that the use of FSS earth stations deployed in some countries in Region 1 for aeronautical communications has the potential to significantly enhance communications between air traffic control centres as well as with remote aeronautical stations,

noting

a) that the FSS is not a safety service;

b) that, by its Resolution **20 (Rev.WRC-03)**, WRC resolved to instruct the Secretary-General "to encourage ICAO to continue its assistance to developing countries which are endeavouring to improve their aeronautical telecommunications ...";

c) Recommendation ITU-R SF.1486 on sharing methodology between fixed wireless access systems in the fixed service (FS) and very small aperture terminals (VSATs) in the FSS in the 3 400-3 700 MHz band;

d) Report ITU-R S.2199 on studies on compatibility of broadband wireless access systems and FSS networks in the 3 400-4 200 MHz band;

e) Report ITU-R M.2109 on sharing studies between International Mobile Telecommunications-Advanced (IMT-Advanced) systems and geostationary-satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands,

resolves to invite ITU-R

to study possible technical and regulatory measures in some countries in Region 1 to support the existing and future FSS earth stations in the 3 400-4 200 MHz band used for satellite communications related to safe operation of aircraft and reliable distribution of meteorological information referred to in *considering c)*,

invites

all members of the Radiocommunication Sector, ICAO and WMO to contribute to these studies,

instructs the Director of the Radiocommunication Bureau

to include the results of these studies in his Report to WRC-15 for the purposes of considering adequate actions in response to *resolves to invite ITU-R* above,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO and WMO.

-END-