MR/5 - WP/02
12/09/07

International Civil Aviation Organization
Fifth MEVA II / REDDIG Coordination Meeting (MR/5)
Mexico City, Mexico, 3 to 5 October 2007

Agenda Item 1: **Review of the Responses to the Technical-Economical Request for Proposal (RFP) for the MEVA II/REDDIG Interconnection**

FOLLOW UP TO THE RFP PROCESS FOR MEVA II / REDDIG INTERCONNECTION

(Presented by the Secretariat)

SUMMARY

This working paper describes the activities carried out by the MEVA II / REDDIG Interconnection Task Force in the elaboration of the request for technical and cost proposals (RFP) document for MEVA II / REDDIG interconnection to be presented to the MEVA II service provider and the REDDIG Administration. In addition, the approval process by MEVA II and REDDIG networks members is analysed, as well as the questions formulated by the MEVA II service provider and the REDDIG administrator to the RFP document, plus the Task Force's replies.

1. Background

1.1 The Fourth MEVA II / REDDIG Coordination Meeting (MR/4), held in Lima, Peru, from 7 to 9 March 2007, agreed to elaborate a Request for Technical and Cost Proposals (RFP) document for MEVA II / REDDIG interconnection. This RFP would be requiring, from the MEVA II service provider and from the REDDIG Administration, a technical analysis to the solution proposed for the implementation of MEVA II / REDDIG interconnection, as well as the fixed and recurrent costs derived from the implementation and provision of inherent services.

1.2 In this regard, during the aforementioned meeting, and Ad-hoc Group was established, composed by Argentina, Brazil, Colombia, Ecuador, United States, Panamá, Venezuela, COCESNA, REDDIG Administration and MEVA II Service Provider.

1.3 The Ad-hoc Group elaborated a preliminary Request for Proposal (RFP) during the meeting and decided that the MEVA II / REDDIG Interconnection Task Force finish the RFP (Decision 4/1 – *Elaboration of a RFP for MEVA II / REDDIG interconnection*), under the coordination of COCESNA.

2. Analysis

2.1 The MEVA II / REDDIG Interconnection Task Force completed the RFP document in accordance with the date established in MR/4 meeting Conclusion 4/2 – *Approval and response to the MEVA II / REDDIG RFP* and Conclusion 4/4 – *Adoption of the action plan for MEVA II / REDDIG interconnection*.

2.2 The ICAO NACC and SAM Regional Offices, through letters LN 3/20.3.4-SA327 of 9 May 2007 and N1/3.6.3 EMX0487 of 17 May 2007, respectively, sent the RFP document to all MEVA II / REDDIG States, Territories and one International Organisation, for their review and approval. Copy of the RFP is shown in **Appendix A** to this working paper.

2.3 Of all the States, Territories and one International Organisation members of the mentioned networks, replies were received from Argentina, Brazil, Chile, Colombia, Cuba Paraguay, Peru, Uruguay, United States, Venezuela and COCESNA. These States/International Organisation indicated in their reply to be in agreement with the RFP document. It was considered that MEVA II / REDDIG network members that had not replied were in agreement with the RFP document, as specified by the letters sent by the ICAO Lima and Mexico Regional Offices (LN 3/20.3.4-SA441 of 2 July 2007 and N1/3.6.3 EMX0593 of 19 June 2007, respectively).

2.4 In this regard, upon continuing with the activities proposed in MR/4 Meeting Conclusions 4/2 and 4/4, the ICAO Regional Offices sent the RFP to the MEVA II Service Provider and REDDIG Administration, respectively, through letters N1/3.6.3–EMX0739 of 6 August 2007 and LT 12/1.2.1.2–SA564 of 8 August 2007.

2.5 The MEVA II Service Provider and the REDDIG Administration, upon analysing the RFP, formulated some questions concerning the interconnection. **Appendices B** and **C** to this working paper include a copy of same, together with the replies from the MEVA II / REDDIG Interconnection Task Force in this regard.

2.6 It is expected that the MEVA II Service Provider, and the REDDIG Administration, present their responses to the RFP, through WP/03 and WP/04 of this Fifth MEVA II / REDDIG Coordination Meeting.

2.7 As regards the MEVA II / REDDIG interconnection time frames, it should be again mentioned that the RFP elaboration by the MEVA II / REDDIG Interconnection Task Force was carried out within the date established (30 April 2007). The review of the RFP by MEVA II and REDDIG States, Territories and one International Organisation suffered a certain delay over the estimated date (31 May 2007). This contributed to a delay in the reception of replies on behalf of the MEVA II Service Provider and the REDDIG Administration, therefore, they are expected to be received by the last week of September 2007.

3. Suggested action

3.1 The Meeting is invited to:

a) take note of the information provided;

b) analyse the actions carried out for the elaboration of the RFP document, its review and approval by MEVA II / REDDIG networks member States, Territories, Organisations, as well as the replies to the questions from the MEVA II service provider and REDDIG administrator, presented in Section 2 and Appendices A, B and C to this working paper; and

c) review any other related matter that the Meeting might consider appropriate.

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APPENDIX / APENDICE A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REQUEST FOR TECHNICAL AND COST PROPOSALS (RFP)

for

INTERCONNECTION OF THE MEVA II AND REDDIG SATELLITE TELECOMMUNICATIONS NETWORKS

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SECTION 1. GENERAL ADMINISTRATIVE PROVISIONS

This Section describes the general purpose and scope of International Civil Aviation Office (ICAO)'s MEVA II / REDDIG Interconnection programme and provides specific instructions to the MEVA II Service Provider and the REDDIG Administration regarding preparation and submission of technical and cost proposals for the telecommunications service requirements specified herein.

1.1 Statement of Purpose

The purpose of this RFP is to solicit a proposal for the interconnection of the MEVA II and REDDIG VSAT Telecommunication Networks.

The physical site locations of air traffic control facilities to be interconnected:

- Aruba
- Venezuela
- Colombia
- Brazil
- Peru
- Netherlands Antilles, Curacao
- USA, Puerto Rico, San Juan
- Guayaquil, Ecuador
- Jamaica, Kingston
- USA, Miami, FL
- Panama, Panama
- COCESNA, Honduras, Tegucigalpa

By issuing this RFP, the ICAO NACC and SAM Offices seek to interconnect specific MEVA II and REDDIG nodes and award a service contract that will expire on the 5-year anniversary date of the MEVA II contract.

1.2 Scope of Work

The scope of work for the MEVA II / REDDIG Interconnection project will consist of providing:

A complete and detailed Proposal for achieving the interconnection requirements according to their present equipment expertise i.e. MEVA II equipment with Americom Government Services (AGS) and REDDIG with the REDDIG Administrator, including equipment and services as well as any consideration/condition for its installation and operation. This proposal should be aimed finally in the ease of achieving the integration of both MEVA II and REDDIG Networks.

Both AGS and REDDIG Administration shall be responsible for doing the jobs without interruption to critical aeronautical communication services and providing the best technical and cost-efficient solution considering the existing equipment and the requested bandwidth potential growth.

Proposal from AGS and REDDIG Administration must include a complete and detailed description of the solution and its unitary cost for each item.

1.3 Historical Perspective

During the second MEVA II/REDDIG coordination meeting held in Lima, Peru from 20 to 22 March 2006, the meeting formulated the Conclusion 2/1 - *Implementation of communication interoperation requirement among the CAR, NAM an SAM region supported by VSAT networks.*

GENERAL ADMINISTRATIVE PROVISIONS

SECTION 1. GENERAL ADMINISTRATIVE PROVISIONS

The first meeting of the MEVA II/REDDIG Interconnection task force analyzed the subjects related with technical, operational control, and management for the Integration and Interconnection solutions. A cost benefit analysis was made for each of the solutions.

At the third MEVA II/REDDIG Coordination Meeting (Mexico City, 26-28 July 2006) it was considered that the technical operational solution to first adopt would be the MEVA II / REDDIG interconnection and, after the end of the MEVA II contract, the MEVA II/REDDIG integration would be implemented.

Second meeting of the MEVA II/REDDIG interconnection task force (Lima, Peru, 2-3 October) considered that the implementation of the MEVA II modem in Bogotá and Caracas, as well as the REDDIG modem in COCESNA, would permit MEVA II and REDDIG member to analyze the reliability of the networks during the transition phase, before implementation an integrated MEVA II/REDDIG network with only one management center.

Following the Conclusion 5/1 formulated during the Fifth Meeting of the CNS Committee (Lima, Peru, 13-17 November 2006), during the Fourth MEVA/REDDIG Coordination Meeting (Lima, Peru, 7-9 March 2007) it was agreed on the elaboration and preparation of a Request for Proposal (RFP) for the Interconnection works and its implementation (Decision 4/1).

1.4 **The Present MEVA II and REDDIG Networks**

1.4.1 **REDDIG**

System Description

1.4.1.1 **Services**

REDDIG Satellite network provides currently high quality Air Traffic Control voice and data services at sixteen sites in thirteen countries on the South America Region and one country from the Caribbean Region. The network uses VSAT (Very Small Aperture Terminal) technology using 3.7m C-Band antennas operating over the IS -1R satellite. The principal user services provided are voice and data. The network also supports a RC&M (Remote Control & Monitoring) service for efficient management of the network. The user voice services actually comprise three separate voice networks overlaid on the same bearers. These are the two Air Traffic Services - ATSd (hotline circuits) and ATSa (switched circuits) and the Administrative (switched) voice networks. Voice services are interfaced in an analogue fashion (E&M, FXS, FXO) or digital (E1 CAS & CCS) according to local requirements. The user data services comprise four networks also overlaid on the same satellite bearers. The initial service provided is 27 point-to-point asynchronous data links for the Aeronautical Fixed Telecommunication Network (AFTN). There are also point-to-point radar links implemented using various synchronous protocols. The Global Navigation Satellite Service (GNSS) network is implemented using the frame relay protocol on a high speed serial synchronous interface. The Aeronautical Telecommunication Network (ATN) is supported through a switched X.25 interface. The RC&M service comprises distributed elements (the local control and monitoring computer) and centralized elements, the Network Control Centre (NCC). Both the local and centralized elements may be accessed by remote control from any site. The RC&M network (which interconnects these elements) operates over-the-satellite and is a routed Bandwidth on Demand (BOD) IP network accessed through the Ethernet Hub at every site. To facilitate automatic Master Reference

Terminal (MRT) redundancy there is also a direct bridged connection between the Ethernet Hubs at SAEZ and SBMN using a terrestrial link provided by the customer.

1.4.1.2 **Theory of Operation**

The user services connect to the REDDIG Network using dual redundant Frame Relay Access Devices (FRAD). The FRAD provides the diverse range of interface and protocol support required by the user's voice and data equipment. The FRAD provides voice and data switching functions allowing both permanent and switched circuit operation. All user services are multiplexed onto a single WAN interface using the Frame Relay Protocol. The MPS-FRAD prioritizes services so that they may co-exist on the same physical connection. Each FRAD defines a unique multiprotocol packet encapsulated (MPE) permanent virtual circuit (PVC) route for every possible destination. The majority of user services are interfaced through the Multiprotocol Packet Switching (MPS) FRAD – this FRAD also connects directly to the satellite terminal. On sites that utilize a digital voice interface this is the only type of FRAD required. Sites, like Piarco, that use an analogue voice interface are also equipped with a Multiplexer (MUX) FRAD that accommodates additional analogue voice cards. The MUX FRAD connects to the satellite terminal through the MPS FRAD using a 2Mbit/s link.

The bearer WAN network is provided by satellite terminal equipment, which implements the Multi-Frequency Time Division Multiple Access (MF-TDMA) protocol. Unlike conventional networks using continuous carriers, TDMA operates in burst-mode using a modulator that is agile in time, frequency and symbol rate. In the REDDING Network modulators may burst on any of three different carrier frequencies. The bottom two carrier frequencies accommodate 1.25Msym/s carriers and the top carrier frequency accommodates a further 0.625Msym/s carrier. As the Network Traffic expands it is possible to define further carriers, without any modification to the terminal hardware. The Master Reference Terminal (MRT) transmits a reference burst on the carrier 1 frequency which marks the beginning of the TDMA frame. All terminals in the Network receive this burst and thus are able to establish network timing. Further timeslots at the beginning of the burst frame are reserved for control bursts, signaling bursts and acquisition bursts and so these timeslots are not available to carry user traffic. When terminals transmit traffic bursts they use the frame structure defined by the reference burst to transmit in a previously agreed timeslot. The transmit burst timing is adjusted in a precision manner to ensure that bursts on a given frequency do not overlap as they pass through the satellite transponder. Each terminal has knowledge of its distance from the satellite and so is able to make the necessary timing correction.

It is important to understand however that each traffic terminal site only contains a single modulator and demodulator online at any time. What this means in practice is that whilst the modulator is bursting on say carrier 1 frequency in a particular timeslot, it cannot also be bursting at the same time on a different frequency. The same rule applies for a demodulator – it cannot receive on two frequencies simultaneously. The clever part of MF-TDMA is how the central controller (the NCC) manages the use of timeslots and carriers in response to demands for bandwidth on particular virtual circuits. It acts to make best possible use of the satellite bandwidth by grouping traffic amongst corresponding (ie communicating) terminals in different timeslots in the frame. When the traffic increases, the NCC starts to allocate burst timeslots from the second carrier. This process continues until all the timeslots on all the carriers are full at which point the network capacity limit has been reached. The process is also however subject to both receiving and transmitting blocking. When the network becomes very busy and high proportions of the available timeslots are used it can be the case that a new traffic demand cannot be satisfied. This is because all the available timeslots on the remaining carrier frequency are already being

used by either one or both of the terminals on different carrier frequencies. The TDMA terminals support two types of Permanent Virtual Circuits (PVCs) – Frame Relay (FR) and Internet Protocol (IP). Frame Relay PVCs are used exclusively for user traffic bearers. IP PVCs are currently used only for the RC&M system. It is worth noting at this point that the RC&M network interfaces directly to the Ethernet port on the TDMA modem and so is independent in operation of the MPS or MUX FRADs.

1.4.1.3 Mode of Operation

The FR PVCs are configured as a full mesh – that is at every site there is defined two-way PVC which connects to each of the 14 other sites. The total number of FR PVCs to create a full mesh is simply 15 x 14 /2 = 105 FR PVCs. With the PIARCO node insertion in the REDDIG community 7 additional FR PVCs (up to 5 FR PVCs, as per contract, to standard REDDIG remote nodes, and 2 FR PVCs to NCC nodes) were added. The IP PVCs are configured as a dual-star network, with 14 IP PVCs radiating out from the two master sites (currently SAEZ and SBMN). The total number of IP PVCs are therefore 2x14-1=27 IP PVCs. Therefore, inserting the PIARCO node to the REDDIG community two additional IP PVC was created. The IP and FR PVCs are set up (at the NCC) by defining the two end point terminals and the Committed Information Rate (CIR or bandwidth) required for each connection. For CIR > 0 and without CIR reuse, the NCC immediately allocates timeslots for the traffic (one in each direction) and the relevant terminals start bursting for the appropriate period. For defined CIR without CIR reuse, bursting occurs whether or not there is any actual traffic. There is no further timeslot allocation process and traffic is not subject to contention. IP or FR packets are transmitted immediately – or at least as soon as the next timeslot occurs (ie within 27ms). The problem with this mode of operation is that satellite capacity (or burst timeslots) pre-allocated in this way is nailed-up and not available for new traffic demands even if the capacity is not being used at that time. Alternatively, the IP and FR PVCs may be defined with zero CIR, in which case the PVC is said to be operating in Bandwidth on Demand (BOD) mode. In this mode the timeslots are not allocated by the NCC until the terminal reports that the FR PVC has become active. Each terminal monitors the actual traffic demand on each of its PVCs and reports this information to the NCC via the signaling channel. When the PVC becomes active there is a short delay before bursts start and the PVC bandwidth becomes available. The system is subject to hysteresis; although bandwidth demands are acted on as quickly as possible, bandwidth is de-allocated in a gradual exponential decay. Generally services do not work well with bandwidth interruptions so the decay time is optimized so that bandwidth (or bursts) is not de-allocated during the active part of a data or voice circuit connection. The problem with this mode of operation is that the bandwidth is not instantly available – it can take 2 or 3 seconds for the active PVC to actually receive bandwidth. The final option for BOD is to select a global flag on the NCC which allows the bandwidth manager to reuse allocated CIR. With this option, for circuits that have defined bandwidth (CIR>0) the unused bandwidth is still returned to the bandwidth pool. Just like zero CIR circuits, the bandwidth is not instantly available when the demand comes along, however CIR>0 circuits still retain an advantage over those with zero CIR, because they have “first call” on the bandwidth in a contended situation. The important advantage of this mode of operation is that the maximum number of burst timeslots is kept free and the available satellite bandwidth pool is maximized. This in turn minimizes the probability of network blocking caused by a shortage of capacity. As initially configured all IP and the majority of FR PVCs are operated in a BOD mode (CIR=0). Some critical paths in the network (those carrying ATS and radar services) benefit from having defined CIR. The option to reuse unused CIR on all PVCs is enabled. The AFTN service in particular has been optimized to work efficiently, without any data loss using Zero CIR PVCs. This has been achieved by enabling an error control protocol (X.25) within the FRAD. The FRADs operating an AFTN/X.25 circuit negotiate end-to-end using Automatic Repeat Request (ARQ) to ensure delivery of the AFTN data.

1.4.1.4 **Hardware**

The TDMA Networks comprises three element types – the Network Control Centre (NCC), the Master Reference Terminal (MRT) and the Traffic Terminal (TT). The NCC is a SUN workstation connected via an Ethernet connection to the MRT. MRTs and TTs are identical Linkway 2100 TDMA L-band modems configured for their respective roles. The Linkway 2100 has an L-band interface to connect to the Outdoor Unit (ODU). The TDMA network operates on the C-band US/Latin America beam of the IS -1R satellite at 45 degrees W longitude. The IS-1R satellite transponder used for REDDIG (3C/4C) uses linear vertical polarization, with the same polarization sense used for transmit and receive. The total lease currently allocated for the Network is 4.38MHz. In each case the link budget is designed to fully utilize the satellite EIRP associated with each carrier. Initially it was thought that the available VSAT EIRP (using a 40W SSPA) would only support operation at a maximum of 0.625Msym/s. So initially the system was configured with 5 identical 0.625Msym/s carriers. However, during system commissioning it was found that even at the edge of the beam (worst sites SOCA and SMPM) there is sufficient VSAT EIRP to operate 1.25Msym/s carriers. Higher data rates lead to greater TDMA frame efficiency so the final configuration is to operate the Carrier 1 and 2 at 1.25Msym/s with Carrier 3 operating at 0.625Msym/s. Burst capacity depends on the size of burst used. Burst size may be any multiple of 16Kbits/s according to the CIR defined or in the case of BOD operation according to the actual demand sensed by the terminal. However in practice the vast majority of bursts allocated in the network are 16Kbit/s capacity and the network has capacity for these as follows:

Carrier	Symbol Rate	16Kbit/s equiv
1	1.25Msym/s	32 bursts
2	1.25Msym/s	34 bursts
3	0.625Msym/s	17 bursts
TOTAL		83 bursts

Please note that a two-way circuit requires separate bursts to carry the data in each direction.

The VSAT terminals are equipped for 1:1 (1 for 1) chain redundancy. The MUX-FRAD (where fitted), MPS-FRAD, TDMA-Modem, Cross-Site Cable, Block Upconverter/SSPA and LNB are all duplicated. At the user interface the Baseband Switch routes the user traffic to the appropriate FRADs. At the antenna interface waveguide switches connect the antenna to the appropriate RF chain. The redundancy switches (waveguide and baseband) are electrically-ganged to select either the A chain equipment or the B-chain equipment. When auto-redundancy is disabled, it is straightforward to select either Chain A or Chain B operation locally or remotely. This allows maintenance or upgrades to hardware without any significant loss of service. Alternatively the redundancy system may be set into AUTO mode. In this mode the local computer monitors the state of the link management at the port of the online MPS-FRAD, which connects to the online TDMA modem. If link management goes into the “link-down” state then the auto redundancy system attempts to recover the site by switching once only to the opposite chain. The system is also equipped for backup over dial-up ISDN.

1.4.2 **MEVA II**

The MEVA II VSAT Network was implemented by the MEVA Member States/Territories/International Organizations under the coordination of the ICAO North America Regional Office in Mexico. MEVA II, is a C Band voice/data network, vertical polarity, TDMA, Frame Relay, Full Mesh network with a single satellite hop via the IS-1R (formerly PAS-1R) satellite based on Viasat Linkway 2100 and Memotec Frame Relay Access Devices

The MEVA II system architecture employs Frame Relay over TDMA as the primary transmission means of achieving voice and data circuit connectivity among nodes throughout the entire network.

The system is capable of supporting a wide range of digital voice and data telecommunication services.

MEVA II has been implemented as a sub-network compatible with the aeronautical telecommunications network (ATN) to permit internetworking service in dissimilar network environments of the future ICAO CNS/ATM systems. In addition, the MEVA II network was designed to facilitate interconnection with other digital satellite and terrestrial telecommunications of other regional networks.

MEVA II is a full mesh-connected topology, with a single satellite hop via the IS-1R satellite, and provides connectivity between all nodes in the network using Frame Relay over TDMA.

Each MEVA II VSAT earth stations is equipped with Linkway 2100 TDMA terminal modem and a Memotec CX-960e Frame Relay multi-services access device.

The RF equipment consists of Terrasat RF outdoor equipments (40 Watt), LNBs (N-Type), AST5100 AGS Outdoor Box, TERRASAT IBUC 48 DC power Supply.

The CX-960e is equipped with a mix of user-side interface cards (circuit cards) that provide voice and data circuit terminations.

1.5 **The Reason for Interconnection**

The Interconnection requirements and specifications are part of a whole process of integration of networks, in which after a five year period from 2006, both MEVA II and REDDIG Network are to be integrated in a single network with a primary and a secondary operational centers.

The integration of the networks, and specifically this interconnection phase seeks to satisfy the different communications requirements between the CAR and SAM Regions and covering the future CNS/ATM requirements such as the ATN implementation, in a cost/Benefit - efficient manner.

The implementation of digital networks and their interconnection are agreed among states and ICAO (Recommendation 9/1 –RAN CAR/SAM/3, GREPECAS 10 Conclusion 10/27, GREPECAS 12 Conclusion 12/39,

Also considering Conclusion 5/16 ALLPIRG /5 discourage the proliferation of VSAT Networks and work towards regional/Interregional Digital Communication networks.

GENERAL ADMINISTRATIVE PROVISIONS

SECTION 1. GENERAL ADMINISTRATIVE PROVISIONS

1.6 **Points of Contact**

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1.7 **Required Proposal Format**

1.7.1 **Volume I - Technical Services Proposal**:

Section 1 -- Executive Summary: This section will contain a short summary of the bidder's technical proposal. The Executive Summary shall include a brief description of the proposed technical solution for the MEVA II / REDDIG interconnection solution and the bidder's program management approach (including project schedule), equipment provision, installation, testing and cutover (if is necessary) to operation.

Section 2 -- Technical Services: This section shall contain complete description of the bidder's proposed technical solution, method of approach, project implementation, and a description of all the telecommunications and management services being offered in response to the requirements sections of this RFP.

1.7.2 **Volume II - Cost Proposal**:

This volume shall contain the bidder's prices for all of the telecommunication equipment and services specified in this RFP. Volume II shall contain complete details of the bidder's prices for the outright purchase of equipment (with an option for Lease-to-Purchase) by the MEVA and REDDIG States, Territories and International Organizations. All prices shall be quoted in U.S. dollars.

The bidder may use its standard price quotation format for this purpose. Prices shall be provided for the five (5) base years and the five (5) one-year options. The bidder shall also include here all commercial terms and conditions of its offer (such as bid validity, method and terms of payment for equipment and services, etc.).

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

This Section of the RFP, describes the required scope of telecommunication services for MEVA II / REDDIG Interconnection that are to be provided by AGS and REDDIG Administration. The requirements of this Section have been organized into sub-sections in the following manner:

2.1 Interconnection premises, Equipment Requirements and Performance Specifications
2.2 Telecommunications Circuits and Service Requirements
2.3 Contingency Communications Requirements
2.4 Equipment Maintenance and Spares Provisioning Requirements
2.5 System Testing, Service Cutover and Scheduling Requirements
2.6 Technical Documentation and System Software Requirements

2.1 Interconnection Premises, Equipment Requirements and Performance Specifications

2.1.1 Objectives for the MEVA II / REDDIG Network Interconnection

By issuing this RFP, MEVA II and REDDIG members have defined the requirement for a interconnection of circuits between designated MEVA II nodes and designated nodes in the REDDIG VSAT system using the IS – 1R satellite and compatible TDMA terminal equipment.

The interconnection technical solution shall be carried out under the premises that the REDDIG and MEVA II VSAT network operate under a full mesh network topology, using TDMA/Frame Relay satellite access, employing a IS-IR satellite transponder with a beam directed over United States /Latin America, C-Band operational frequencies and co-linear vertical polarization.

This objective is foreseeing the implementation of MEVA II compatible modems in the REDDIG Nodes in Bogotá, Colombia and Caracas, Venezuela, and a REDDIG compatible Modem in the MEVA II node in COCESNA.

For all new equipment offered by the bidder to meet the service requirements of this RFP, the Service Provider shall use only commercial-off-the-shelf (COTS) equipment and/or software from reputable manufacturers and suppliers.

The bidder's proposed design for the MEVA II / REDDIG Interconnection solution must be modular and technologically upgradeable, state of the art, compatible with existing modules in the existing VSAT nodes, thereby permitting a high degree of flexibility for implementing future changes in communications services when requested to do so by ICAO.

The bidder must place particular emphasis on the availability and reliability performance factors.

2.1.2 Key Requirements of the MEVA II / REDDIG Interconnection Service Solution

Taking the above requirements into full consideration, the bidder's proposal must address in sufficient detail how the Service Provider will meet the following key requirements:

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

- Implement a MEVA II / REDDIG Interconnection solution that is capable of using a wide variety of standard information protocols such as X.25, IP, ATM, Frame Relay, and circuit switching protocols for future ATN support.

- The bidder must provide each MEVA II / REDDIG end-user with a written monthly report showing the end-user's individual bandwidth usage, call record details, system performance statistics, and a trouble log summary (e.g., trouble ticket number, transaction date/time, trouble reported, cause and repair, and technician name at both ends), as well as the same service being now provide in the MEVA II Network or in the same level as is being provided in the REDDIG Network.

Link Budget

- The bidder's proposal shall include a Satellite Link Budget Performance Analysis for each MEVA II or REDDIG site in the system, basing it on the proposed equipment solution and the minimum bandwidth requirements needed for the MEVA II / REDDIG Interconnection circuit and connectivity requirements identified in this RFP.

2.1.2.1 **Indoor Unit (IDU) Requirements**

The communications terminal and end-user equipment being offered must be compatible with the current equipment used in the MEVA II and REDDIG Networks.

The bidder's proposal shall demonstrate maximum use of the existing RF Terminal (IDU) equipment at MEVA II and REDDIG sites in their proposed service solution. Where this is not entirely practical the bidder shall propose and justify an alternative solution. No major addition to the present architecture is foreseen since the MEVA II and REDDIG nodes are technically similar.

An additional Linkway2100 (IDU) is needed to support simultaneous communications with two independent networks so the bidders should offer additional MODEM Linkway 2100 at VSAT nodes involved (Caracas, Bogotá and COCESNA)

2.1.2.2 **Outdoor Unit (ODU) Requirements**

The bidder's proposal shall demonstrate maximum use of the existing RF Terminal (ODU) equipment at MEVA II and REDDIG sites in their proposed service solution.

Because of the same VSAT node architecture is used for the MEVA II and REDDIG nodes, no ODU equipment should be duplicated to satisfy these requirements.

2.1.2.3 **MEVA II / REDDIG Antenna System**

The Service Provider must use the existing MEVA II / REDDIG antenna systems (dish antenna, feed assembly, LNB, etc.) and co-linear vertical polarization in its proposed service solution for MEVA II / REDDIG Interconnection.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

2.1.2.4 **Network Control Center (NCC)**

REDDIG NCC

The REDDIG NCC shall continue to provide the overall monitoring and control (M & C) functions at all its respective VSAT nodes. Also it shall continue to provide overall network TDMA burst timing and synchronization for their respective VSAT nodes.

MEVA II NCC

The MEVA II NCC shall continue to provide the overall monitoring and control (M & C) functions for all its respective VSAT nodes. Also it shall continue to provide overall network TDMA burst timing and synchronization for its VSAT nodes.

Considerations of MEVA II and REDDIG NCC/NMS:

The Service Provider's NCC shall perform overall monitoring and control (M&C) functions required for the MEVA II / REDDIG Interconnection. Network and remote VSAT terminal equipment configurations shall be defined at the NCC and automatically distributed to each of the MEVA II or REDDIG terminal in the network via satellite link.

The NCCs shall provide overall network TDMA burst timing and synchronization for their respective MEVA II or REDDIG sites. This functionality, referred to generically to in this RFP as the Master Reference Terminal (MRT), shall be provided from the Service Provider's NCC or from other locations that are directly under the Service Provider's control.

A backup or redundant NCC/ Secondary Reference Terminal (SRT) shall be maintained by the Service Provider at a geographically distant location from the primary MRT in order to eliminate the loss of network timing and synchronization in the event of a system outage at the primary NCC or a sun outage at the primary MRT site.

For maintenance coordination purposes, a shout-down or voice order wire circuit shall be provided between each VSAT remote site and the NCC that permits end-user personnel to communicate with NCC operations staff. The Service Provider shall also provide a PSTN telephone number that can be called by any end-user to reach NCC personnel. An alternative PSTN telephone number to a higher level authority in the Service Provider's organization shall be provided that will allow any MEVA II user to call for assistance in the event that the NCC does not answer a call to the primary number after (3) three rings.

The Service Provider's NCC shall be manned with English and Spanish speaking operations staff, 24 hours a day, 7 days a week, 365 days of the year.

The primary function of the Service Provider's NCC staff is to monitor the operational status and performance of the MEVA II/REDDIG networks and to assist MEVA II /REDDIG end-user personnel in the process of trouble diagnosis and restoring service to satisfactory operational status.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

Administrative coordination to be included in proposal by bidders:

The procedures to be implemented when there is any problem in a REDDIG node, communicating with MEVA II, shall be the following:

- MEVA II service provider shall call the REDDIG Administrator informing of the happening.
- The REDDIG Administrator shall call the respective node and shall establish an audio conference between MEVA II service provider and Caracas or Bogotá local technicians, as necessary.
- REDDIG NCC, under control of the Administrator, shall supervise communications between MEVA II service provider and REDDIG nodes technicians.
- The MEVA II service provider is the only one that may call the REDDIG Administrator to open or close the respective trouble ticket.

The procedures to be implemented when there is any problem in a MEVA II node, either in the MODEM or other equipment permitting the interconnection with REDDIG, will be the following :

.A The REDDIG Administrator shall call the MEVA II service provider informing of the happening.

.B The MEVA II service provider shall call the respective node and shall establish an audio conference between REDDIG Administrator and local technicians as necessary ;

.C The MEVA II NCC, under control of the Service Provider shall supervise communications between REDDIG Administrator and MEVA II nodes technicians.

.D The REDDIG Administrator is the only one that may call the MEVA II Service Provider Administrator to open or close the respective trouble ticket.

The MEVA II and REDDIG primary and alternate NCC shall be physically secure facilities with controlled access that is strictly limited to NCC operations staff.

The Service Provider's NCC shall be operated from highly reliable commercial AC power that is backed up by an on-site diesel-generator and battery backup power source that automatically starts in the event of a commercial power failure.

2.1.2.5 **Desired Space Segment Architecture**

The INTELSAT IS-1R satellite shall be used by the MEVA II Service Provider and the REDDIG Administration to provide telecommunications services for the MEVA II / REDDIG Interconnection.

The US-LATIN BEAM, C-BAND, and Co-pol vertical polarization shall be used for all interconnection services.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

2.1.2.6 **Remote VSAT Site and Terminal Addressing**

Addressing and control of the VSAT terminal must be provided by the respective network control system. In addition to addressing and controlling the interconnected VSAT terminals the systems shall be capable of simultaneously addressing their respective VSAT terminals, in the MEVA II or REDDIG networks.

The NCC/NMS shall have control over assignment of their respective Master Reference Terminal (MRT) and Secondary Reference Terminal (SRT) functions.

2.1.2.7 **Acquisition and Synchronization**

The TDMA system shall compensate for timing variations and loss of network burst synchronization due to Doppler frequency shift of the RF carrier that is caused by satellite motion.

The TDMA NCC/NMS control system shall recognize and acquire any new remote MEVA II /REDDIG Interconnection VSAT terminal entering the network within a maximum of 30 seconds of VSAT terminal power-up.

The TDMA NCC/NMS control system shall recognize and report any MEVA II /REDDIG Interconnection VSAT terminal equipment or link performance alarm or a loss of service condition within 30 seconds of such an incident.

2.1.2.8 **Clock Management**

In order to minimize possible system and network timing errors each MEVA II/REDDIG Interconnection remote VSAT terminal shall automatically monitor and adjust its internal digital synthesizer timing to match that of the respective MRT and SRT. In order to minimize such timing errors, an industry-standard highly accurate external clock source shall be used at the MRT and SRT.

2.1.2.9 **Network Management Requirements**

Each Service Provider's NCC shall provide and maintain central control over their respective networks as well as the equipment and services provided for the interconnection. The interconnection objective of this RFP must fully comply with the present functions of the correspondent NCC/NMS, which are detailed in **Appendix A** of this document. [Appendix A is a list of requirements; as such these requirements should be integrated in the main body of the RFP and not as an Appendix.]

2.2 **Telecommunications SERVICES and PRICING Requirements**

2.2.1 **Telecommunications Equipment Requirements**

Appendix B of this RFP contains a current list of MEVA II / REDDIG Interconnection circuit requirements that are to be satisfied in the proposals. Bidder's prices for any additional items such as port charges, space segment charges, maintenance; other required services, etc., shall be fully identified and included in proposal Volume II.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

Appendix C presents an estimated equipments list needed for the interconnection, and is given as a reference the bidder shall use this information as reference for its proposal.

2.2.2 **Non-Recurring Charges for Telecommunications Services**

Any additional non-recurring charges proposed shall be identified and fully explained in proposal Volume II of the RFP.

2.2.3 **Monthly Recurring Charges for Telecommunications Services**

Recurring charges for operating and usage of all circuits specified in 2.2.1 shall be detailed in Volume II of the proposal; including any conditions or consideration not indicated in this document.

2.3 **Equipment Maintenance and Spares Provisioning Requirements**

2.3.1 **New Equipment**

The Service Provider shall provide, maintain, repair and replace any new equipment required for the proposed MEVA II /REDDIG Interconnection service solution.

In proposal Volume II, the bidder shall identify and quote the cost to MEVA II /REDDIG end-users for any new and/or on-site equipment spares at a level necessary to maintain the system at the reliability and availability figures and Quality of Service (QoS) levels specified for MEVA II in this RFP as well as the credits in case of lacking the performance required:

Quality of Service (QoS) Performance Parameters

Parameter	Specification
1. Minimum acceptable performance of a half-duplex (one-way) satellite RF link on the basis of BER performance:	a) Not less than 99.9% for a VSAT terminal link over the latest (rolling) 12-month period with a BER of $>1x10^{-6}$ as measured over the latest (rolling) 24-hour period. b). A VSAT RF link BER worse than $1x10^{-4}$ for a period exceeding 10 continuous minutes. c). Intermittent VSAT RF link outages (periodic dropouts or RF carrier chopping) exceeding six (6) dropouts per continuous minute.
2. Maximum Service Restoration Time due to any cause (excluding AGS response time and reasonable travel time to the affected site):	24 hours
3. Maximum Routine Preventive Maintenance Service Interruption Time:	8 hours per year
4. Minimum Interval between Service Interrupting Routine Preventive Maintenance:	2190 hours

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

Parameter	Specification
5. Maximum Number of Service Outages per latest (rolling) 12 month period due to any cause(s):	6

Credit Computation

Performance Requirements	Criterion for Assessing a Penalty	Credits Assessed for Each Incident based on Monthly Recurring Charges
1. Minimum Availability of a Satellite RF Link	A) Availability is less than specified	A: 100%
2. Maximum Service Restoration Time	A) Exceeds required restoration time by 10% B) Exceeds required restoration time by 100% C) Exceeds required restoration time by 300%	A: 10% B: 50% C: 100%
3. Maximum Preventive Maintenance Service Interruption Time	A) Exceeds the maximum allowed time by 10% on a rolling 12-month basis B) Exceeds the maximum allowed time by 10% on a rolling 12-mont basis for 12 or more consecutive months.	A: 50% B: 100%
4. Maximum Interval Between Service Interrupting Preventive Maintenance	A) Service interrupting preventive maintenance is performed after an interval that is less than the minimum interval by one hour or more. B) Service interrupting preventive maintenance per A) above is performed three or more consecutive times.	A: 50% B: 100%
5. Maximum Number of Outages (per latest 12 month period)	A) Exceeds the maximum number on a rolling 12-month basis. B) Exceeds the maximum number on a rolling 12-month basis for three consecutive months. C) Exceeds the maximum number on a rolling 12-month basis for four or more consecutive months.	A: 25% B: 50% C: 100%

The bidder shall state the warranty terms and conditions for any new purchased or leased equipment required for the proposed interconnection service solution.

2.3.2 Plan for Maintenance, Repair and Replacement of Existing Equipment

The bidder shall propose a practical plan (with terms and conditions) to maintain, repair and replace any of the interconnection equipment for the time of the service contract. The prices associated with these efforts shall be identified in Proposal Volume II.

2.3.3 Plan for Routine Equipment Maintenance and Emergency Repairs

The additional equipment that would be installed in the REDDIG nodes and that would route communications requirements with MEVA II nodes, shall be maintained by the respective REDDIG member States, under the coordination of the REDDIG Administrator.

The additional equipment that would be installed in the MEVA II node, with communications requirements with REDDIG nodes, shall be maintained by COCESNA, in coordination with the MEVA II Service Provider.

2.4 System Testing, Service Cutover and Scheduling Requirements

The bidder shall propose a plan for testing the installed and integrated interconnection equipment prior to Service Acceptance Certification. The MEVA II service provider and the REDDIG Administrator shall be responsible for coordinating and managing the integration of all telecommunications circuits for the interconnection. This shall be accomplished with no interruption to critical aeronautical communications services on the MEVA II and REDDIG networks. The bidder's proposed transition plan shall take into consideration the need for:

- Equipment Installation Testing
- Operational Readiness Testing
- Thirty Day System Performance Evaluation
- Service Acceptance Certification

The bidder shall include this plan in Volume 1, of its proposal. The costs for these efforts shall be identified in Volume II.

2.5 Technical Documentation and System Software Requirements

2.5.1 Technical Documentation

The bidder shall include, in proposal Volume II, a set of the manufacturer's technical documentation describing any new equipment that will be provided and installed under the interconnection contract.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

Within 60 days after completion, testing and commissioning of a new interconnection circuits the Service Provider shall provide each end-user involved with two sets of site as-built engineering records to the end-user.. The records shall include a system block and level diagram, cable and circuit connection lists, and all other details reflecting each installed site configuration. In addition, the Service Provider shall provide each interconnection end-user with two sets of the manufacturer's theory of operation and service manual for each item of new equipment supplied by the Service Provider.

2.5.2 **System Software**

The bidder's proposal Volume I shall include documentation describing the operating systems software and firmware used interconnection. The documentation shall identify commercial off-the-shelf software and firmware and any proprietary software and firmware developed or to be developed by the bidder that will be used in the MEVA II/REDDIG interconnection services.

The Service Provider shall maintain the currency of all such software and firmware and notify the ICAO NACC and SAM Offices, and each MEVAII /REDDIG end-user in advance whenever software and firmware upgrades or changes are going to be implemented throughout the MEVAII /REDDIG interconnection services.

Within 60 days after completion, testing and commissioning of a site installation the Service Provider shall provide every end-user with a copy of the site license for any commercial software used in the system.

2.6 **Service Provider Initiated Network Changes**

2.6.1 **Change Notifications**

The Service Provider shall notify the ICAO points of contact in writing at least 60 days in advance of all significant planned changes to the configuration of the MEVA II/REDDIG interconnection services; changes in equipment or software that affect MEVAII/REDDIG interconnection functionality or performance, or changes in space segment configuration.

Such changes shall be accompanied by sufficiently detailed engineering documentation and explanation. The ICAO points of contact shall receive change notices from the Service Provider at least 30 days prior to the start of work on such changes.

The Service Provider shall obtain the approval of the ICAO points of contact at least 30 days prior to performing any planned changes that would adversely affect MEVAII/REDDIG interconnection services, including any periods of service outage for equipment maintenance or equipment/software changes.

2.7 **Activation of New Services**

Any MEVA II or REDDIG State, Territory or International Organization may request the Service Provider to provide new or additional equipment and/or Aeronautical telecommunications services during the lifetime of the MEVA II/REDDIG interconnection contract.

MEVA II / REDDIG INTERCONNECTION TELECOMMUNICATIONS SERVICE REQUIREMENTS

SECTION 2. TELECOMMUNICATIONS SERVICE REQUIREMENTS

2.8 **Discontinuation of Service**

Upon completion or termination for any reason of a lease for MEVA II/REDDIG interconnection service or upon termination of a MEVA II/REDDIG interconnection Service Agreement between any Member State/Territory//International Organization and the Service Provider, the Service Provider shall be responsible for:

Removing any Service Provider owned equipment and material from the designated site.

2.9 **MEVAII/REDDIG Program Administration**

The MEVA II Service Provider and REDDIG Administrator shall work with the MEVA II TMG, REDDIG Coordination Group, the MEVA II and REDDIG Member States/Territories/ International Organizations to support program management and administrative activities. This shall include attendance at meetings or participation in teleconferences scheduled by ICAO, REDDIG Coordination or the MEVA II TMG. Participation at such meeting and in teleconferences shall be at the expense of each Civil Aeronautical Administration.

APPENDIX A: NMC/NMS FUNCTIONS

NMC/NMS FUNCTIONS

- Network Configuration Management
- RF Carrier Acquisition, Synchronization and Control
- RF Carrier Burst Timing
- Bandwidth On Demand (BOD) Management
- SVC and PVC circuit set-up and take-down
- Fault Protection and Equipment Alarm Reporting
- Overall Network and VSAT Link Level Performance Monitoring
- MEVA II Network Security Management
- Communications Circuit Security Management
- Accounting and Billing Records Management
- Equipment Spares Inventory Management
- System Software/Firmware Updates Management

Network Configuration Management

The correspondent NCC/NMS system shall store all equipment configuration data for the MEVA/REDDIG Interconnection including configuration data for the NMS and all remote VSAT terminals in the MEVA II/ REDDIG interconnection. Configuration data file used for this purpose shall be based on a standard format as used in a database management system.

The NCC/NMS system operator shall have the capability to change (add, delete or modify) configuration data as necessary to maintain network configuration and control.

At NMS startup and upon any configuration changes, the NCC/NMS system shall download the changes configuration data via satellite links to all remote interconnection VSAT equipments.

RF Carrier Acquisition, Synchronization and Control

The MEVA II and REDDIG NCC/NMS shall control RF carrier acquisition and synchronization of their respective VSAT terminals involved in the MEVAII REDDIG interconnection. Upon system startup, the NCCs shall establish contact with the MRT (and SRT) and command it to initiate reference station acquisition and burst timing synchronization and keep these stations in precise adjustment with satellite movement in orbit.

Bandwidth Management

The NCC of MEVA II and REDDIG shall maintain central bandwidth management functions for efficient operation of the MEVA II/REDDIG interconnection. The bandwidth management functions shall accomplish dynamic bandwidth allocations (i.e., bandwidth-on-demand) and fixed bandwidth allocations for the various types of circuits derivate from the MEVA II/REDDIG interconnection and access protocols being supported by the system.

APPENDIX A: NMC/NMS FUNCTIONS

Network and Satellite Link Level Performance Monitoring

The Service Provider shall maintain a performance and alarm management system (an NMS function) that maintains continuous monitoring over the health and performance of the respective interconnection VSAT equipments in the MEVA II/REDDIG Network.

The NMS shall provide a view of transmit and receive burst data and collect performance data (e.g., BER, link performance, Frame Relay and IP traffic statistics) from the respective interconnection VSAT terminals in the MEVA II/REDDIG Network.

The NMS shall be able to collect major and minor fault alarms and Frame Relay and IP traffic statistics from the respective remote interconnection VSAT terminals in the MEVA II/REDDIG Network, as well as perform automatic diagnostic. The NMS shall make this data available to NCC personnel who will use it to diagnose troubles associated with link performance and equipment operation at sites.

In his proposal, the bidder shall provide a list of the alarms and functions monitored by the NMS.

Network Security Management

In order to provide network security management for the MEVA II/REDDIG interconnection the following consideration shall be considered for the REDDIG and MEVA II networks:

The minimum security arrangements required by REDDIG, and that should be followed by the MEVA II, are:

- MEVA II network have no direct communications with public networks.
- The equipment is not shared with services different to MEVA II.
- Access restriction to equipment belonging to the network, through the use of a password.
- The network must exclusively support services to which it was originally constituted for.

The minimum security arrangements required by MEVA II, and that shall be followed by REDDIG, are:

- REDDIG network have no direct communications with public networks.
- The equipment is not shared with services different to REDDIG.
- Access restriction to equipment belonging to the network, through the use of a password.
- The network must exclusively support services to which it was originally constituted for.

Network Protocols and Services

The interconnection equipments shall be capable of using industry standard Frame Relay, X.25, circuit switching protocols, ATM, and IP transmission protocols in order to achieve the most cost efficient use of satellite bandwidth and equipment resources.

Internet Protocol (IP) Service

The TDMA/Frame Relay terminal shall be capable of providing, on-demand, the following standard IP routing protocols:

- Routing Information Protocol, both RIP-1 and RIP-2
- Open Shortest Path First (OSPF) Protocol for future packet applications
- Border Gateway Protocol (BGP-4) for special applications
- Internet Group Management Protocol (IGMP for possible future multicast applications)

Frame Relay (FR) Service

The TDMA terminal shall be capable of supporting UNI/NNI connection level with ANSI or ITU local management interface (LMI) access management and it shall be compliant with current ITU and ANSI standards.

Frame Relay service setup and provisioning shall be accomplished under control of the Service Provider's NMS at the primary and backup NCCs.

Frame Relay service provisioning shall allow selection of the transmission rate, clock source, the type of interfaces (RS-449, V.35, EIA 530, etc.), and determine the local management interface (LMI or ITU) and other related parameters.

Frame Relay service provisioning shall allow both source and destination sites, their respective circuit interfaces and related QoS parameters (e.g., CIR and Bc) to be established on command and monitored by the NMS.

In the event a VSAT RF link or a VSAT terminal goes down for any reason, the link connection shall be reported by the NMS as inactive, and the assigned bandwidth shall be temporarily de-allocated for shared use within the network. When the VSAT link or terminal recovers, the connection shall be automatically re-established and bandwidth re-allocated.

Satellite Link Availability

All MEVAII and REDDIG VSAT satellite RF links shall provide a minimum of 99.9 percent availability performance as measured from satellite modem to satellite modem using the BER (or the equivalent E_b/N_o or Symbol Rate) method of calculation.

The VSAT RF satellite links shall provide an average Bit Error Rate (BER) of $1x10^{-6}$ BER or better as measured over the latest (rolling) 24-hour period during the worst rain period out of the year for the affected VSAT node. The bidder shall state his guaranteed Committed Information Rate (CIR) for services provided under this specification.

Whenever the satellite RF link's BER becomes worse than $1x10^{-4}$ for a period exceeding 10 continuous minutes the Satellite Provider's NMS shall declare the link to be out of service.

Intermittent outages (periodic RF carrier dropouts or RF carrier chopping as detected in the earth station's satellite modem) exceeding six (6) dropouts per continuous minute (60 seconds) shall also be declared a loss of service by the NMS.

Service outages due to blocking of the satellite signal by the sun (i.e., sun-transit outages) that occurs during the spring and fall equinox shall not be counted towards link availability performance.

The MEVA II Service Provider and the REDDIG Administrator shall notify the end-user concerned fourteen (14) days in advance of schedule maintenance outages.

Back-up transponder and satellite for contingency planning. The bidders shall provide detailed procedures so change over can be performed by trained technicians in the field.

Switched Voice Circuit Call Blocking Performance

Switched voice circuits shall have an Erlang B call blocking probability of no greater than 0.05 (five percent) at all times and under all traffic loading conditions. Voice Circuit Latency Performance

The total one-way latency for PAMA and Switched Voice Circuits between service delivery points shall not exceed 400 milliseconds (demarcation point to demarcation point) under all possible satellite link conditions and earth station equipment configurations. Latencies for the voice circuits specified in this RFP shall be shown in the bidder's link budget calculations.

Data Circuit Latency Performance

Total one-way latency for dedicated Data and Packet Switched Circuits between service delivery points (local circuit demarcation frames) shall not exceed 350 milliseconds (demarcation point to demarcation point) under all possible satellite link conditions and earth station equipment configurations. Latencies for data circuits specified in this RFP shall be shown in the bidder's link budget calculations.

APPENDIX B: CIRCUIT REQUIREMENTS

CIRCUIT REQUIREMENTS

COMMUNICATIONS SERVICES REQUIREMENTS FOR MEVA II / REDDIG INTERCONNECTION

Table 1 – CAR/SAM AFS interconnection requirements in the Caracas, Venezuela, REDDIG node

No.	CAR/SAM	Required AFS Circuits	Remarks
1	2	3	4
1	Curaçao / Caracas	1 ATS voice– A 1 AFTN data, 2400 bps, X25, IA-5	
2	Aruba / Venezuela	1 ATS voice – A	
3	Puerto Rico / Venezuela	1 ATS voice – A 1 AFTN data, 2400 bps, X25, IA-5	

A: Indicates ATS requirements for voice communications which should be established in 15 seconds.

Table 2 - CAR/SAM AFS interconnection requirements in the Bogota, Colombia, REDDIG node

No.	CAR/SAM Interconnections	Required AFS Circuits	Remarks
1	2	3	4
1	Colombia (Barranquilla)/Curaçao*	1 ATS voice – A	
2	Colombia (Barranquilla)/Jamaica*	1 ATS voice – A	
3	Colombia (Bogota)/Panama Barranquilla / Panama* Bogota / Panama* Cali / Panama* Medellin / Panama* San Andres / Panama*	1 AFTN data, 2400 bps, X25, IA-5 1 ATS voice – A 1 ATS voice – A 1 ATS voice – A 1 ATS voice – A 1 ATS voice – D	Panama has two terminals of the Harris 2020 ATS speech circuit switching centre installed in Bogota. Therefore, interconnection requirements would be reduced to two ATS* and one AFTN channels.
4	Colombia (Bogota)/ CENAMER	1 ATS voice – A	
5	Peru (Lima) / United States	1 AFTN data, 2400 bps, X25, IA-5	
6	United States / Brazil	1 AFTN data, 2400 bps, X25, IA-5	

D: Indicates requirements for instantaneous communications.

* Colombia will examine the amount of channels it will need to meet these requirements through the interconnection.

APPENDIX B: CIRCUIT REQUIREMENTS

A: Indicates ATS requirements for voice communications which should be established in 15 seconds.

Table 3 – CAR/SAM AFS interconnection requirements in the Tegucigalpa, COCESNA MEVA II node

No.	CAR/SAM	Required AFS Circuits	Remarks
1	2	3	4
1	Cenamer / Bogota, Colombia	1 ATS voice– A	
2	Cenamer / Guayaquil, Ecuador	1 ATS voice – A	

A: Indicates ATS requirements for voice communications which should be established in 15 seconds.

Table 4 – Interconnection Impact in the Curacao, Kingston, Miami, San Juan and Panama MEVA II nodes

No.	CAR/SAM	Required AFS Circuits	Remarks
1	2	3	4
1	Aruba, Aruba	1 ATS voice– A	Circuits with Josefa Camejo, Venezuela
2	Curacao, Netherlands Antilles	1 ATS voice – A 1 AFTN data	Circuits with Venezuela
3	Kingston, Jamaica	1 ATS voice – A	Circuits with Colombia
4	Miami, United States	2 AFTN data	Circuits with Brazil and Peru
5	Panama, Panama	2 ATS voice – A 1 AFTN data	Circuits with Colombia
6	San Juan, Puerto Rico	1 ATS voice – A 1 AFTN data	Circuits with Venezuela

A: Indicates ATS requirements for voice communications which should be established in 15 seconds.

Peru/USA is a 9.6kbps AFTN circuit.

APPENDIX C: ESTIMATED EQUIPMENT REQUIREMENTS

ESTIMATED EQUIPMENT REQUIREMENTS

EQUIPMENT NECESSSARY IN REDDIG NODE DUE TO MEVA II / REDDIG INTERCONECTION
EQUIPAMIENTO NECESARIO EN LOS NODOS REDDIG DEBIDO A LA INTERCONEXION MEVA II / REDDIG

ESTADO/STATE		NÚMERO DE CIRCUITOS REQUERIDOS / NUMBER OF CIRCUITS REQUIRED		NUMERO DE TARJETAS Y EQUIPOS REQUERIDOS PARA LA INTERCONEXIÓN / NUMBER OF CARDS AND EQUIPMENT REQUIRED					
				FRAD MEMOTEC CX950			MODEM LINKWAY 2100	SPLITTER	SSPA 75W
		ORAL ATS / ATS SPEECH	AFTN	E1 DIM VOICE MOD.	ANALOG VOICE CARD DAV	I/O Multi			
Argentina									
Bolivia									
Brasil / Brazil	Manaos		1						
	Curitiba								
	Recife								
Chile									
Colombia		4	3	2			1	1	1**
Ecuador		1		2*					
Guyana									
Guyana Francesa / French Guiana									
Paraguay									
Perú			1						
Surinam									
Uruguay									
Venezuela		3	2		4		1	1	1**

* Confirmation in the node is pending / Falta confirmación en el nodo

** Uplink satellite budget is pending / Falta comprobar a través de un análisis de enlace satelital

APPENDIX C: ESTIMATED EQUIPMENT REQUIREMENTS

EQUIPMENT NECESSSARY IN MEVAII NODE DUE TO MEVA II / REDDIG INTERCONECTION

EQUIPAMIENTO NECESARIO EN LOS NODOS MEVA II DEBIDO A LA INTERCONEXION MEVA II / REDDIG

ESTADO/STATE	NUMERO DE CIRCUITOS REQUERIDOS NUMBER OF CIRCUIT REQUIRED		NUMERO DE TARJETAS Y EQUIPOS REQUERIDOS PARA LA INTERCONEXIÓN /NUMBER OF CARDS AND EQUIPMENTS REQUIRED					
			FRAD MEMOTEC			MODEM LINK WAY 2100	SPLITTER	SSPA 75W
	ORAL ATS / ATS SPEECH	AFTN	E1 DIM VOICE MOD.	ANALOG VOICE CARD DAV	I/O Multi			
Aruba								
Cuba								
Curazao / Curacao	1			1*				
Gran Caimán / Grand Cayman								
Haiti								
Honduras	2			1*		1	1	1**
Jamaica	1			1*				
Miami		2						
Panamá	2	1		1*	1*			
Puerto Rico	1	1		1*	1*			
Republica Dominicana / Dominican Republic								

* Confirmation in the node is pending / Falta confirmación en el nodo

** Uplink satellite budget is pending / Falta comprobar a través de un análisis de enlace satelital

APPENDIX C: ESTIMATED EQUIPMENT REQUIREMENTS

APPENDIX D: GLOSSARY OF TERMS AND ABBREVIATIONS

GLOSSARY OF TERMS AND ABBREVIATIONS

ACC	Area Control Center
ADPCM	Adaptive Differential PCM
AFSS	Aeronautical Flight Service Station (FAA)
AFTN	Aeronautical Fixed Telecommunications Network
ANSI	American National Standards Institute
ARTCC	Air Route Traffic Control Center (FAA)
ATN	Aeronautical Telecommunications Network
BER	Bit Error Rate
BoD	Bandwidth on Demand
CAA	Civil Aviation Administration
CAR/SAM	Caribbean/South American
CCITT	ITU Consultative Committee on International Telephone and Telegraph
CELP	Code Excited Linear Prediction
CNS	Communications, Navigation and Surveillance
CODEC	Coder-Decoder
COTS	Commercial Off The Shelf
CPDLC	Controller-Pilot Data Link Communications
DAMA	Demand Assigned Multiple Access
DCA	Director of Civil Aviation
DTMF	Dual Tone Multi-Frequency
Eb/No	Energy per bit divided by Noise spectral density
FAA	Federal Aviation Administration
FR	Frame Relay
FRAD	Frame Relay Access Device
FXO	Foreign Exchange Operation
FXS	Foreign Exchange Signaling
GNSS	Global Navigation Satellite System
GREPECAS	CAR/SAM Regional Planning and Implementation Group
ICAO	International Civil Aviation Organization
IDU	Indoor Unit
IFL	Inter-facility Link
ITU	International Telecommunications Union
Kbps	Kilobits per second
LMI	Local Management Interface
MEVA	Mejoras al Enlace de Voz del ATS Project
MRT	Master Reference Terminal
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
M&C	Monitor and Control
NACC	North American, Central American, and Caribbean (Office)
NADIN	NAS Aeronautical Digital Information Network
NAS	National Airspace System
NCC	Network Control Center
NCS	Network Control System

APPENDIX D: GLOSSARY OF TERMS AND ABBREVIATIONS

NMS	Network Management System
ODU	Outdoor Unit
PABX	Private Automatic Branch Exchange
PSTN	Public Switched Telephone Network
PTT	Post, Telephone and Telegraph
PVC	Permanent Virtual Circuit
RELP	Residual Excited Linear Predictive (coding)
SCPC	Single Channel Per Carrier
SRT	Secondary Reference Terminal
SVC	Switched Virtual Circuit
TDMA	Time Division Multiple Access
TMG	Telecommunications Management Group
UPS	Uninterruptible Power Supply
VSAT	Very Small Aperture Terminal

APPENDIX / APENDICE B

ANSWERS TO QUESTIONS FROM AGS CONCERNING THE MEVA II/REDDIG INTERCONNECTION RFP

Question 1:
1. Section 2.1.2 (Key Requirements...), page 8 and Appendix A (subsection- Network Protocol and Services), page 18 state that the interconnection shall be capable of using ...ATM... Given that Viasat no longer manufactures ATM cards nor supports them, please clarify this requirement.

ANSWER 1: This requirement has been included considering the actual equipment capacities (as reference in the Linkway 2100 modem manual and website). If today Viasat, Linkway 2100 Manufacturer, no longer manufactures ATM cards, please indicate and detail it in your proposal.

Question 2:
2. The current REDDIG allocated bandwidth is 4.38 MHz (page 5, section 1.4.1.4) with 2x1.25 and 1x0.625 Msym/s carriers (page5). What is the projected bandwidth allocation for the next 2 years? Is AGS required to implement more efficient carrier groupings such as 2.5 Msym/sec?

ANSWER 2: The projected bandwidth allocation for the next two years is 4.950 MHz. AGS is not required to implement carriers of 2.5 MSYM/S.

Question 3:
3. The REDDIG network uses dual redundant FRAD (section 1.4.1.2, line 1). Is the REDDIG modem in Cocesna required to implement dual redundant FRAD?

ANSWER 3: As in MEVA present configuration, no redundant equipment configuration is requested.

The REDDIG modem in COCESNA is not required to implement dual redundant frad. (Appendix C of the RFP and Appendix B of the report on Agenda Item 1 of the Fourth MEVAII/REDDIG Coordination Meeting)

Question 4:
4. The REDDIG VSAT terminals are equipped for 1 for 1 chain redundancy (section 1.4.1.4, page 5). Is the REDDIG chain in COCESNA required to implement 1 for 1 chain redundancy?

ANSWER 4: As in MEVA present configuration, no redundant equipment configuration is requested.

The REDDIG chain in COCESNA is not required to implement 1:1 redundancy. (Appendix C of the RFP and Appendix B of the Report on Agenda Item 1 of the Fourth MEVAII/REDDIG Coordination Meeting)

Question 5:
5. AGS needs the REDDIG dial plan for voice circuits so that REDDIG and MEVA-II dial plans do not have conflicts.

ANSWER 5:

REDDIG Dial Plan		
Country, Location	**Node**	**Voice Dial Code**
Argentina, Ezeiza	**SAEZ**	**20**
Bolivia, La Paz	**SLLP**	**25**
Brazil, Manaus	**SBMN**	**36**
Brazil, Recife	**SBRF**	**38**
Brazil, Curitiba	**SBCT**	**30**
Chile, Santiago	**SCEL**	**40**
Colombia, Bogotá	**SKED**	**45**
Ecuador, Guayaquil	**SEGU**	**50**
Guyana, Georgetown	**SYGC**	**90**
French Guyana, Cayenne	**SOCA**	**92**
Paraguay, Asunción	**SGAS**	**55**
Peru, Lima	**SPIM**	**60**
Surinam, Paramaribo	**SMPM**	**94**
Uruguay, Montevideo	**SUMU**	**65**
Venezuela, Maiquetia	**SVMI**	**80**
Trinidad and Tobago, Piarco	**TTZP**	**91**

Question 6:
6. General question: Can you provide details of the AFTN in the REDDIG network?

ANSWER 6: All AFTN circuits (user side) in the REDDIG network have the following parameters:

Electrical Interface: RS232 / V.24
Mechanical Interface: DB-25
Rate: 2400 bps
Protocol: asynchronous, 8 bits, NP, 1 stop bit

Note.- FRAD ports (network side) for such AFTN circuits employ internal x.25 protocol in addition to the async driver and pad.

Question 7:
7. 2.1.2.4 Consideration of MEVAII and REDDIG NCC/NMS
The term SRT do you mean AMRT? Viasat use the term SRT for Supporting Reference Terminal.

ANSWER 7: Please referred to the Glossary provided in the RFP, in which SRT means Secondary reference Terminal. For the following references using the SRT term, please replaced this term with the term AMRT (alternate master reference terminal):
Page 10, paragraph 2.1.2.6
Page 11, paragraph 2.1.2.8
Page 12 and
Page 17

The REDDIG does not employ a SRT which is used in multiple-beam configuration to control the traffic terminals that the MRT can not see.

In any case, the glossary of terms with respect to MRT, AMRT, SRT and other relative concepts must be clearly defined in your proposal taking in consideration the terms of the *LINKWAY system specifications.*

Question 8:
8. The use of NCC is used to describe to different things and can be confusing to the RFP reader. Can you use NCC to describe the Sun server that controls the MEVAII and REDDIG networks and use TOC to describe the AGS 24x7x365 operations center that is manned to support the MEVAII/REDDIG interconnection network? AGS operates an NCC and an alternate NCC but does not have an alternate TOC.

ANSWER 8: OK, please present this information and details in your proposal.

The term NCC will be used to describe the sun server and the term TOC to describe the AGS 24 X 7 X 365 operations center.

Manaos, Brazil is the main NCC with local redundancy. Ezeiza, Argentina is the alternate NCC with local redundancy.
The REDDIG operations center is in Manaos, however, if required, an alternate operations center in Ezeiza can be activated.

Question 9:
9. Appendix B Table 2

Row 5 and 6 MEVAII will interconnect the REDDIG at Columbia and Venezuela. How will the traffic get to Lima, Peru, and Brazil? Is the use of a double hop for these sites acceptable?

ANSWER 9: The AFTN traffic from USA to Peru and Brazil will pass through Colombia MEVA II node to the REDDIG network.
As these are data circuits carrying message traffic, there would not be a problem to use a double hop. However, it is recommendable to do an analysis at this respect.

The AFTN circuits PERU-USA and Brazil-USA will be configured in this form:

Two additional AFTN circuits will be programmed in the REDDIG network: Peru-Colombia and Brazil-Colombia

In Colombia, each additional AFTN traffic will be extracted from one port of the frad equipment and connected to another port of the same FRAD equipment.
From here, Colombia MEVA II node, both mentioned AFTN traffic will be linked to USA MEVA II node for final destination.

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APPENDIX / APENDICE C

RESPUESTAS A LAS PREGUNTAS FORMULADAS POR EL ADMINISTRADOR DE LA REDDIG SOBRE EL NODO MEVA II DE COCESNA

1. Energía Primaria

a. Voltaje AC y Frecuencia
Respuesta: 110 VAC, 60 HZ

b. Tipo de toma corriente (AC outlet) en el Rack de equipos
Respuesta: NEMA 5-15 (ver fotos adjuntas)

c. Número de tomas disponibles en el Rack de equipos
Respuesta: Uno toma en regleta existente dentro del rack

2. Rack de equipos

a. Espacio (unidades de rack) disponibles para montaje de equipos adicionales
Respuesa: Actualmente hay un espacio disponible de 5Us de rack, ver fotos, dos U arriba del Linkway y 3U debajo de este equipo

b. Planos de vista frontal y posterior del Rack de equipos
Respuesta: Ver esquemas adjuntos

3. Equipo Memotec CX-950e

a. Software/Application Revision
Respuesta: Application Version: 4.5.2

b. Tarjetas I/O instaladas y en que "slot" está cada una
Respuesta:
Slot 1: tarjeta V.35H
Slot 2: tarjeta V.24
Slot 7: tarjeta DAV
Slot 8: tarjeta DAV

c. Número de "slots" disponibles para instalación de Tarjetas I/O adicionales
Respuesta: 4 slots

d. Información del equipo: "sysinfo" y "module"
Respuesta: Se adjunta fichero denotado: "sysinfo y module (Memotec Honduras)"

e. Archivos de configuración del equipo: ".cxt" y ".txt"
Respuesta: Se adjunta el fichero: "custom (Memotec Honduras) "equivalente al archivo ".txt". El archivo ".cxt" no se tiene ya que la herramienta CxTool no se dispone en sitio, en todo caso se ha consultado a la empresa prestadora de servicios MEVA

f. Versión de la herramienta de configuración CxTool con el que se generó la configuración
Respuesta: No se dispone en sitio de la herramienta CxTools

4. Conmutador/Central de Voz

a. Interfaces disponibles para dos (2) circuitos ATSa en el Conmutador/Central de Voz
Respuesta: En el Conmutador/Central de voz en CENAMER se cuenta con interfaces del tipo FXO

b. Interfaz disponible para un (1) circuito de mantenimiento/administrativo
Respuesta: Actualmente los canales o circuitos de mantenimiento de nuestros equipos de comunicaciones, como el caso de MEVA, están interconectados a nuestra planta telefónica (PABX) la cual recibe el canal a través de interfaces configuradas como FXO, por lo tanto la línea proveniente de la VSAT deberá ser del tipo FXS

c. Longitud del cableado desde el MDF del Conmutador/Central hasta el Rack de equipos
Respuesta: La distancia es de unos 50 mts aproximadamente, sin embargo ya se dispone de unos cables multipares desde la ubicación MEVA II hasta nuestro Conmutador/Central de Voz para realizar este tipo de implementación de canales futuros

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