



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICA OFFICE**

**Sixth Meeting of the Central Atlantic FIR Satellite Network (CAFSAT) Management Committee
(CNMC/6)
(Lisbon, Portugal, 6-7 June 2016)**

Agenda item 4: CAFSAT re-engineering and modernization

CAFSAT stations upgrade. Phase 2.

(Prepared by ENAIRE, ONDA, NAV Portugal and Aicox and presented by Portugal)

SUMMARY

This Working Paper presents guide lines for future implementation of phase 2 of CAFSAT stations.

Reference: Document “Technical Study for CAFSAT network upgrade – February 2012”.

1. Introduction

During last AEFMP Technical Working Sub Group meeting (Lisbon 30th and 31st March 2016), some issues that depends on future developments of CAFSAT stations were raised, mainly:

- Plans of ONDA to install new CAFSAT station in the future Agadir ACC;
- Plans of NAV Portugal to install new and powerful transmitters in Lisbon station to have the possibility to increase the bandwidth of Lisbon station in order to implement new services.
Existing transmitters in Lisbon and Santa Maria are reaching end of life.

In order to discuss these short term issues and find solutions for the evolution of CAFSAT stations, a meeting was organized by ENAIRE in Madrid on May 25th 2016.

The meeting was attended by ENAIRE, ONDA and NAV Portugal.

On 26th May 2016 the Aicox company joint the three ANSP's to precede the discussions and to propose solutions.

The results of the discussions are the guide lines presented below.

2. Presentation

Following the guidelines presented in CNMC/1 and after most of the stations have already implemented the Phase 1, an analysis of the different options to implement phase 2 (evolution of CAFSAT) was done during the meeting.

2.1. Three different possibilities raised in the analysis:

- Centralize the management for all stations. This was discarded due to institutional difficulties to implement this approach. Taking into account the structure of the network and the different regions involved, it is not possible to centralize the management of the network. This solution would also imply that all the stations have to migrate the satellite modems at the same time, which is also a very unlikely scenario.
- Use an external satellite communications service provider following a service model. This approach is very difficult to be implemented due to the same reasons that the first option.
- Continue with the current CAFSAT network approach (decentralized CAFSAT stations being ANSPs responsible of procurement and operation of them) with a satellite modem that is fully compatible with the actual network. This is the more suitable option, choosing a modem that is compatible with the ones already installed in the different CAFSAT stations and that is a state-of-the-art equipment with features that allow bandwidth savings using modern FECs and Turbo codecs and compatible with modern equipment using IP connectivity. There is an equipment that fulfills all this requirements and has already been installed in some CAFSAT stations that is the Radyne DMD20.

2.2. Following this analysis, the recommendations for CAFSAT Phase 2 would be to substitute the old modems, modulators and demodulators of the stations with Radyne DMD20.

2.3. There are other 2 issues that were identified in the meeting and discussed in order to get some alternatives and solutions.

2.3.1. First one is the Satellite end of life. The current satellite used by CAFSAT is the Intelsat IS-901, which is supposed to go end of life in 2018. There are different alternatives also to be considered at this point:

- Frequency Band. The first question is if the change of frequency band should be considered as an option. The option of going to Ku band was raised in the meeting. Nevertheless, this option has several disadvantages: higher attenuation with rain, change of all RF equipment (antenna, HPAs, LNBS...) in all CAFSAT stations with a deadline, negotiation of new contracts for each country. For these reasons, continuation in C-Band is considered the best option.
- Potential change of the satellite operator. This issue requires a deeper analysis to check if there is an alternative satellite operator in the market with other satellites providing global coverage with similar EIRP. In case there is another satellite available, it would be necessary to negotiate and sign new contracts, which can be a complicated institutional issue.

2.3.1.1. Considering the rational explained above, Intelsat was contacted to know about their plans for this issue. Intelsat answered that they will launch a new satellite, the IS-37, to ensure the services they are giving to their customers using IS-901. This satellite will be located in the same orbital position, which means there will be no need to point the antennas and the frequencies will be in the same range as the current ones. Intelsat will send a notification to all clients with this information and the new frequencies with enough time to be able to plan a smooth and seamless migration.

2.3.1.2. Therefore, the conclusion of the analysis is that the best option is to continue with the same satellite operator unless we can find another option that has considerable economical savings.

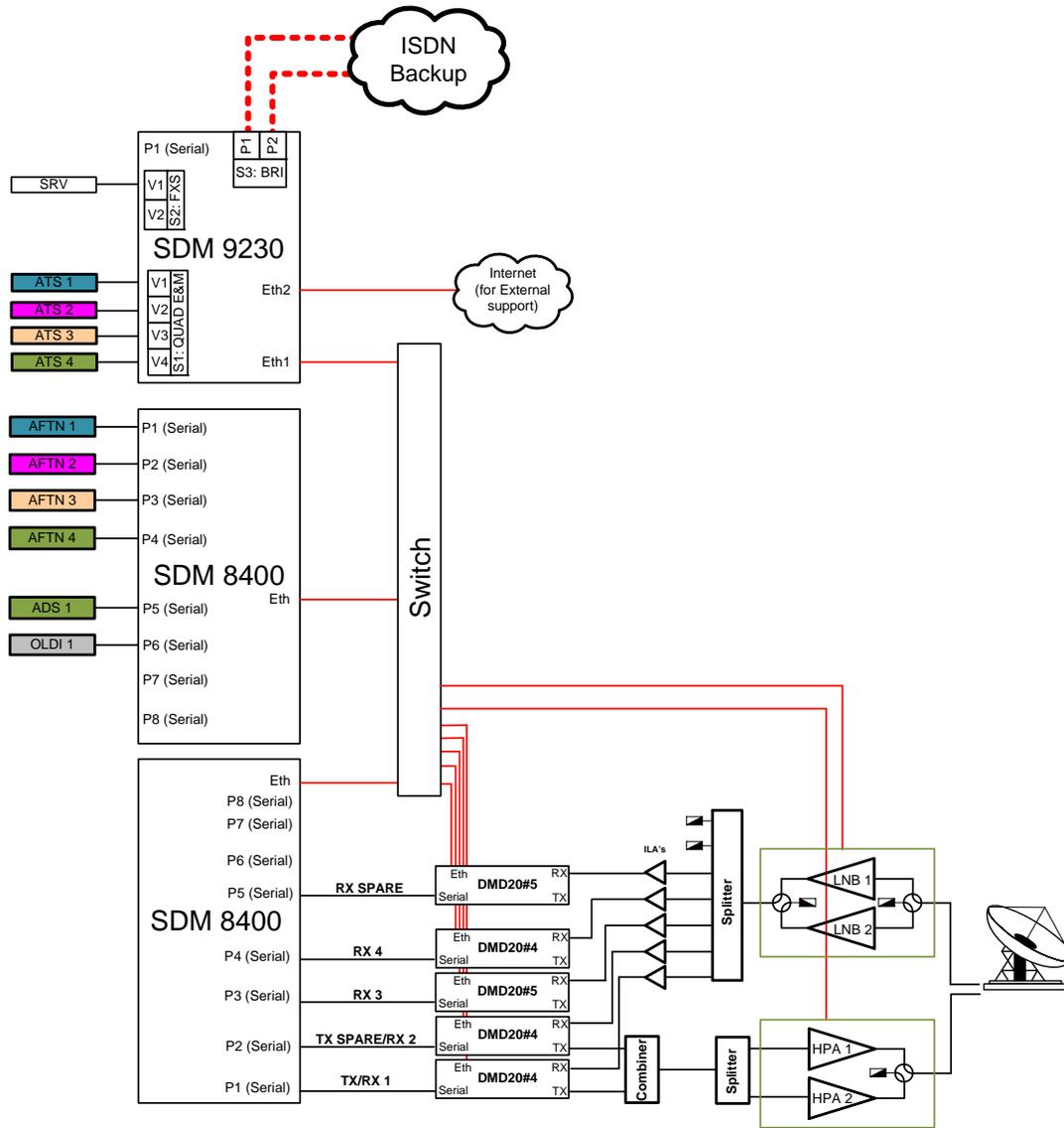
2.3.2. The second issue is related to the M&C system of CAFSAT stations. The company that was giving the maintenance and updates for the current M&C, ISDEFE (ex INSA), has decided to discontinue this business line, which brings up a problem for the support of the systems currently running and also for updates to Phase 2 of the different stations. As a solution for this issue, ISDEFE has introduced a company (Aicox) that has been providing them support in several projects during the last years (including CAFSAT in which Aicox has been an equipment distributor for ISDEFE and INSA and also given engineering support). ISDEFE has reached an agreement with Aicox to pass the necessary know-how and tools to be able to give support for current M&C installed and also for future updates of the systems.

Aicox has presented in the meeting its capabilities as an engineering company to provide any kind of support to CAFSAT users: Design, hardware installations/updates, software maintenance/updates.

2.4. For the definition of the evolution of CAFSAT network (CAFSAT 2), it was found necessary to provide some guidelines regarding the different components of the system. A resume of the guidelines concluded in the meeting can be found here below:

- Baseband: The plan for the baseband is to continue with the update proposed in Phase 1 based on Memotec NetPerformer equipment that has already been adopted by most of the countries.
- Satellite Modems: As defined before in this document, the chosen equipment to substitute the old modems is the Radyne DMD20 that is fully compatible with the modems installed in the network. They have been already installed in the CAFSAT stations that have been upgraded in the last years.
- RF: The stations that have not upgraded the HPAs in the last years (excluding stations that have been installed recently) are equipped with transceivers that are probably going to end of life and may start failing sooner than later. There are different options for the update of this equipment in the market. All equipment installed in CAFSAT is either from ANACOM or Terrasat manufacturers. Therefore the recommendation is to choose equipment from one of these two brands. Regarding the type of equipment, most of the current installed devices are Transceivers with input frequency 140MHz because old modems worked with that Intermediate Frequency. Nowadays it is still possible to use this equipment but most of the modems currently work in L-band and it is more usual to use BUCs. So the recommendation would be to use BUCs of one of the two brands already mentioned even Transceivers are also acceptable. Depending on the solution adopted, it may be necessary to do small changes in the station, like RF cables between equipment and antenna. There is no need on any change in the antenna itself at all as well as in the LNBS unless it is necessary for a specific station.
- M&C: All equipment of CAFSAT 2 must support SNMP over IP management capabilities. All equipment recommended before has SNMP features but in some of the cases it might be not included by default but as an option. Therefore, every country installing new equipment in a station has to make sure this equipment include SNMP.

A generic diagram of CAFSAT 2 can be found below:



3. Action by the meeting

The meeting is invited to:

Discuss and endorse the content of this WP.

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(4 pages)