

---

**Agenda Item 3: Formulate solutions to outstanding problems and the most efficient and reliable way to meet AFS communication requirements among users, of different digital communication networks**

3.1 Taking into account several Working Papers presented, the Meeting analyzed the development of the national and regional implemented digital networks as well as those that are under implementation with different technologies from the CAR/SAM Region. As established in the ANP CAR/SAM FASID, the Meeting examined the voice plus data communications requirements in the boundaries of the CAR/SAM Regions that are not yet implemented or that present deficiencies reported by States/Territories/Organizations.

3.2 Taking this into account, and as per Conclusions 9/8 and 13/28 of the CAR/SAM/3 RAN Meeting, the Meeting analyzed several solution alternatives to the voice and data requirements. Even though in many cases requirements are met through current communications arrangements in a reliable and efficient manner, the Meeting considered several alternatives based on the new digital technologies that are already or in the process of being implemented in the CAR/SAM Regions; especially those that are based on VSAT or optic fibers technologies. This is targeted to accomplish a new digital platform for the current and future development of the AFS.

**3.3 Alternative solutions for digital networks interconnection**

3.3.1 The alternative solutions are proposed from the most adequate technical framework, considering from the simple communications solution of point-to-point circuits leased to public carriers and/or using the network environment of the implemented or to be implemented digital networks established through multilateral agreements or of property of a particular State or Organization.

3.3.2 In analyzing all possible alternatives based on existing VSAT and other digital technologies, the Meeting agreed to consider that in order to make future plans it must be emphasized that the technology has an actual life of ten years and that an update should be made when it is five years old.

3.3.3 The Meeting agreed that it is necessary to prepare solution alternatives to be addressed to establish connection among determined operational and technical dependencies of these network environments, as explained under Agenda Item 2.

3.3.4 Taking into account the interconnection architecture's point of view, voice requirements were considered by the Meeting, since these are most critical and practically define this architecture. In this respect, solutions were identified in which the delay of voice from end to end, for analogue or digital solutions, will be a maximum of 0.4 seconds (ITU Rec. G114). The Meeting also took note that in the new communication schemes of CNS/ATM systems, the AIDC (ATS interfacility data communication) application is considered. This eliminates the delay restrictions imposed to the voice communications. In this new environment the digital network compatible with the ATN Internet will provide the platform for the internetworking of CNS/ATM applications, such as the AIDC, which should be encouraged for its implementation. To outline the solution alternatives for interconnection in the boundaries of the CAR/SAM Regions, several alternatives were considered to apply options of common solutions; these alternatives are presented as **Appendixes A and B** to this part of the Report. In so doing the interconnection requirement groups were identified as follows:

**Group A** ATS speech coordination requirements among the ACCs of San Juan and Piarco with the ACCs of Maiquetía, Georgetown, Paramaribo and Rochambeau as required. This involves the E/CAR and the future REDDIG networks.

**Group B**      ATS Speech coordination requirements among Cenamer, Panama, Kingston and Curaçao with the ACCs of Guayaquil, Bogota, Barranquilla, Medellin and Cali. This involves the MEVA, REDDIG and Colombian VSAT networks.

**Other requirements.**    ATS communication requirements ATS Curaçao ACC – Maiquetía ACC Panama ACC-EI Coco APP and San Andres APP - Panama ACC-.

3.3.5            The technical/economical study of the different solution alternatives is presented in **Appendix I**. Taking into account the decision taken by the Meeting a brief summary of the alternative solutions is also presented to this part of the Report.

### **3.4                Solutions for Group A**

3.4.1            The ATS speech coordination requirements contained in *Group A* consider the stations in the FIRs of the States/Territories of: French Guiana, Suriname, Guyana, Venezuela, Netherlands Antilles, United States and Trinidad and Tobago and are indicated in Appendix B.

3.4.2            In **Appendix C** to this part of the Report a possible solution to satisfy the above requirements, using the REDDIG and E-CAR networks is presented. The chart in Appendix C is explained hereunder.

- 1)                To satisfy voice requirements among Piarco ACC with the ACCs of Rochambeau, Paramaribo, Georgetown and Maiquetía, it should be noted that the REDDIG will have nodes located at the mentioned SAM ACCs. At the same time, Maiquetía (entry/exit point to E/CAR network) will have a node (multiplexer) of the E/CAR network which will be connected for voice and data through terrestrial channels (optic fiber) to a similar installation in San Juan, Puerto Rico, and, in the near future, to the E/CAR multiplexer in Piarco. Taking this into account, a speech channel in the Maiquetía FRAD/SW connected to the E/CAR multiplexer for the Piarco voice channel can be foreseen, which would be shared with the ACCs of Rochambeau, Paramaribo and Georgetown. The signaling, numbering code conversion and other technical aspects for the connection of the REDDIG and E/CAR networks must be thoroughly studied at the level of the corresponding user interfaces. The communication between Piarco and the mentioned SAM ACCs will be established in the future, through the E/CAR network, through two routes, San Juan and Piarco. The coordination between Piarco and Maiquetía could be carried out as it is currently carried out or through the connection to San Juan by the E/CAR network, while the connection to the Maiquetía and Piarco E/CAR multiplexers are established; this communication will also have in the future two routes within the E/CAR network.
- 2)                Coordination between San Juan ACC and Maiquetía ACC is already established through the E/CAR network.
- 3)                AFTN data and the future ATN remain the same, which is already recommended or will be recommended in the FASID.
- 4)                It is important to discuss the communication costs through the REDDIG and E/CAR networks, since the communication providers would have to provide the necessary additional capacity to carry out the indicated solutions. (This aspect should be thoroughly analyzed).

---

### **3.5 Alternative Solutions for Group B**

3.5.1 The ATS speech coordination requirements contained in *Group B* consider those established in the FIRs of the States/Territories/Organizations of: Colombia, Ecuador, Curaçao, Jamaica, Panama and COCESNA.

3.5.2 The Meeting considered that for *Group B*, the following solutions should be examined:

#### **Option 1**

Conclusion 9/8 was formulated at the CAR/SAM/3 RAN Meeting, which recommends the extension of the Colombian VSAT network to Panama, Jamaica, Netherlands Antilles and COCESNA. During the Meeting, Colombia presented detailed information on its VSAT network for the installation of VSAT nodes of this network at the ACCs of Panama, Kingston, Curaçao and Cenamer. Moreover, the Meeting took note that based on the last operational letter of agreement, Colombia-Ecuador, the Colombia VSAT network will be extended to Ecuador through the installation of a node in Guayaquil. The Meeting, on the basis of this proposal, examined the advantages and left it to the States to decide on this matter. The proposal had merit, since it completely fulfils the ATS speech communications requirements previously mentioned, even though several considerations related to the efficient use of the bandwidth were considered. Furthermore, it was noted that Ecuador (Guayaquil ACC) will be able to benefit from the Colombian network for its communications with Cenamer. According to the AFTN it was noted that circuits can be broadened as a consequence of speech communications and the availability of bandwidth.

#### **Option 2**

This option contemplates the installation in Colombia of a MEVA node (**Appendix G**). This option is also of merit since it also meets the speech communications requirements previously mentioned and could also give access to Guayaquil ACC. Nevertheless, this option should be examined under the light of economical aspects and available plans to restructure the MEVA in correspondence to the agreements reached during MEVA/7 Meeting, which foreseen the possibility of a MEVA II network. This planning process towards MEVA II could be initiated in the next months with the emission of a Request for Information (RFI) from ICAO, through which and on the basis of replies from potential future competitors a decision will be taken. In this respect, the Meeting took note of this option, which consists of establishing a provisional solution, while a decision regarding MEVA II is taken.

#### **Option 3**

There are two possibilities within this option, as follow:

### Option 3a

The proposal in **Appendix E** to this part of the Report, consists in installing in Bogotá a multiplexer to integrate voice and data, which could be the one used in the E/CAR Network, to take advantage of this network's infrastructure. To this multiplexer, two voice circuits would be connected, that would be trunk circuits of the Harris 20/20 voice switch, which would be programmed to be connected to 5 subscriber circuits corresponding the ACCs of Bogota, Barranquilla, Cali, Medellin and Guayaquil. The connection from these ACCs should be made through ground circuits. This multiplexer would be connected by optic fiber to a similar installation in San Juan or Miami, where the voice channels would be then connected to the MEVA network, which would extend them to the subscribers of the ACCs of Panama, Kingston, Curaçao and Cenamer. The details with regard to signaling, numbering plan and others will be able to be discussed further on. As in options 1 and 2, the communications provider costs must be analyzed. With regards to the AFTN network, the Meeting took note of the implementation of an AFTN/X.25 circuit between Bogota and United States.

### Option 3b

In this option, contained in Appendix E, the Bogota FRAD/SW REDDIG is used to connect the voice circuits from the Bogota voice switch. In accordance with the REDDIG system planning, this FRAD/SW in Bogota must be connected with the Maiquetía FRAD/SW through optic fiber (existing), to have an alternate ground means as back up. This ground means would be taken advantage for the REDDIG/E/CAR/MEVA connection. Once the voice circuits are at user interface level at the Maiquetía FRAD/SW, the same would be extended to the E/CAR multiplexer and from there to a convenient point in the MEVA network (San Juan or Miami), as previously indicated. The details with regard to signaling, numbering planning and other aspects will be able to be discussed in detail further on. As in the previous options, the communications provider costs must be analyzed. With regard to the AFTN network, an AFTN/X.25 circuit between Bogota and United States could be taken into consideration, as indicated in Option 3a.

## 3.6 Other Alternatives

3.6.1 The ATS speech communication requirements of this alternative include those established among ATS facilities that are indicated in Appendix B.

3.6.2 In relation with the requirement Curaçao APP- Maiquetía ACC there are the following options:

**Option 1:** To establish a connection in the MEVA Network in San Juan that would provide a speech circuit from Maiquetía through the E/CAR Network, as shown in Appendix C. The technical aspects of numbering, signaling and others must be studied in detail.

**Option 2:** Implementation of the MEVA Network in Caracas (Appendix G).

**Option 3:** Use the National networks of Colombia and Venezuela (**Appendix D**).

3.6.3 In relation with the ATS speech communication requirement El Coco APP-Panama ACC, the following options were considered:

- Option 1:** To connect El Coco APP to the COCESNA MEVA node and to extent the circuit to Panama by means of MEVA.
- Option 2:** Implementation of a CENSAT Network node in Panama.
- Option 3:** Implementation of a MEVA Network node in Costa Rica.

3.6.4 In relation with the ATS speech communication requirement San Andres APP-Panama ACC, several options could be outlined depending on the availability of ground circuits, however, besides the option considered in the Colombian network, another one could be the establishment of a digital ground circuit between Panama and Bogota connected to corresponding multiplexers to be provided in order to integrate a voice and a data channels for the implementation of the AFTN circuit connecting the AFTN communication Centres of Panama and Bogota and the ATS speech communication requirement Panama ACC-San Andres APP with the condition that Colombia may connect the voice channel from San Andres to the multiplexer in Bogota as shown in **Appendix F**.

3.6.5 After studying all of the alternatives, the Meeting agreed that in order to complete the analysis and selection of the solution alternatives for each group, it is necessary to obtain further information regarding technical conditions as well as cost aspects. Moreover, the fact that some States and Territories who have incidence in the solution alternatives did not attend this Meeting showed that it is imperative to know their opinion especially in those aspects where they are directly involved.

3.7 Taking the aforementioned into account, the Meeting prepared the following Conclusion:

**Conclusion 1/1            Solution alternatives studies for the interconnection of the regional/domestic digital networks in the CAR/SAM Regions**

That:

- 1) the CAR/SAM States/Territories/Organizations take the necessary actions in order to:
  - a) complete the studies aimed at selecting the solution alternatives for the network interconnection in the boundaries of the CAR/SAM Regions;
  - b) consider for the above study the interconnection requirements indicated in Appendixes A and B;
  - c) complete the studies of the alternatives indicated in Appendixes A, B, C, D, E, F, G and **H** including the completion of their technical advantages and disadvantages upon the different groups of the established AFS requirements;
  - d) complete the economical analysis of each solution alternative based on the information contained in **Appendix I** and in other pertinent information; and
  - e) use the forms and guidance material for the preparation of proposals regarding interconnection of digital networks, contained in **Appendix J**, in order to proceed with the work referred in paragraphs c) and d).
- 2) the ICAO Regional Offices provide the necessary assistance for the development of 1) above.