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)

Review of the report of the First Joint Meeting of the AFI Aeronautical VSAT Networks Managers

(Presented by the Secretariat)

SUMMARY
This paper presents the Review of the report of the First Joint Meeting of the AFI Aeronautical VSAT Networks Managers
Action by the meeting is at paragraph 3.
References : ICAO SP AFI RAN (2008) Report, Doc 9930 APIRG/17, Report 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 The First Joint Meeting of the AFI Aeronautical VSAT Networks Managers (AFI VSAT/1) was held in the Conference Room of the Fairmont Zimbali Lodge in Kwa-Zulu Natal, South Africa, from 13 to 15 June 2011, at the kind invitation of Air Traffic and Navigation Services Company Limited of South Africa (ATNS). Mr. Rushj Lehutso from ATNS, South Africa was elected as Chairman.

1.2 The meeting was attended by thirty seven (37) participants from twelve (12) Contracting States, international organizations (ASECNA and Roberts FIR) representing twenty (20) other AFI Contracting States and the industry (INEO, INTELSAT, SITA).

2. Discussion

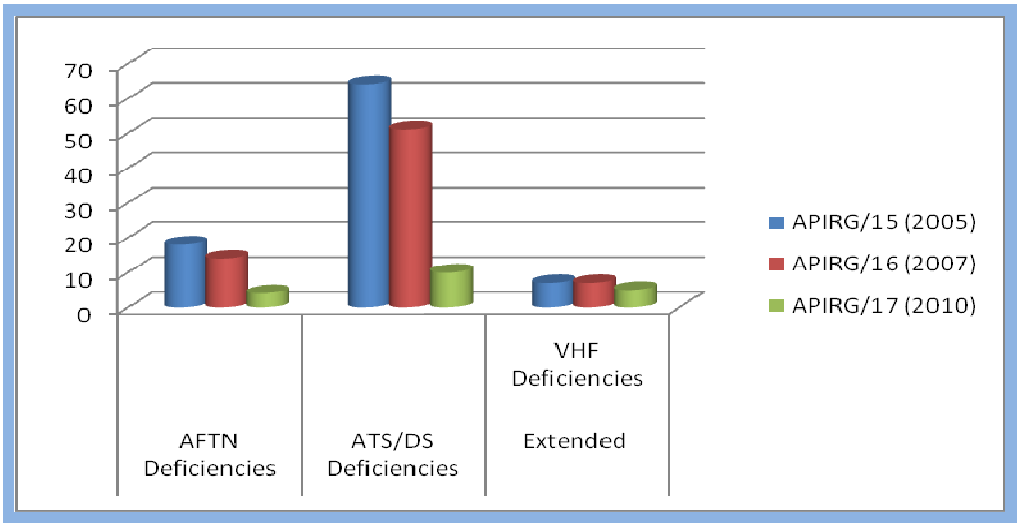
Report on Agenda Item 1: General provisions governing the use of VSAT Technology in the AFI Region

2.1 Under this agenda, the Secretariat briefed the meeting on the use of VSAT technology in the AFI Region, its impact in the resolution of air navigation deficiencies and the challenges to be addressed in order to maintain the level of performance reached and accommodate new CNS/ATM applications.

Impact of VSAT Networks on AFI States compliance with ICAO Air Navigation Plan (ANP) requirements

2.2 The ICAO Special AFI Regional Air Navigation Meeting of 2008 (SP AFI RAN/08) acknowledged that ground-ground networks based on VSAT technology offered the best means of providing Aeronautical Fixed Services (AFS) connectivity as well as relaying air/ground communications between ATS centres and remote ground stations. The graph below showS the added value of VSAT Networks in the reduction of major deficiencies affecting AFTN circuits, ATS/DS circuits and Extended VHF radio coverage in the AFI Region between 2005 (APIRG/15) and 2010 (APIRG/17):

Communications Deficiencies between APIRG/15 (2005) and APIRG/17 (2010)



Sustainability issues

2.3 There are still 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 include maintenance capabilities, modernization of network components, funding arrangements for the networks and related cost recovery mechanisms.

Integration of AFI VSAT networks

Interoperability and seamless

2.4 The meeting recalled the following explanations of the notions of interoperability and seamless which were developed by the ATMCP to serve as working terms for use toward development of the ATM operational concept.

2.5 Interoperability within the ATM system may be described as the ability to transfer information or effect functionality across any discontinuity, in order to enable operations. It can be seen that interoperability is primarily associated with the need for systems, people and procedures, among other things, to operate effectively across disparate systems.

2.6 Seamless within the ATM system may be described as the property that allows a transition across any discontinuity which, from the perspective of the transiting agent, does not require a considered action to facilitate the transition. It should be noted that, in this context, seamless does not imply ATM systems convergence into singleness.

Integration of AFI Aeronautical VSAT Networks

2.7 The Fifth meeting of All Planning and Implementation Regional Groups (ALLPIRG/5, 2006) which 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). The Fourth Meeting of Directors-General of Civil Aviation (DGCA/4, Matsapha, Swaziland, 8-9 November 2010) accordingly called upon the African Commission for Civil Aviation (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.

AFI Traffic forecasts for 2004-2020

2.8 The Secretariat presented the AFI Traffic Forecasts for 2004-2020 as established by the AFI Traffic Forecast Group (TFG) for each of the six (6) major traffic flows as defined by the APIRG (ICAO Doc 9879 refers). The meeting noted an average annual increase of 6% over the considered period, with an annual increase of 8.1% for the intra-African traffic.

2.9 The meeting acknowledged that the increase in traffic would certainly have an impact on aeronautical telecommunication traffic, and that as part of the air navigation infrastructure supporting the aviation pivotal role in the social and economic development of AFI States, the aeronautical telecommunication infrastructure needed to evolve accordingly to accommodate air transport demand.

2.10 Moreover, the meeting recognized that Africa's safety records adversely affected the regional economic growth rate, hence the challenge to consistently improve safety consistently.

Report on Agenda Item 2: Presentation of the AFI Aeronautical VSAT Networks (AFISNET, CAFSAT, NAFISAT and SADC VSAT II)

2.11 Under this agenda item, the meeting was provided with comprehensive information concerning each of the AFI aeronautical VSAT networks, covering the following items:

a) Membership

b) System architecture

c) Operations

d) Working arrangements

e) Interconnection with other networks

f) Development plans

2.12 The information provided to the meeting for each eronautical VSAT network is compiled at **Appendix A** to this working paper.

Agenda Item 3: Identification of similarities and dissimilarities

2.13 Under this agenda item, the meeting carried out a comparative analysis of the AFI VSAT networks and identified similarities and dissimilarities between them. As a result of these dissimilarities, many interconnections have been implemented between the various VSAT networks, making the system more complex, and generating additional investments and operating costs.

2.14 The meeting discussed and agreed on a set of applicable best practices associated with VSAT networks elements and features as shown in **Appendix B** to this working paper. Additional best practices may be considered and discussed at the next meeting of the AFI aeronautical VSAT networks managers. These best practices are based on ICAO standards and recommended practices and guidance material, as well as industry best practices. The meeting also assessed each of the AFI aeronautical VSAT networks were against these best practices.

2.15 Concerning the space segment, the meeting discussed the reliability of the operated satellites/transponders[1], and raised concerns at the current single point of failure configuration, with no fallback. Accordingly, the meeting requested the Secretariat to liaise with INTELSAT, to obtain their disaster recovery plans for AFI operated satellites/transponders for use in developing contingency plans for AFI VSAT networks.

2.16 Concerning the satellite transponder access schemes, the meeting discussed at length the merits and demerits of TDMA and FDMA, mainly due to the requirement for a centralized network control centre for synchronization in TDMA (network wide timing), and the need for a back up for such a critical facility. However, all AFI continental VSAT networks, i.e. AFISNET, NAFISAT and SADC2 are using TDMA as a common satellite access scheme, while FDMA is used by AFISNET and CAFSAT.

2.17 Concerning the AFTN transit times, the Secretariat highlighted their critical importance in a performance-based environment, and indicated that technology was meant to support operational objectives, and was not an end in itself. He therefore reminded the meeting of the obligation of States and Air Navigation Services Providers (ANSPs) to compile AFTN transit time statistics and communicate them to their accredited ICAO Regional Offices on a regular basis, as prescribed by the AFI Planning and Implementation Regional Group (APIRG), in accordance with the ICAO Manual on the Planning and Engineering of AFTN (Doc 8259). Likewise, performance evaluation of AFTN circuits was 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.

1 INTELSAT IS 10.02: AFISNET, NAFISAT and SADC2; INTELSAT 901: CAFSAT

2.18 The meeting formulated the following conclusions:

Conclusion 1/1: Contingency planning for AFI VSAT networks operated satellites

That the Secretariat should obtain from the Intelsat Company disaster recovery plans for use by the AFI aeronautical VSAT networks managers as part of their contingency plans aimed at ensuring continuity of service in case of disruption or failure of the operated satellites.

Conclusion 1/2: Best practices for AFI VSAT networks

That the AFI States and Air Navigation Services Providers (ANSPs) operating aeronautical VSAT Networks should adopt the best practices stated at **Appendix E** to this report, as well as any other best practices to be developed as required.

Conclusion 1/3: Submission of transit time statistics to ICAO Regional Offices

That States and Air Navigation Services Providers (ANSPs) should provide statistical data on AFTN transit times to enable the end-to-end assessment of the telecommunication infrastructure ability to meet established operational performance requirements.

Agenda Item 4: Sustainability issues

2.19 Under this agenda item, the meeting discussed sustainability issues inherent to all AFI VSAT networks, such as maintenance capabilities, system modernization and funding mechanisms.

Maintenance arrangements and capabilities, and system modernization

2.20 The meeting noted the arrangements for the maintenance of AFISNET, CAFSAT, NAFISAT and SADC VSAT2 networks as follows:

AFISNET

2.21 An AFISNET Network Management Committee (SNMC) was established to collectively review the network circuits' availability and performance and discuss ways of addressing identified deficiencies as well as the enhancements to be implemented by the network members. The SNMC, which meets on yearly basis, is governed by a Form of Agreement between the Air Navigation Services Providers (ANSPs) operating AFISNET nodes, which was last updated at the eighteenth meeting of the committee (SNMC/18) in June 2010.

2.22 The participating entities: ASECNA, GCAA (Ghana), NAMA (Nigeria) and Roberts FIR apply their own maintenance policies which are not properly coordinated based on a formal agreement. No centralized facility has been established for the network management and control. However, ASECNA has implemented a network control centre (NCC) in Dakar to monitor its managed AFISNET nodes (75 out of 89 nodes installed in 18 States within the AFI Region)2. No formal arrangement has been made to anage interconnections with other VSAT networks.

2.23 The meeting recalled that some AFISNET nodes had already reached or exceeded their lifetime, and that the AFISNET Management Committee (2007) had formulated a conclusion on technical evaluation and re-engineering of the network. Accordingly, SP AFI RAN Recommendation 6/18 and APIRG/15 Conclusion 15/12 urged ASECNA, Ghana, Nigeria and Roberts FIR to implement appropriate corrective measures.

2.24 ASECNA informed the meeting that the network was partially upgraded in 2007. A Joint Technical Evaluation of AFISNET was conducted in 2010, the outcome of which would serve as the basis for addressing the re-engineering of the network.

2 The use of ASECNA central facility for the entire AFISNET network can be considered by the SNMC.

CAFSAT

2.25 A CAFSAT Network Management Committee (CNMC) was established by the SAT Informal Group in order to address issues of common interest between network members.

2.26 The participating administrative entities: 3Argentina, Brazil, Cape Verde, Morocco, Portugal, South Africa (ATNS), Spain (AENA) and ASECNA apply their own local maintenance policies that are not coordinated on a formal basis. No centralized facility has been established for the network management and control. No formal arrangement has been made to manage interconnections with other VSAT networks.

2.27 A CAFSAT Joint Technical Evaluation and Re-engineering Team (JTT) was recently established (in 2011) to study and develop recommendations concerning the modernization of the network, starting with the baseband upgrades in the short-term. Studies were underway with respect to the long-term evolution of the network.

NAFISAT and SADC

2.28 A Supervisory Board was established for NAFISAT and SADC2 VSAT networks to oversee the performance of the Network Provider and approve the budget and any major developments. Each participating State, the Network Provider (ATNS and IATA) and ICAO[4], are represented in these boards that meet once a year.

2.29 A network management and control system has been established for each network, including a centralized network control centre (NCC) located in Johannesburg. However, no formal arrangement has been made to manage interconnections with other VSAT networks.

2.30 With respect to NAFISAT and SADC VSAT2 networks, the meeting noted that through constant evaluation and measuring of the network availability, it would be possible to determine any trends and to predict the lifespan of these networks.

2.31 An in-depth evaluation would be conducted to establish the most cost effective way of upgrading and optimizing the two networks, taking into account the predicted lifespan, advantages of the present network and other relevant considerations.

2.32 The meeting formulated the following conclusions:

Conclusion 1/4: AFISNET and CAFSAT networks' management and control

That AFISNET and CAFSAT participating States and Organizations should consider establishing common network management and control systems with shared responsibilities, and harmonize their maintenance policies in order to enhance the availability and reliability of these networks. In so doing, consideration should be given to the interregional aspects of the CAFSAT network.

Conclusion 1/5: Modernization of AFISNET and CAFSAT networks

That AFISNET participating States and Organizations should pursue their efforts to achieve fully modernized networks that continue to meet regionally/inter-regionally agreed performance requirements.

Conclusion 1/6: Management of interconnections between aeronautical SAT networks

That the concerned States and Organizations should establish formal arrangements for the efficient management of the interconnections implemented between the various aeronautical VSAT networks.

Funding arrangements

3 Angola is in the process of joining. A CAFSAT node is expected to be implemented in Luanda by April 2012.
4 As Secretary of the NAFISAT Supervisory Committee, and Observer of the SADC/2 Supervisory Committee.

2.33 As an introduction, IATA briefed the meeting on air transport industry trends. It noted that the aviation industry supported 32 million US dollars worldwide and 630,000 jobs in Africa respectively; and that it contributed 3.5 trillion US dollars to the global economy, and 9.4 billion US dollars to Africa's gross development product (GDP). As the world economies integrate, aviation will continue to grow.

2.34 However, in 2010, the best year over a decade, airlines collectively made a profit of 18 billion US dollars, a margin of 3.18%; AFI carriers' share of the profit amounted to 100 million US dollars. As profitability varies along the air transport supply chain, the efficiency and sustainability of aviation industry requires that investors in the industry receive a fair return, ensuring that it continues to attract long-term investment. Therefore, partnership between aviation stakeholders was emphasized as a means of adding values to industry businesses and supporting the safe and efficient development of other key sectors in the AFI Region.

AFISNET and CAFSAT

2.35 A common funding mechanism has not been established by participating States and Air Navigation Services Providers (ANSPs) for the implementation, operation and maintenance of AFISNET and CAFSAT networks. Instead, each participating entity applies its own cost recovery mechanism through general air navigation charges, making it difficult to develop and implement manageable projects aimed to enhance the two networks. Adding to that, there is no established supervisory body empowered with the necessary authority to address and make decisions concerning managerial /financial issues. Only technical and operational matters can be discussed within each network's management committee (SNMC and CNMC). For this reason, a number of initiatives designed to improve AFISNET network have proved unsuccessful.

NAFISAT and SADC2

2.36 The objectives of the partnership established between ATNS and IATA in implementing NAFISAT and SADAC VSAT networks were to assist participating States in meeting their obligations in terms of Article 28 of the Chicago Convention (1944)[5] , and improving infrastructure safety to support flight operations in the AFI Region. ATNS took the business risk to finance the capital costs of the networks and the responsibility to operate the network, whereas IATA ensured that the airlines meet their commitment in paying back fully the investment cost to ATNS and continue to pay navigation charges to the individual States participating in both networks.

2.37 The meeting recognized that the funding model of SADC VSAT and NAFIST had improved the air navigation infrastructure safety and efficiency, by enabling a high degree of connectivity, including where States were facing challenges to implement the AFI Air Navigation Plan (ANP) requirements for aeronautical communications. At the same time, the meeting noted that the on-going arrangements would be terminated in 2014 (SADC VSAT2) and 2015 (NAFISAT). By that time, the two networks would have been operating for about 7 to 8 years.

2.38 It was expected that, after the full recovery of ATNS investments, an effective management of the networks and the efficiencies achieved over the past 2 years would add value to all stakeholders and facilitate sustainable funding arrangements whereby all partners share the associated risks and potential benefits.

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[5] Under Article 28 of the Chicago Convention "Each contracting State undertakes, so far as it may find practicable, to:
a) Provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention;
b) Adopt and put into operation the appropriate standard systems of communications procedure, codes, markings, signals, lighting and other operational practices and rules which may be recommended or established from time to time, pursuant to *the* Convention."

Conclusion 1/7: Sustainability of AFISNET and CAFSAT networks

That, in coordination with airspace users, AFISNET and CAFSAT member States and Air Navigation Services Providers (ANSPs) should ensure that sufficient resources are made available in order to:

1) continuously maintain an acceptable level of performance of these VSAT networks; and

2) achieve a high degree of interoperability with other AFI VSAT networks while transitioning towards an integrated ATN infrastructure.

Conclusion 1/8: Sustainability of NAFISAT and SADC VSAT2 networks

That, mindful of the current funding arrangements governing the NAFISAT and SADC networks to be terminated in 2014 and 2015, and based on experience gained and available capabilities, their member States and Air Navigation Services Providers (ANSPs) should ensure, in coordination with airspace users, that sustainable funding arrangements are established in a timely manner in order to:

1) continuously maintain an acceptable level of performance of these VSAT networks; and

2) achieve a high degree of interoperability with other AFI VSAT networks while transitioning towards an integrated ATN infrastructure.

Report on Agenda Item 5: Latest developments concerning ICAO SARPs and guidance material, and outcome of ITU WRC-07

2.39 Under this agenda item, the Secretariat briefed the meeting on the Global ATM Operational Concept endorsed at the 11th Air Navigation Conference (2003), and subsequently published in the form of a dedicated manual (Doc 9854) which provides a detailed description of the concept.

ICAO SARPs and Guidance Material

2.40 The meeting reviewed *the principles necessary to satisfy the ATM objectives, as well as* the relevant ATN provisions contained in ICAO Annex 10 – *Aeronautical Telecommunications, Volume III.* It recalled APIRG/16 Conclusion 16/13 on the use of emerging technologies and communication bit-oriented protocols newer than X.25 for AFTN, and Conclusion 16/14 on the Implementation of ATN/IPS

2.41 The Secretariat also presented the relevant provisions contained in ICAO Manual on Detailed Technical Specifications for the ATN using ISO/OSI Standards and Protocols (Doc 9880), Part II - Ground-Ground Applications - ATS Message Handling Service (ATSMHS), and ICAO Manual on the ATN using Internet Protocol Suite (IPS) standards and protocols (Doc 9896), which contains the minimum communication that will enable implementation of an ICAO aeronautical telecommunication network (ATN) based on the Internet protocol suite (IPS).

Outcome of the ITU World Radiocommunication Conference (2007) (WRC-07)

2.42 The meeting reviewed ITU WRC-07 Recommendation 724 on the Use by civil aviation of frequency allocations on a primary basis to the fixed-satellite service (FSS). The purpose of Recommendation 724 is to facilitate the licensing of VSAT (very small aperture terminal) satellite ground stations in support of aeronautical telecommunications infrastructure. It also recognizes that VSAT networks operating in the fixed satellite service can be used to carry aeronautical safety related traffic. The meeting noted that the AFI aeronautical VSAT networks were being used mainly for the Aeronautical Fixed Service (AFS) and the Aeronautical Mobile Service (AMS – extended VHF coverage). There were also plans to use VSAT networks to share aeronautical surveillance data between ATS units. In addition, VSAT

networks were used for the transmission of GNSS data during the AFI EGNOS Test Bed (ESTB) that was conducted in the Region (2003/2005).

ICAO guidelines for VSAT networks

2.43 The meeting recalled the deliberations of the ICAO SP AFI RAN (2008) on the use of VSAT networks. SP AFI RAN/08 had noted that, in general, there was a direct relationship between cost of the network and the type of performance it was required to provide. Therefore, it was critical to keep the performance requirements to a reasonable limit to avoid unnecessary costs. In this respect, SP AFI RAN/08 encouraged the entities charged with planning and implementation of VSAT networks to use the guidelines developed by ICAO.

Report on Agenda Item 6: Integration of AFI Aeronautical VSAT Networks

Implementation of ALLPIRG/5 Conclusion 5/16

2.44 The meeting noted that of the existing VSAT networks have been implemented with varying access and network protocol schemes and that the only practical way forward was to use any opportunity for equipment upgrade or renewal in any given region to integrate various neighboring VSAT networks into a single one. In this context, it was important to select the type of network protocol that is easiest to implement, least costly to operate and easiest to interoperate with other networks (including the Internet). The meeting acknowledged that Internet Protocol- (IP) based networks may provide an optimum means of establishing regional/interregional aviation intranets that would also enable access by users to vast resources available on the Internet (e.g. aeronautical meteorology and other databases).

2.45 Based on the above, the Fifth Meeting of the All Planning and Implementation Regional Groups (ALLPIRG/5) (Montreal, 23 to 24 March 2006) adopted its Conclusion 5/16, which states as follows:

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

That PIRGs:

1) discourage the proliferation of VSAT networks where one/some of the existing ones can be expanded to serve the new areas of interest;

2) work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP); and

3) give due consideration to managed network services (e.g. a virtual private network (VPN)), subject to availability and cost-effectiveness.

2.46 Accordingly, the ICAO Special Regional Air Navigation Meeting (November 2008) formulated the following recommendation which was endorsed by APIRG/17 Meeting (August 2010):

Recommendation 6/19 — Planning, implementation and operation of very small aperture terminal (VSAT) networks in the AFI Region

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

2.47 The First Meeting of the AFI Aeronautical VSAT Networks Managers was therefore convened to discuss the implementation of ALLPIRG/5 Conclusion 5/16, which had already been taken into account in other ICAO Regions.

Draft AFI ATN Routing Architecture Plan

2.48 The meeting recalled that the APIRG ATN Planning Task Force had prepared and submitted to APIRG/15 Meeting (2005) a draft ATN Routing Architecture for the AFI Region (WP/8 of this meeting refers).

Development of a regional project

2.49 The meeting acknowledged that outstanding deficiencies continued to affect the Aeronautical Fixed Service (AFS) in the AFI Region. While addressing these deficiencies as a matter of urgency, it was also necessary to develop a coordinated regional plan for the migration of the AFI AFS infrastructure towards an integrated regional/interregional digital communication network preferably based on the Internet Protocol (IP), in accordance with ALLPIRG/5 Conclusion 5/16.

Establishment of a Task Force for the development of a regional project

2.50 In view of the above, the meeting agreed to develop a regional project aimed to enhance the overall performance of AFI aeronautical VSAT networks, and converge towards a consolidated regional ATN infrastructure. To this effect, the meeting established a Task Force with the terms of reference shown at **Appendix C** to this working paper. The following conclusion was formulated:

Conclusion 1/10: 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** to this working paper.

Guidelines on the establishment and provision of a multinational facility/service

2.51 The meeting recalled that, as part of its assigned work, the APIRG CNS Sub-group was requested to *give further consideration, as necessary, to the concept of multinational ICAO AFI air navigation facility/service addressed in the AFI/7 Report under Agenda Item 14 (AFI/7, Conclusion 10/6c).*

2.52 After reviewing the general guidelines on the establishment and provision of a multinational facility/service in the AFI Region, the meeting recognized the multinational nature of the AFI Aeronautical Telecommunication Network (ATN) backbone infrastructure; and recommended that these guidelines be adhered to by States and APIRG when developing a regional project for an integrated AFI Aeronautical Telecommunication Network (ATN) infrastructure. The following conclusion was formulated:

Conclusion 1/11: Application of the concept of multinational facility/service

That APIRG:

a) apply the concept of multinational facility/service to an integrated IP-based regional/interregional digital communication network, including its evolution towards a consolidated AFI Aeronautical Telecommunication Network (ATN) infrastructure; and

b) accordingly facilitate the institutional technical, financial, and administrative arrangements between States, in accordance with the guidelines on the establishment and provision of a multinational facility/service.

Note: Subsequent amendment proposals to the AFI Air Navigation Plan will be developed in due course.

Proposals from the industry

2.53 The meeting was presented with proposals from the industry (INTELSAT and SITA), which will be further reviewed by the Task Force established under its Conclusion 1/10.

Report on Agenda Item 7: Any other business

Date and venue of the next meeting

2.54 The meeting agreed that it was necessary to hold a Review Meeting of the AFI Aeronautical VSAT Networks Managers to assess the progress achieved by the Task Force established under Conclusion 1/10 of this report; and accordingly develop proposals and recommendations to be submitted to APIRG/18 Meeting (tentatively scheduled for 15-18 November 2011).

2.55 The meeting welcomed ASECNA's offer to host that meeting in Dakar, Senegal, in October 2011. The exact dates will be communicated to the concerned stakeholders through the ICAO Secretariat, once finalized with ASECNA.

2.56 The participants congratulated and expressed their gratitude to the Air Traffic and Navigation Services Company Limited of South Africa (ATNS) for hosting the First Joint Meeting of the AFI Aeronautical VSAT Networks Managers and for the hospitality kindly extended to them during their stay in Kwa-Zulu Natal.

3. Conclusion

3.1 The meeting is invited to:

1) note the report of the First Joint Meeting of the AFI Aeronautical VSAT Networks managers (AFI VSAT/1) as presented in this working paper;

2) endorse the conclusions adopted by AFI VSAT/1;

3) review the terms of reference and the work assigned to the Task Force established by AFI VSAT/1; and

4) provide further guidance as required.

-END-

Appendix A

		AFISNET	CAFSAT	NAFISAT	SADC VSAT II
1.	Year of completion	1995-2007	2000-2007	2008	2007
2.	Period of Inception	TBD	TBD	TBD	TBD
3.	Membership	23 States6	8 States7	13 States8	15 States9
4.	Satellite used	IS 10-02@359^{0}E	IS 901@342^{0}E	IS 10-02@359^{0}E	IS 10-02@359^{0}E
5.	Transponder (Up/Down)	20/20 23/23	36/36	23/23	23/23
6.	Frequency band	C-Band	C-Band	C-Band	C-Band
7.	Topology	Meshed & Star	Meshed	Meshed	Meshed
8.	Satellite access method	MF-TDMA FDMA MCPC SCPC	FDMA MCPC	MF-TDMA MCPC	MF-TDMA MCPC
9.	Lease Bandwidth	14.2 MHz (20/20) 10 MHz (23/23)	TBD	9 MHz	9 MHz
10.	Administrative arrangements	Network Management Committee (MOU signed by ANSPs)	Network Management Committee (MOU signed by ANSPs)	Supervisory Board (MOU signed by States)	Supervisory Board (Protocol to the SADC Treaty and individual contractual agreements)
11.	Technical arrangements (Maintenance Management)	Local policy	Local policy	Network Management and Control System (NMS)	Network Management and Control System (NMS)
12.	Network control centre (NCC)	No Centralized NCC	No Centralized NCC	Centralized NCC Johannesburg	Centralized NCC Johannesburg
13.	Services supported	ATS/DS AFTN	ATS/DS AFTN	ATS/DS AFTN	ATS/DS AFTN

6 AFISNET : Algeria, Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea Bissau, La Reunion (France), Liberia, Madagascar, Mali, Mauritania, Niger, Nigeria, Sao Tome & Principe, Senegal, Sierra Leone and Togo.
7 CAFSAT : Argentina, Brazil, Cape Verde, Morocco, Portugal, Senegal (ASECNA), South Africa (ATNS) and Spain (AENA)
8 NAFISAT: Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Somalia, Sudan, Tanzania, Uganda, Saudi Arabia, Seychelles and Yemen
9 SADC VSAT: Angola, Botswana, Burundi, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

		AFISNET	CAFSAT	NAFISAT	SADC VSAT II
		AMS (extended VHF) GTS	CIDIN OLDI AMHS trials SSR data ADS data trials Service channel	AMS ATN Apps (AMHS trials) OLDI AIDC Radar Data	AMS ATN Apps (AMHS trials) OLDI AIDC Radar Data
14.	New Services	TBD	TBD	TBD	TBD
15.	Cost recovery model	Cost recovery by each participating entity through navigation charges	Cost recovery by each participating entity through navigation charges	Cost recovery by network manager (ATNS) through temporary arrangement with airlines (until 2015)	Cost recovery by network manager (ATNS) through temporary arrangement with airlines (until 2014)
16.	Interconnections	**CAFSAT :** Las Palmas/ Nouadhibou **NAFISAT :** Addis/Niamey Brazzaville/ Khartoum Brazzaville/Nairobi Ndjamena/ Khartoum Ndjamena/Tripoli **SADC :** Abidjan/Luanda Accra/Luanda Brazzaville/Johannesburg Brazzaville/Luanda Dakar/Luanda Antananarivo/ Johannesburg	**AFISNET :** Las Palmas/ Nouadhibou **SADC:** Johannesburg/Dakar, Johannesburg/Las Palmas, Johannesburg/Ezeiza Johannesburg/Recife	**AFISNET :** Addis/Niamey Brazzaville/Khartoum Brazzaville/Nairobi Ndjamena/Khartoum Ndjamena/Tripoli **SADC:** Kinshasa / Entebbe Kigali / Entebbe Dar es Salaam / Entebbe Dar es Salaam / Nairobi Dar es Salaam / Victoria (Seychelles) Plaisance (Mauritius) / Victoria (Seychelles) Antananarivo / Victoria (Seychelles) Kinshasa / Khartoum Johannesburg / Nairobi Johannesburg /	**AFISNET :** Abidjan/Luanda Accra/Luanda Brazzaville/Luanda Brazzaville/Johannesburg Dakar/Luanda **NAFISAT:** Kinshasa / Entebbe Kigali / Entebbe Dar es Salaam / Entebbe Dar es Salaam / Nairobi Dar es Salaam / Victoria (Seychelles) Plaisance (Mauritius) / Victoria (Seychelles) Antananarivo / Victoria (Seychelles) Kinshasa / Khartoum Johannesburg / Nairobi Johannesburg / Victoria (Seychelles) Plaisance (Mauritius)

		AFISNET	CAFSAT	NAFISAT	SADC VSAT II
				Victoria (Seychelles) Plaisance (Mauritius) / Nairobi	/ Nairobi
17.	Management of interconnections	By each managing entity (local policy)	By each managing entity (local policy)	Fully Integrated NMS	Fully Integrated NMS
18.	Base band	Frame Relay ATM X.25 IP	Frame Relay	Frame Relay X.25 IP	Frame Relay X.25 IP
19.	Transmission speed	19.2 kbps 64 kbps Sync/Async: Max 5 Mbps	64 kbps	9.6 kbps (AFTN) 16 kbps (ATS/DS) 9.6 – 64 kbps (ATN) Sync/Async: Max 2 Mbps	9.6 kbps (AFTN) 16 kbps (ATS/DS) 9.6 – 64 kbps (ATN) Sync/Async: Max 2 Mbps
20.	Availability data	Provided	Provided	Provided	Provided
21.	Transit times	Not provided	Not provided	Not provided (On trials)	Not provided (On trials)

Appendix B

		Best practices	Guidance material	Network compliance status			
				AFISNET	**CAFSAT**	**NAFISAT**	**SADC**
1.	**Year of completion**	Not applicable					
2.	**Period of Inception**	Not applicable					
3.	**Membership**	Not applicable					
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 (MF-TDMA)	ICAO, Annex 10, Aeronautical Telecommunications, Volume III ICAO Manual on VDL Mode 2 ICAO Manual on VDL Mode 3	Yes	No	Yes	Yes
9.	**Lease Bandwidth**	Available	ICAO, Annex 10,	Yes	Yes	Yes	Yes

		Best practices	Guidance material	Network compliance status			
				AFISNET	CAFSAT	NAFISAT	SADC
		bandwidth should accommodate current and future services	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)				
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 coordination of maintenance between networks' stations	ICAO Annex 10, Volume I, Attachment F	Yes	Yes	No	No
14.	**Services supported**	Aeronautical fixed services (AFTN, ATS/DS) Aeronautical mobile service	ICAO, Annex 10, Aeronautical Telecommunications, Volume II ICAO, Annex 11, Air	Yes	Yes	Yes	Yes

		Best practices	Guidance material	Network compliance status			
				AFISNET	**CAFSAT**	**NAFISAT**	**SADC**
		(AMS) – Extended VHF radio coverage Aeronautical Telecommunication Network (ATN) applications (AMHS, AIDC)	Traffic Services ICAO, Doc 4444 – PANS/ATM ICAO, Doc 9880- Detailed Technical Specifications on ATN ICAO, Doc 7474 (ANP/FASID)				
15.	**New Services to be supported**	To be defined.		Not applicable	Not applicable	Not applicable	Not applicable
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.	**Connectivity (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.	**Management of interconnections**	Formal agreements recommended to address interconnection issues		No	No	No	No
19.	**Base band transmission 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 APIRG Conclusion 13/10 APIRG Conclusion 16/13 APIRG Conclusion 16/14				
20.	**Transmission speed**	AFTN main circuits: 1200 bauds ATN circuits: 9.6	APIRG Conclusion 12/13 APIRG ATN/TF/2 Report	Yes	Yes	Yes	Yes

		Best practices	Guidance material	Network compliance status			
				AFISNET	**CAFSAT**	**NAFISAT**	**SADC**
		Kbps ATN backbone circuits: 64 Kbps					
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

Appendix C

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:

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.

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:

a) Cost estimates;
b) Funding (project teams and integrated network model);
c) Cost recovery methods (cost sharing amongst states, billing); and
d) Maintenance

Composition of the Financial Team:

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

3.3.Administrative:

a) Oversight model;
b) States' commitment;
c) Legal issues; Governance; and
d) Maintenance.

Composition of the Administrative Team:

- ATNS (S. Africa), ASECNA, Egypt, IATA, Kenya (**Team Leader**), Tanzania

4.Working arrangements and milestones

a) Electronic correspondence
b) Teleconferencing
c) Side meeting during CNS/SG/4 Meeting (25-29 July 2011, Dakar, Senegal),
d) APIRG/18 Preparatory Meeting (October 2011, Dakar, Senegal)
e) APIRG/18 Meeting (16-18 November 2011, Kampala, Uganda)

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