INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICAN OFFICE

AFISNET SATELLITE NETWORK MANAGEMENT COMMITTEE (SNMC)
COORDINATION MEETING
Dakar, 26 March 2008

Agenda Item 3 : Implementation of a Joint Technical Evaluation of AFISNET Network

SUMMARY

Appendix to this paper provides the SNMC Coordinating Meeting with the initial terms of reference of the technical audit and re-engineering of AFISNET network stemming from SNMC/14 (Accra, Ghana, 17-21 January 2005), for review and update as necessary.

AFI SATELLITE TELECOMMUNICATION NETWORK
(AAFISNET)

Technical Audit and Re-engineering of the Network

Draft Terms of Reference

1 –Objectives :

1.1 The main objectives of the network audit are to:

a) identify its deficiencies and non-ICAO, WMO and ITU compliant elements/features;

b) make recommendations and proposals concerning the short-term, mid-term and long-term solutions and strategies to be implemented using appropriate modern technologies for achieving an enhanced, efficient, high performance, secure, CNS/ATM capable 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 - Network presentation and functionalities

Presentation

2.1 The network was designed as a closed user group network. Before it is established on Intelsat Satellite IS 10-02 at 359 degrees East, the continental part of the network was established on Intelsat Satellite IS 903 located at 325.5 degrees East, using the IBS operating mode on Transponder 105/105, zone beam, in B-polarization. Thereafter, as a result of a multi-vendor environment during its expansion phase, proprietary features have progressively been introduced by Administrations and Organizations as shown at **Appendix**…

Functionalities

2.2 The network was originally designed to support the following communication services in accordance with the Air navigation plan for the Africa-Indian ocean (AFI) Region:

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) Support for remote VHF voice;

6) Aeronautical Administrative support (AAC);

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

1) Aeronautical Telecommunications Network (ATN)

2)   GNSS augmentation data transmission.

3) Computer-to-computer data exchanges (ICC) between ATS Flight Data Processing Systems (FDPS); and

4) Air/ground data link applications (ADS/CPDLC, ADS-B, DFIS) (VDL or SSR Extended Squitter - ES1090).

3 – Reference documentation

3.1 The technical audit shall be conducted using relevant provisions contained in ICAO, WMO and ITU standards, recommendations, regulations, manuals and procedures (ICAO Annex 10, WMO Technical manual on GTS – Doc 386, ITU Radio regulations), AFI Air navigation plan (Doc 7474), AFI CNS/ATM plan (Doc 003), APIRG Reports, SNMC meeting Reports and European Union Evaluation Mission Report (2003).

4 – Expectations

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

a - Technical

- Availability, continuity and reliability requirements;
- System maintainability;
- Frequency plan;
- 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) and SADIS operations;
- Bit-oriented protocols (BOPs).

b - Operational

This part of the audit 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 for ground-to-ground applications and air-to-ground applications, based on ICAO and WMO requirements;
- Network security, confidentiality and data integrity;
- AFTN transit times against the agreed requirements;
- Implementation of TCP/IP protocol stack.

The audit shall clearly establish the extent to which the network performances are SARPs-compliant and meet users' needs.

c - Economic/Financial

This part of the audit shall include comparative cost-effectiveness, value for money and cost-benefit analyses related to systems acquisition, installation, operating and maintenance costs, together with proposals taking due account of the quality of the services rendered to users. A cost-recovery mechanism together with appropriate institutional arrangements shall also be studied based on existing examples in the Region.

System configuration and performance assessment

4.2 The auditor shall assess and provide advice on the following:

- ✓ AFTN

    - Suitability of network topology taking into consideration ICAO specifications concerning continuity of services;
    - X25 links routing tables;
    - Message switch – X25 switch and Frame relay combination: performance assessment (dialogue, conflicts, etc.);
    - X25 encapsulation using Frame Relay;
    - 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 QoS.

- ✓ 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

4.3 After a critical analysis of the network, showing the network capabilities and limitations, the audit 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 technologies, suitable topologies for ATS communications (ATSC) and aeronautical administrative correspondence (AAC), system reliability, data integrity, as well as network management, administration, monitoring and maintenance policies, including development of a common software tool for statistics.

5 – Audit requirements

Duration:

5.1 The audit shall be completed within three (3) months.

Audit management:

5.2 The auditor shall prepare a work programme for the conduct of the audit. Technical proposals from the auditor shall include the methods of work, need for resources, site visits and planning.

Audit Report:

5.3 The draft Report on the audit shall be compiled within thirty (30) days following the end of the audit, and circulated to the States and Organizations through the ICAO Regional Office, Dakar for their prior comments before it is finalized.

6 – Auditor's profile

6.1 The auditor to be selected with the assistance of ICAO shall have the following references and experience:

- Solid references in the field of satellite telecommunications, including the types of the network operated earth stations;
- Sound knowledge of ICAO, WMO and ITU standards, recommendations and procedures;
- Excellent command of satellite networks management, administration, operations and maintenance; and
- Good experience with the INTELSAT system and knowledge of INMARSAT system.