INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICAN OFFICE

FIRST MEETING OF CAFSAT NETWORK MANAGEMENT COMMITTEE (CNMC/1)

FINAL REPORT

Recife, Brazil, 02 May 2011

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Appendices

PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The First Meeting of the CAFSAT Network Management Committee (CNMC/1) was held at the Park Hotel in Recife, Brazil, on 02 May 2011, at the kind invitation of the Departamento de Control del Espacio Aéreo (DECEA) of Brazil.

1.2 Mr. **Joao Batista Oliveira Xavier**, Chief of CINDACTA III of DECEA welcomed the participants, pointed out the importance of the CNMC/1 meeting that will contribute for the enhancement of CAFSAT network performance and ensure a cost effective provision of reliable Telecommunications Service for Air Navigation in the SAT region to support ATM objective , wished successful deliberation and declared opening the meeting.

2. Officers and Secretariat

Mr. **François Xavier SALAMBANGA**, RO/CNS, WACAF Office served as Secretary of the meeting and therefore prepared the working and information papers to be presented accordingly. He was assisted by Mr. **Onofrio SMARRELLI**, RO/CNS, SAM Office.

3. Attendance

The meeting was attended by twenty nine (**29**) participants from nine (**09**) States (Angola, Brazil, Cape Verde, Cote d'Ivoire, Portugal, Senegal, South Africa, Spain, Uruguay) , two (**02**) Airnavigation Service Providers, namely ASECNA and ATNS, one international organization (ARINC) and a Communication Integrator Company INSA (Spain).

The list of participants is attached in **Appendix A** to this report.

4. Working Language

The meeting was conducted in the English language.

5. Agenda

The meeting adopted and discussed the following Agenda items through the Work programme as presented in **Appendix B** to this report.

Agenda Item 1: **Review of CNMC Terms of Reference**

Agenda Item 2: **Review of CAFSAT earth stations performance and operational statistics of availability for supported links**

Agenda Item 3: **Review/Updating of CAFSAT nodes**

Agenda Item 4: **Implementation of Special AFI RAN meeting recommendations 6/19**

Agenda Item 5: **CAFSAT modernization and re-engineering**

Agenda Item 6: Any other business

6. Summary of Conclusions

After deliberation the meeting adopted three (03) Decisions and six (06) Conclusions.

Agenda Item 1: Review of CNMC Terms of Reference

Draft Conclusion 1/01: Active participation in CNMC meetings by CNMC members

That:

CNMC Members should endeavour to actively:

a) participate in CNMC regular meetings and technical specialized Task Forces / Study Groups and therefore,

b) provide the suitable support to their nominated delegates in accordance with the commitment they have taken under the Terms of Reference and Work Programme of CNMC.

Agenda Item 2: Review of CAFSAT earth stations performance and operational statistics of availability for supported links

Draft Conclusion 1/02: Development of CAFSAT Earth Stations Performance Data Collection Form (PDCF)

That:

In accordance with ICAO guidelines on Performance of Very Small Aperture Terminals (VSAT), ASECNA and GHANA, already tasked by SNMC Conclusion 18/ 02 for the matter, develop and submit to next CNMC meeting, a draft Earth Stations Performance Data Collection Form **(PDCF)** aiming to facilitating the future automation of the collection and the monitoring of CAFSAT stations performance data, taking into consideration the most sensitive components of the network.

Draft Decision 1/02: Utilization of provisional templates for the collection of the Performance data statistic of CAFSAT nodes

That:

Meanwhile the complete development of the PDCF for the automation of the monitoring of the Network Performance, CAFSAT members adopt the templates attached in Appendix C and report quarterly to the current CNMC manager with copy to ICAO Regional Offices of Dakar and Lima.

Agenda Item 3: **Review/Updating of CAFSAT nodes**

Draft Conclusion 1/03: Updating CAFSAT Nodes

That:

When collecting their performance data, the CAFSAT members take the opportunity to update the location of CAFSAT nodes coordinates (LONG, LAT) under WGS 84 format in order to feed the future data base and facilitate the study of future migration, if necessary, of the network on a new satellite.

Agenda Item 4: **Implementation of Special AFI RAN meeting recommendations 6/19**

Draft Decision 1/02: Representation of CAFSAT members states to the AFI VSAT Managers meetings

That:

CNMC members States/Organization participate in the AFI VSAT Managers meeting called for by Conclusion 6/19 of the SP AFI RAN meeting on the basis of representative (s) from each CNMC members Sate/Organization as stipulated by the Terms of Reference of CNMC.

Draft Conclusion 1/04: Participation in the first AFI VSAT Managers Meeting Durban, South Africa, 13-15 June 2011.

That:

a) CNMC members should endeavor to attend or send Working and/or Information papers to the first meeting of AFI VSAT Managers, scheduled to be held in Durban, South Africa from 13 to 15 June 2011;

b) Administration/Organization should nominate their representatives with suitable provisions aiming to effectively participate in the meeting;

c) Nominated CNMC delegates ensuring that the forthcoming VSAT Managers meetings consider the CNMC expectations and conclusion raised up by the first CNMC meeting.

Agenda Item 5: **CAFSAT modernization and re-engineering**

Draft Conclusion 1/05: Development of a Roadmap for CAFSAT joint technical evaluation and re-engineering

That:

In accordance with ICAO guidance materials (***Annexe X, Vol 1, Attachment F: Guidance material concerning reliability and availability of radiocommunications and navigation aids; ICAO Guidelines on Performance of Very Small Aperture Terminal (VSAT) Networks)*** CNMC member states develop a Roadmap for a Joint Technical Evaluation and re-engineering in the view of ensuring an efficient and optimized modernization of CAFSAT Network taking into consideration:

a) Required service performance level of the network to support the operation and development of sensitive current and forthcoming CNS/ATM components;
b) CAFSAT interoperability with its neighbouring networks;
c) Maintenance fundamental parameters governing service availability, continuity and integrity such as: reliability, turn over statistics, maintenance personnel expertise;
d) Cost-effectiveness;

Draft Decision 1/03: Establishment of a Joint Technical Team for CAFSAT Network evaluation and re-engineering

That:

A Joint Technical Team for CAFSAT network evaluation and re-engineering **(JTT)** is established with Term of Reference and Work Programme presented in **Appendix D**.

PART II: REPORT ON AGENDA ITEMS

Agenda Item 1: Review of CNMC Terms of Reference

1.1 The meeting reviewed the Term of Reference, Composition and Work Programme of CNMC as adopted by SAT/15 meeting held in Lisbon, Portugal, from 19 to 21 May 2010 through its Conclusion 15/03.

1.2 The meeting recognized that for the successful development of CNMC current and future activities in accordance with its Term of Reference, the Members administrations/organizations should actively participate in the regular meetings and specialized technical Task forces and study Group. At this respect the following draft conclusion was formulated:

Draft Conclusion 1/01: Active participation in CNMC meetings by CNMC members

That:

CNMC Members should endeavour to actively:

a) Participate in CNMC regular meetings and technical specialized Task Forces / Study Groups and therefore,

b) Provide the suitable support to their nominated delegates in accordance with the commitment they have taken under the Terms of Reference and Work Programme of CNMC.

Agenda Item 2: Review of CAFSAT earth stations performance and operational statistics of availability for supported links

2.1 Under this agenda item the meeting noted that the CAFSAT network involves various technical components which contribute to the Quality of the Aeronautical Fixed Service provision. ICAO reminded the meeting that, due to the wide variety of network architectures, type of access used by VSAT industries worldwide, ICAO has not standardized the physical layer of communication.

2.2 The meeting was provided with the Guidelines on Performance of Very Small Aperture Terminal (VSAT) networks aiming at supporting States/Organization for the implementation and the operation of VSAT Networks developed by ICAO.
The metrics for VSAT monitoring derived from guidance material concerning the reliability and availability of radiocommunication and radionavigation aids (**Attachment F of Annex X Vol. 1)** was presented to the meeting as well as two templates developed by other aeronautical satellite network committee (SNMC) aiming to conducting a survey of the performance of the network nodes.

2.3 The meeting therefore decided to develop a **P**erformance **D**ata **C**ollection **F**orm **(PDCF)** aiming to facilitating the automation of the survey of CAFSAT network Earth Stations basics parameters and nominated ASECNA and Ghana, already tasked by SNMC to conduct similar development. Meanwhile, it was agreed to use the proposed templates as presented in **Appendix C** for he collection of CAFSAT nodes parameters for a quarterly report to the secretariat. For this reason
the following draft Conclusion and Decision were formulated:

Draft Conclusion 1/02: Development of CAFSAT Earth Stations Performance Data Collection Form (PDCF)

That:

In accordance with ICAO guidelines on Performance of Very Small Aperture Terminals (VSAT), ASECNA and GHANA, already tasked by SNMC Conclusion 18/ 02 for the matter, develop and submit to next CNMC meeting, a draft Earth Stations Performance Data Collection Form **(PDCF)** aiming to facilitating the future automation of the collection and the monitoring of CAFSAT stations performance data, taking into consideration the most sensitive components of the network.

Draft Decision 1/02: Utilization of provisional templates for the collection of the Performance data statistic of CAFSAT nodes.

That:

Meanwhile the complete development of the PDCF for the automation of the monitoring of the Network Performance, CAFSAT members adopt the templates attached in **Appendix C** and report quarterly to the current CNMC manager with copy to ICAO Regional Offices of Dakar and Lima.

Agenda Item 3: **Review/Updating of CAFSAT nodes**

3.1 The meeting discussed the issue of updating CAFSAT nodes in terms of location, geographical coordinates, frequencies plan. It was agreed to collect the basic parameters of the nodes in particular the geographical coordinates (Long., Lat.) in WGS 84 format to feed the future data base.

3.2 The meeting recognized that the proposed template in **Appendix C.1** contains fields in which those data can be filled. Therefore the meeting following Conclusion was formulated.

Draft Conclusion 1/03: Updating CAFSAT Nodes

That:

When collecting their performance data, the CAFSAT members take the opportunity to update the location of CAFSAT nodes coordinates (LONG, LAT) under WGS 84 format in order to feed the future data base and facilitate the study of future migration, if necessary, of the network on a new satellite.

Agenda Item 4: **Implementation of Special AFI RAN meeting recommendations 6/19**

4.1 Under this item the meeting analyzed the status of implementation of AFI/RAN conclusion 6/19 (***Planning, implementation and operation of very small aperture terminal (VSAT) networks in the AFI Region)*** that calls for regular meetings of all AFI networks managers.

4.2 The meeting was informed on the steps followed by AFI VSAT networks (AFISNET, NAFISAT, and SADC/2) management committees to implement this recommendation.

4.3 The outcome of APIRG/17 pertaining to the issue meeting were reported to the meeting as well as the AFISNET SNMC and NAFISAT supervisory body last deliberations on the subject.

4.4 The meeting decided on the principle of the participation of each CAFSAT member state/organization to the regular meetings of AFI VSAT managers and therefore agreed on the following draft Decision:

Draft Decision 1/02: Representation of CAFSAT members states to the AFI VSAT Managers meetings

That:

CNMC members States/Organization participate in the AFI aeronautical VSAT Managers meeting called for by Conclusion 6/19 of the SP AFI RAN meeting on the basis of representative (s) from each CNMC members Sate/Organization as stipulated by the Terms of Reference of CNMC.

4.5 The secretariat informed the meeting that the first session of the AFI aeronautical VSAT Managers was planned to take place from 13 to15 June 2011 in Durban at the kind invitation of South Africa Civil Air Traffic and Navigation Service **(ATNS).**

4.6 The meeting welcomed this initiative and encouraged CNMC members to actively attend this meeting with the view of bringing the outcome of its deliberations to the AFI VSAT Network community and proposed the following draft Conclusion

Draft Conclusion 1/04: Participation in the first AFI VSAT Managers Meeting Durban, South Africa, 13-15 June 2011.

That:

a) CNMC members should endeavor to attend or send Working and/or Information papers to the first meeting of AFI VSAT Managers, scheduled to be held in Durban, South Africa from 13 to 15 June 2011;

b) Administration/Organization should nominate their representatives with suitable provisions aiming to effectively participate in the meeting;

c) Nominated CNMC delegates ensure that the forthcoming VSAT Managers meetings consider the CNMC expectations and conclusion raised up by the first CNMC meeting.

Agenda Item 5: CAFSAT modernization and re-engineering

5.1 Under this agenda item the meeting noted that CFSAT network has been operating since 2001 over three continents (EUR, SAM, and AFI) and recognized that it modernization and re-engineering should be initiated through an harmonized approach that should involve all the stakeholders in order to ensure seamless provision of Aeronautical fixed service (AFTN, ATS/DS) supported by the Network along the EUR/SAM corridor while interfacing with AFI for a safer Air navigation service provision.

5.2 Moreover, the meeting also recognized that the forthcoming implementation of CNS/ATM components with time critical or sensitive applications (Automation of ATM in the frame of ICAO New Flight Plan Format, Sharing Surveillance data, Implementation of AMHS…) may require the modernization/re-engineering of the current VSAT Networks taking into consideration the flexibility gained with the emerging technologies and bearing in mind the necessity to ensure a comprehensive safety of the data across the Networks and a costs effectiveness of the operation for the VSAT managers.

5.3 The principle of the development of a Roadmap for CAFSAT joint technical evaluation and re-engineering was adopted by the meeting which therefore formulated the following draft Conclusion:

Draft Conclusion 1/05: Development of a Roadmap for CAFSAT joint technical evaluation and re-engineering

That:

In accordance with ICAO guidance materials (***Annexe X, Vol 1, Attachment F: Guidance material concerning reliability and availability of radiocommunications and navigation aids; ICAO Guidelines on Performance of Very Small Aperture Terminal (VSAT) Networks)*** CNMC member states develop a Roadmap for a Joint Technical Evaluation and re-engineering in the view of ensuring an efficient and optimized modernization of CAFSAT Network taking into consideration:

a) Required service performance level of the network to support the operation and development of sensitive current and forthcoming CNS/ATM components;
b) CAFSAT interoperability with its neighbouring networks;
c) Maintenance fundamental parameters governing service availability, continuity and integrity such as: reliability, turn over statistics, maintenance personnel expertise;
d) Cost-effectiveness;

5.4 The secretariat submitted to the meeting with a draft Term of Reference Composition and Work Programme of a Joint Technical Team for CAFSAT Network Evaluation and Re-engineering. The meeting discussed in length on this proposal and agreed on the amended version attached in **Appendix D** to this report. Spain was nominated to be the Team Leader of the Team whose duration is estimated to be six (06) months.

Therefore the following Decision was formulated

Draft Decision 1/03: Establishment of a Joint Technical Team for CAFSAT Network evaluation and re-engineering

That:

A Joint Technical Team for CAFSAT network evaluation and re-engineering (**JTT**) is established with Term of Reference and Work Programme presented in **Appendix D**.

Agenda Item 6: Any other business

6.1 Under this agenda item the meeting took note of the study for the implementation of a new digital network in the SAM Region (REDDIG II). The study contains the analysis of the current fixed aeronautical services, the bandwidth required to support the specified requirements, the definition and cost of a satellite REDDIG II structure model; definition and cost of a ground REDDIG II structure model; comparative study of the REDDIG II satellite and ground models and costs; analysis of the mixed model (ground and satellite network) and proposal of a final network infrastructure. The SAM ATN will be based on IP networks, its core structure will be made up by routers linking the domestic services (either current or future) to the backbone access; that is, to the new digital network.

APPENDIX A

LIST OF PARTICIPANTS / LISTA DE PARTICIPANTES
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APPENDIX B

WORK PROGRAMME

Monday, 02 May 2011

Venue: Park Hotel, Recife, Brazil

08:00 – 09:00 Registration of delegates

09:00 – 09:15 Opening Ceremony

09:30 – 11:30 Working session: ***Agenda items 1, 2 and 3***

11:30 – 11:45 Coffee break

11:45 – 13:45 Working session: ***Agenda items 4, 5 and 6***

13:45 – 15:00 Coffee break

15:00 – 15:30 Closing session

APPENDIX C1

Provisional Templates for the Collection of the Performance Statistic Data

Center

Date/

Parameters	Values	Remarks
Fixed Parameters		
Intelsat link Name	IS 901 @°E	
Transponder Number	36/36	
Satellite Earth Station Coordinates	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 C2: Provisional Templates for the Collection of the Performance Statistic Data

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	
Brazil	**Atlántico**	Dakar	CAFSAT					TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX

D2: 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
Brazil	**Atlántico**	Dakar	CAFSAT						01	02	03	04	05	06	

D3: 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 D

Central Atlantic Firs Satellite Telecommunication Network (CAFSAT) Network Management Committee (CNMC)

Terms of Reference Composition and Work Programme of the Joint Technical Evaluation and re-engineering

1. Objectives:

1.1 The main objectives of the joint technical evaluation are to:

a) Identify CAFSAT service deficiencies elements/features in accordance with ICAO guideline metrics ;

b) Make recommendations and proposals concerning the short, mid and long term solutions and strategies to be implemented, such as using appropriate human resource management, training policies and modern technologies, for achieving an enhanced, efficient, high performance, secured, CNS/ATM capability and cost-effective network, meeting interoperability and seamlessness requirements ; and

c) Evaluate the anticipated costs in view of a comprehensive project document to support a collective financing mechanism.

2. Expectations

The joint technical evaluation shall provide a detailed description and analysis of the current network features, performance and operating/maintenance costs. The following constituents shall be addressed:

2.1 - Technical

- Availability, continuity, integrity and reliability requirements;
- System maintainability;
- Frequency plan;
- Spectrum management;
- Adequacy of available bandwidth for AFTN, ATS/DS, service channels and other voice services;
- Architecture, satellite access techniques, protocols;
- Configuration management;
- Interoperability requirements;
- Ability to accommodate CNS/ATM emerging technologies (ATN applications), SUR and GNSS operations;
- Bit-oriented protocols (BOPs).

2.2 - Operational

This part of the joint technical evaluation shall clearly show up the advantages and disadvantages associated with the current network. In this connection, the following issues shall particularly be analyzed:

- Quality of Service (QoS) of ground-to-ground applications and if implemented, air-to-ground applications , based on ICAO and WMO requirements;
- Network security, confidentiality and data integrity;
- AFTN transit times against the agreed ICAO requirements;
- Implementation of TCP/IP protocol.

The joint technical evaluation shall clearly establish the extent to which the network performances

C-System configuration and performance assessment

The joint technical evaluation shall assess and provide advice on, and not limited to, the following:

AFTN

- Suitability of network topology taking into consideration ICAO specifications concerning continuity of services;
- Routing tables;
- Message switch performance assessment (dialogue, conflicts, etc.);
- Congestion, loss of AFTN messages, propagation times and quality of service (QoS).

ATS/DS

- Topology conformance to ICAO specifications to ensure continuity of services
- Implementation of voice links using Frame relay protocol stack.
- Priority management, connection time, and quality of service.
-

AMS

- Extended VHF coverage (if implemented) QoS and availability

CNS/ATM

Possibility of implementing a number of CNS/ATM functionalities (AMHS, AIDC, ADS/CPDLC, D-FIS, etc.) and meeting availability, reliability integrity and continuity performance criteria using the network infrastructure.

Enhancements

After a critical analysis of the network, showing the network capabilities and limitations, the joint technical evaluation shall propose corrective measures and/or adequate solutions to rectify any reported deviations (as required), and formulate proposals for the network re-engineering. These shall include use of appropriate human resource management policies, suitable technologies and topologies for ATS communications (ATSC) and aeronautical administrative correspondence (AAC), system reliability, data integrity, as well as network management, administration, operations, monitoring and maintenance policies, including development of a common software tool for technical statistics.

3. Project requirements

3.1. Work programme

The work programme for the conduct of the joint technical evaluation shall include if necessary some site visits, taking into consideration their roles in the regional communication infrastructure (AFTN main centres) and/or air traffic management system (flight information centres, area control centres), or associated interface problems.

However in order to take into consideration the funding concerns, the basic exchanges medium will be E-Mailing and Skype exchange ; coordinating meetings aiming to validate a crucial step of the exercise could be held.

3.2 Duration

The joint technical evaluation shall be completed within six (06) months.

4. Composition

- **ENANA (Angola)**
- **ANAC (Argentina)**
- **ATLANTICO FIR (Brazil)**
- **ASA (Cape Verde)**
- **ASECNA (Côte d'Ivoire, Mauritanie, Sénégal)**
- **AENA (Spain) - Team Leader**
- **ONDA (Morocco)**
- **NAV Portugal (Portugal)**
- **ATNS (South Africa)**
- **ICAO**
- **IATA**

5. Reference documentation

The joint technical evaluation shall be conducted using relevant provisions contained in ICAO, WMO and ITU standards, recommendations, regulations, manuals and procedures (ICAO Annexes, WMO Technical Manual on GTS – Doc 386, ITU Radio regulations), AFI EUR Navigation Plans (Doc 7474,), , APIRG Reports, CNMC Meeting Report, and any relevant document containing material that can contribute to the success of the exercise.

ATTACHMENT TO APPENDIX D

CAFSAT Network functionalities to be addressed by the Joint Technical Team

Functionalities

1. Original scope of CAFSAT network

The network was originally designed to support the following communication services in accordance with the regional Air navigation plan for the Africa-Indian Ocean (AFI), EUR/NAT and SAM Regions:

1) ATS Direct Speech between adjacent FIRs;
2) Aeronautical Fixed Telecommunications Network (AFTN);
3) Operational meteorological data exchanges (OPMET);
4) Operational Aeronautical Information Services exchanges.
5) Aeronautical Administrative support (AAC);

2. Current and future evolution of CAFSAT network

In addition to these services, the following communications are also being or will be progressively supported by the network:

1) Aeronautical Telecommunications Network (ATN) components
   - Air/ground data link applications : ADS/CPDLC, ADS-B, DFIS, VDL (if implemented) or SSR
   - Ground-ground applications: AMHS, AIDC.
2) Computer-to-computer data exchange (ICC) between ATS Flight Data Processing Systems (FDPS); and
3) GNSS augmentation data transmission and exchange.