INTERNATIONAL CIVIL AVIATION ORGANIZATION
NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE

FIRST MEVA III - REDDIG II INTERCONNECTION COORDINATION MEETING

MIII-RII/INTERCON/01

FINAL REPORT

ORANJESTAD, ARUBA, 25 TO 26 MAY 2015

Prepared by the Secretariat

May 2015

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HISTORICAL

ii.1 Place and Date of the Meeting

The First MEVA III/REDDIG II Interconnection Coordination Meeting (MIII-RII/INTERCON/01) was held at the Aruba Surfside Marina in Oranjestad, Aruba, from 25 to 26 May 2015.

ii.2 Opening Ceremony

Mr. Julio C. Siu. Regional Officer, Communications Navigation and Surveillance of the North American, Central American and Caribbean (NACC) Regional Office of the International Civil Aviation Organization (ICAO) highlighted the successful performance of the MEVA II/REDDIG interconnection, the overall work to be achieved by the Meeting on the interconnection agreement between the MEVA III and REDDIG Networks and thanked Aruba for hosting this important meeting. Mr. Onofrio Smarelli. Regional Officer, Communications Navigation and Surveillance of the South American (SAM) Regional Office of ICAO gave an overview of the actions and meetings for the interconnection. Mr. Nilknarf Koch, CEO Air Navigation Services Aruba (ANSA), provide opening remarks and thanked the participants for attending this Meeting, Mr. Edwin Kelly, Director of Civil Aviation Aruba, welcomed the participants and officially opened the meeting.

ii.3 Officers of the Meeting

The MIII-RII/INTERCON/01 Meeting was chaired by Ms. Dulce Roses, MEVA TMG Coordinator. Mr. Onofrio Smarrelli and Mr. Julio Siu of the ICAO SAM and NACC Regional Offices respectively, served as Secretaries of the Meeting.

ii.4 Working Languages

The working language of the Meeting was English and working papers, information papers and report of the meeting were available to participants in said language.

ii.5 Schedule and Working Arrangements

It was agreed that the working hours for the sessions of the meeting would be from 09:00 to 16:30 hours the first day, and from 09:00 to 13:00 the Second day with adequate breaks. Ad hoc Groups were created during the Meeting to do further work on specific Agenda items.

ii.6 Agenda

Agenda Item 1: **Approval of Meeting Agenda, Work Method and Schedule**

Agenda Item 2: **MEVA III and REDDIG II Network Overview**

Agenda Item 3: **Analysis to the performance of the MEVA II/ REDDIG Interconnection**

Agenda Item 4: **Overview of the MEVA – REDDIG Interconnection Coordination and Review and update of MEVA – REDDIG Interconnection and Integration Agreements**

Agenda Item 5: **Other Matters**

ii.7 Attendance

The Meeting was attended by 9 States/Territories and COCESNA from the CAR and SAM Regions and members of the MEVA III and REDDIG II Networks, the MEVA III Service Provider and the REDDIG Administration,, totalling 29 delegates as indicated in the list of participants.

ii.8 Conclusions

The Meeting recorded its activities as Conclusions

ii.8 List of Conclusions

Number	Title	Page
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1/2	**CONFIRMATION OF NEW INTERCONNEXION CIRCUIT REQUIREMENTS**	3-16
1/3	**ADOPTION OF THE MEMORANDUM OF UNDERSTANDING BETWEEN STATES/TERRITORIES/INTERNATIONAL ORGANISATIONS MEMBERS OF MEVA III AND REDDIGII PROJECT ORGANISATION**	4-2

ii.9 List of Working and Information Papers and Presentations

Refer to the Meeting web page:
http://www.icao.int/NACC/Pages/default.aspx

WORKING PAPERS

Number	Agenda Item	Title	Date	Prepared and Presented by
WP/01	1	Approval of Meeting Agenda, Work Method and Schedule	21/04/15	Secretariat
WP/02	2	MEVA III Overview	19/05/15	COMSOFT
WP/03	2	REDDIG II network overview	20/05/15	Sectetariat
WP/04	3	Overview of the MEVA – REDDIG Interconnection Coordination	15/05/15	Secretariat
WP/05	4	Analysis to the Performance of the MEVA / REDDIG Interconnection	19/05/15	Secretariat
WP/06	5	Review and Update of MEVA – REDDIG Interconnection and Integration Agreements	14/05/15	MEVA Task Force Rapporteur
WP/07	4	New Circuit requirements for MEVA III/ REDDIG II Interconnection	19/05/15	Secretariat
WP/08	5	Review and update of the interconnection Agreement COCESNA - REDDIG	20/05/15	COCESNA

INFORMATION PAPERS

Number	Agenda Item	Title	Date	Prepared and Presented by
IP/01	---	List of Working and Information Papers	21/05/15	Secretariat

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Agenda Item 1 Approval of Meeting Agenda, Work Method and Schedule

1.1 Under WP/01, the Meeting approved the provisional agenda interchanging Items 3 and 4 and consolidating some items for a better comprehension and discussion of the papers. Also, the working method and schedule of the meeting, referring to IP/01 with the list of associated documentation, were approved. The approved meeting agenda is presented in the historical section of this report.

Agenda Item 2 MEVA III and REDDIG II Network Overview

2.1 Under WP/02, the MEVA Service Provider, Comsoft, provided an overview of the MEVA III Network and the MEVA III-REDDIG II Interconnection matters, describing the technical features, the SKYWAN structure, the foreseen benefits, the MEVA III implementation, the bandwidth required, system/node design and details on the interconnection. **Appendix A** provides the detailed presentation of this MEVA III overview.

2.2 The MEVA III network is composed by 18 nodes belonging to 13 States and 2 Territories of the CAR Region, 1 SAM State, and COCESNA. The MEVA III VSAT network is based on NDSatcom SkyWAN solution in combination with Memotech Frame relay Access Devices (FADs). The MEVA III operates in IS-14 satellite. State-of-the-art modem performance (Turbo Phi coding) and 8PSK modulation reduce ODU size requirements and satellite bandwidth costs**.**

2.3 Under WP/03, the REDDIG Administrator presented a general overview of the REDDIG II Network, describing its architecture, a chronological description of its agreement and the current operation status. **Appendix B** presents a detailed description of the REDDIG Network.

2.4 The REDDIG II is a digital network totally based on IP protocol on a mixed satellite-ground Multi-Protocol Label Switching (MPLS) network and it was launched in February 2015 by the INEO & Level (3) consortium. The main satellite equipment of the REDDIG II is composed by the CISCO 2900 routers, the SKYWAN IDU 7000 satellite modems that will act as masters (Manaus and Ezeiza), and the SKYWAN IDU 1070 modems in the other REDDIG II nodes, which will act as slaves.

2.5 The REDDIG network comprises 17 nodes belonging to 12 States and 1 Territory of the SAM Region, 1 State of the CAR Region and COCESNA. The REDDIG II continues operating in the same IS-14 satellite transponder, the same satellite segment with three carriers, but employing new modulation scheme 8PSK and FEC 2/3.

Agenda Item 3 Analysis to the performance of the MEVA II/ REDDIG Interconnection

3.1 Under WP/05 the Secretariat briefed on the current operational implementation of the MEVA III REDDIG II interconnection circuits, requesting the involved parties to review and report the performance resulted from this interconnection and searching for agreements for its prompt resolution. The Meeting was recalled on the interconnection requirements:

No.	Sites	Requirement
	Connectivity through the Caracas, Venezuela MEVA III site	
1	Curaçao/Caracas (Venezuela)	1 ATS voice A
		1 AFTN data, 2400 bps, X.25, IA-5
2	Aruba/Josefa Camejo (Venezuela)	1 ATS voice A
3	Atlanta (United States)/Caracas (Venezuela)	1 AFTN data, 9600 bps, X25, IA-5
4	Puerto Rico/Caracas (Venezuela)	1 ATS voice A
5	San Juan (Puerto Rico) / Caracas (Venezuela) Curacao/ Caracas (Venezuela) Aruba/ Josefa Camejo (Venezuela)	ATS voice D
	Connectivity through the Bogota, Colombia MEVA III site	
6	Barranquilla (Colombia)/Curaçao Barranquilla (Colombia)/Jamaica Barranquilla (Colombia)/Panama	ATS voice A ATS voice A ATS voice A
7	Bogota (Colombia)/Panama	1 AFTN data, 2400 bps, X25, IA-5
8	Bogota (Colombia)/Panama Cali (Colombia)/Panama Medellin (Colombia)/Panama San Andrés (Colombia)/Panama Jamaica/ Barranquilla (Colombia) Curacao/ Bogotá (Colombia) Panamá/Bogotá (Colombia)	ATS voice A ATS voice A ATS voice A ATS voice A ATS voice D ATS voice D ATS voice D
9	Lima (Peru) / Atlanta (United States)	1 AFTN data, 9600 bps, X25, IA-5
10	Atlanta (United States)/Manaus (Brazil)	1 AFTN data, 9600 bps, X25, IA-5
	Connectivity through the Tegucigalpa, Honduras REDDIG site	
11	COCESNA/Guayaquil COCESNA/ Bogotá	ATS voice

3.2 The performance of this interconnection through the MEVA II and the REDDIG Networks has been satisfactory as concluded from the corresponding MEVA TMG and REDDIG Network Meetings. The only requirement not completed was the AFTN data circuit between Atlanta (United States) and Manaos (Brazil).

3.3 The REDDIG II Network became operational since 6th February 2015 and the MEVA III Network became operational since 1 April 2015. From the REDDIG II and MEVA III Network implementation all MEVA-REDDIG circuits were implemented except for:

a) the 3 AFTN Data circuits with Atlanta, where a PAD equipment will be implemented in the Caracas and Bogota nodes by May/June 2015.

b) Voice circuits to Bogota through the REDDIG Network solutions are being tested at the Bogota end user system.

Review of pending circuit implementation

Circuits with connectivity in Bogota

3.4 The Meeting conducted a review of the operational status of each of these circuits. The MEVA III Service Provider, the REDDIG Administration and the MEVA and REDDIG members coordinated some testing and reconfiguration of the equipment, resolving the problems on the ATS voice switched lines in Colombia. The following procedure was adopted:

Procedure for testing ATS voice interconnection circuits

a) MEVA III service provider will coordinate with the technical focal point of Curacao, Jamaica and Panama in order to make calls to the correspondent destination counterpart. Coordination will be done separately with each of them.
b) Service provider will monitor that the calls activate the designated port at the local FAD.
c) Once completed the previous step, the service provider will monitor that such mentioned calls arrive to and activate the designated time slot of the E1 trunk at the Bogota FAD.
d) If the MEVA circuit is OK, then the E1 trunk of Bogota FAD will be connected directly to the PBX to monitor that the incoming calls are activating the designated time slot of the PBX and thus establishing the communication with the ACC.

3.5 Employing this procedure, the MEVA Service Provider reconfigured the MEVA FAD dialing map and the switched ATS communications (7 channels of Bogota E1) were established from Curacao to Bogota and from Panama to Bogota. Pending of testing are the direct Air Traffic Service(s)(ATS) channels which are scheduled for 26 May 2015.

Circuits with connectivity in COCESNA

3.6 Regarding the activities to resolve the ATS voice circuit Colombia–COCESNA the following actions have been agreed between Colombia-COCESNA:

Existing Situation of ATS Circuit Bogota-COCESNA

a) Calls are set correctly from COCESNA to Bogota, as confirmed by Air traffic control (ATC) staff. But when the call is originated by ATC operational staff of Bogota, it fails to run into COCESNA.

b) When the technicians manually dial Bogota Extension 2153, it reaches COCESNA, so it was concluded that the REDDIG equipment settings are correct.

The following action Plan was agreed:

- Thursday 28 May 2015: new joint testing by technical personnel of Colombia and COCESNA will be conducted to validate the current operation of the channel.
- Thursday 28 - Friday 29 May 2015: Colombia will review and make necessary changes in the PABX and VCS, to ensure that any call to extension 2153 of REDDIG/COCESNA is finally connected.
- Friday 29 May 2015: Final tests; it is expected to have the operating circuit in both directions.

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Data Circuit implementation –Packet Assembler/Disassembler (PAD) implementation

3.7 Regarding the implementation of the PAD equipment, Comsoft informed that:

- The PAD has been delivered by DHL to Bogota and Caracas and equipment is already in Colombia and Venezuela and expected to be available by 27 May 2015
- Comosft will install Colombia and Venezuela simultaneously by next week (week of 1 June)
- Comsoft will inform about the logistics for this installation to Colombia and Venezuela

3.8 Colombia and United States expressed their commitment for the PAD testing and implementation coordination starting next week.

Final status of operation of the Interconnection circuits

3.9 For the circuits with connectivity in Caracas, Venezuela, MEVA III site, the Meeting confirmed that:

- all voice switched circuits have been successfully implemented (3)
- hotlines (3) are not implemented due to the lack of signal detection in the Caracas Voice switching system,
- Curacao-Caracas AFTN Data circuit is operative
- Async to sync conversion through the use of the PAD is ongoing for the first week of June 2015

3.10 For the circuits with connectivity in Bogota, Colombia, MEVA III site, the Meeting confirmed that:

- all voice switched circuits (7) have been successfully implemented
- hotlines (3) are not implemented, testing ongoing this week
- Bogota (Colombia)/Panama Aeronautical Fixed Telecommunication Network(AFTN) circuit is implemented
- Async to sync conversion through the use of the PAD is ongoing for the first week of June 2015

3.11 Due to the above, the following conclusion was adopted to complete the pending circuit implementation:

CONCLUSION MIII/RII/1/1 ACTIONS TO COMPLETE THE PENDING CIRCUIT IMPLEMENTATION

That in order to streamline and complete the implementation of the pending MEVA III-REDDIG II interconnection circuits:

a) Venezuela review and adjust the local Voice Communication Switching System (VCSS) or end user equipment to complete the hotline configuration;

b) Colombia and COCESNA conduct the necessary action to complete the operation of the switched voice lines; and

c) Colombia and Venezuela inform the MEVA-REDDIG Coordination members by the next Teleconference the results of a) and b).

New circuit proposals for MEVA III REDDIG II Interconnection

3.12 Under WP/07 the Secretariat invited the MEVA and REDDIG participants to resume some pending agreements for new circuits and explore the need for other circuit for implementation by both networks. The implementation of new circuits require a timely and appropriate coordination between the MEVA III – REDDIG Network Administrations

3.13 The implementation of new circuits in the REDDIG II and MEVA III Network requires not only the common acceptance of the need for these circuits, but also the study for its feasibility considering the network hardware and software availability, bandwidth needs, costs involved and the end user equipment readiness.

3.14 The Meeting was informed that the MEVA III Service provider together with the MEVA Members, will discuss the common cost sharing method for additional MEVA III circuit implementation during the TMG/30 Meeting and inform accordingly to the REDDIG Administration. Similarly, REDDIG Administration indicated that the cost estimation shall be conducted on a case by case requirement.

3.15 The Meeting proposed several additional circuits to be implemented shortly for 2015-2017:

NO.	Circuit requirement	Implementation estimate
1	Radar Data sharing between Curacao-Venezuela (1 radar data circuit)	Prior to 2017
2	Radar Data sharing between Colombia-Panama	By mid 2016
3	SAM AMHS circuit implementation with Atlanta • Caracas - Atlanta • Brasilia - Atlanta • Lima - Atlanta • Bogotá - Panama	2016-2017
4	AMHS circuit Atlanta- PIARCO-- planned thru COCESNA REDDIG	2016
5	AFTN Data circuit PIARCO- Curacao	After June 19 2015

Table 1 Proposed new circuits

3.16 The Meeting adopted the following:

CONCLUSION MIII/RII/1/2 CONFIRMATION OF NEW INTERCONNEXION CIRCUIT REQUIREMENTS

That in order to start and prepare the technical and cost matters in a timely manner for the implementation of new circuits,

a) States involved in the additional circuits listed in table 1 confirm the need of these circuits by 30 June 2015;

b) States inform ICAO by 30 June 2015 of any additional circuit; and

c) MEVA and REDDIG coordinate the necessary actions for the implementation of additional circuits through teleconferences.

Agenda Item 4 **Overview of the MEVA – REDDIG Interconnection Coordination and Review and update of MEVA – REDDIG Interconnection and Integration Agreements**

4.1 The Meeting took note that with the implementation of the new REDDIG II and MEVA III digital networks, a new contract was established for the interconnection of REDDIG II nodes in Bogotá and Caracas with the MEVA III network. The condition of this new contract was reviewed and approved by the REDDIG members during the Seventeenth Meeting of the Coordination Committee of Project RLA/03/901 -- *REDDIG Management System and Satellite Segment Administration (*Lima, Peru, 24-26 March 2014) establishing Conclusion RCC 17/1 *New MEVA III / REDDIG II interconnection*

4.2 In this respect, ICAO, on behalf of the REDDIG II members States and MEVA III service provider, drafted and signed a contract (N° 2201528) for interconnection of REDDIG II nodes of Bogotá and Caracas with MEVA III Network

4.3 Additionally, the Meeting was informed that an amendment was made in Contract RLA 09/901 to adapt it with the new interconnection of MEVA III node of COCESNA with the REDDIG II Network.

4.4 The Meeting was reminded that the Fifth meeting of the MEVA II/REDDIG coordination meeting (MR/5 Mexico City, Mexico, from 3 to 5 October 2007) adopted the final Memorandum of Understanding (MoU) between States/Territories/International Organisations members of MEVA II and REDDIG project organisation for the coordination and cooperation process for the MEVA II REDDIG interconnection.

4.5 The Meeting took note of two ´proposals for amendment of the MoUs for the coordination and cooperation process for the MEVA II/REDDIG interconnection in order to align it with the new MEVA III-REDDIG II network implementation. One of the proposal was prepared by the MEVA TMG Group (WP/6 refers) and the other by the REDDIG Administration (WP/4 refers).

4.6 The Meeting, in order to review the proposal for amendments of MoU established an Ad hoc Group formed by representatives of United States, COCESNA, REDDIG Administration, MEVA III communication service provider and ICAO .

4.7 The Ad hoc Group reviewed and completed the MoU and presented it to the Meeting, which proceeded to its revision and adoption by the States/Territories/International Organisations members of the MEVA III and REDDIG II project. A copy of the MoU is presented as **Appendix C** to this report.

4.8 The revision of MoU reflected the following changes:

- The MEVA III and REDDIG II Networks are implemented
- The interconnection is implemented, so references to its implementation were removed.
- References to the implementation of new requirements were introduced
- References to the fact that the REDDIG II contract with the MEVA III Service Provider is a lease agreement for equipment.
- References to the fact that maintenance of MEVA III equipment in REDDIG II nodes shall be coordinated through the REDDIG Administration

4.9 In this respect, the Meeting formulated the following conclusion:

CONCLUSION
MIII REDDIG II 1/3 ADOPTION OF THE MEMORANDUM OF UNDERSTANDING BETWEEN STATES/TERRITORIES/INTERNATIONAL ORGANISATIONS MEMBERS OF MEVA III AND REDDIG II PROJECT ORGANISATION

That the States/Territories/International organisations members of MEVA III and REDDIG II project adopt the Memorandum of Understanding (MoU) between States/Territories/International organisations members of MEVA III and REDDIG II project organisation for the coordination and cooperation process for the MEVA III-REDDIG II interconnection network presented as Appendix C to this report

4.10 The Meeting reviewed the information related with the Network Operation Center of MEVAIII Communication service provider and REDDIG Administration, **Appendix D** to this report refers. This information will be used by the MEVA III and REDDIG II networks manager for the coordination specified in the MoU.

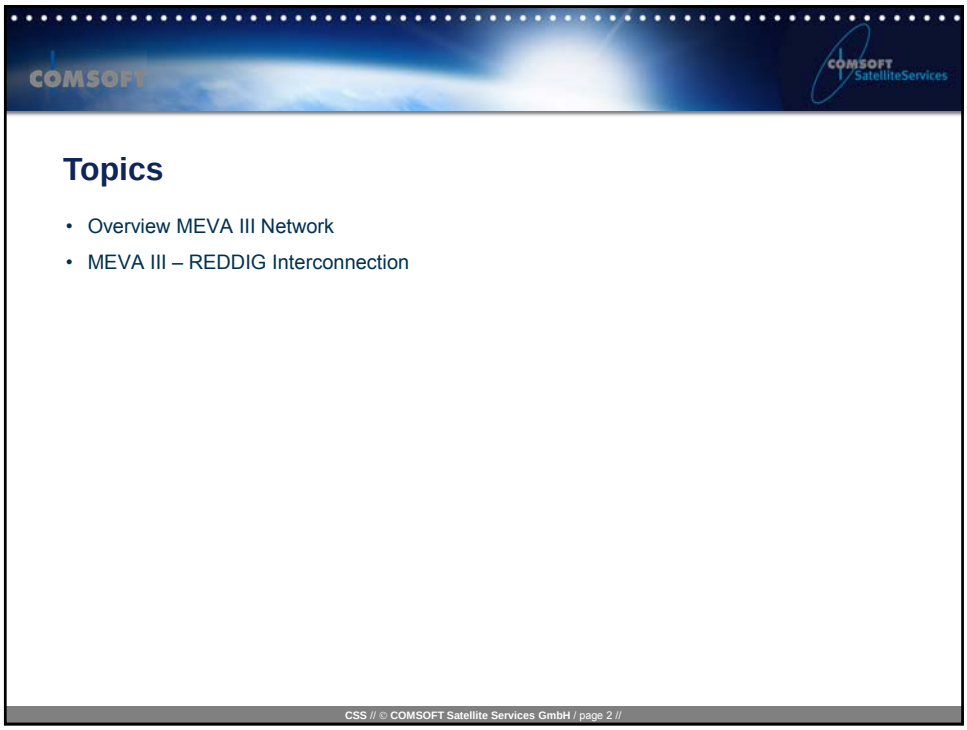
4.11 Under WP/08, COCESNA provided a general description and up-to-date information about the modernization of MEVA and REDDIG nodes that belong to COCESNA, showing the negotiations for upgrading the interconnection agreement between COCESNA and ICAO/REDDIG. On March 14, 2010, ICAO and COCESNA signed an agreement of Service Management which Annex One (#1) corresponds to the "Interconnection of COCESNA MEVA Node to the REDDIG" RLA/09/201 with a validity of 5 years, renewable. Due the implementation of MEVA III and REDDIG II networks in March 2015 the Project Document RLA/09/901/B was signed, which extended for a period of five years the interconnection of MEVA III node of COCESNA to the REDDIG II, with starting date on the 1 April 2015.

Agenda Item 5 Other Matters

5.1 A visit to the Air Navigation Services Aruba (ANSA) facility for the MEVA III node was kindly provided by Aruba. The Meeting appreciated this visit, which provided better understanding of the on-site status and operation of the MEVA III node.

5.2 The Meeting identified that coordination shall be made to effectively implement any new MEVA III REDDIG II Interconnection circuit and perform any review to the circuit performance. Therefore, it agreed that this coordination can be conducted by teleconferences led by the MEVA TMG and REDDIG Administration. Even though no future face-to-face meeting for the MEVA III-REDDIG II Interconnection is scheduled, in accordance with the Terms of Reference of this Coordination Group future meetings may be convened as needed.

Solutions
COMSOFT
SatelliteServices
MEVA III overview
MEVA III-REDDIG II Coordination Meeting WP02 - Presentation


COMSOFT
COMSOFT SatelliteServices
Topics
• Overview MEVA III Network
• MEVA III – REDDIG Interconnection
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Topic

- Overview MEVA III Network

Overview MEVA III Network

The MEVA III network is consisting of:

- Miami, Florida, United States (connected via redundant T1s to Teleport Opa-locka)
- Atlanta, Georgia, United States (redundant nodes)
- Nassau, Bahamas
- Freeport, Bahamas
- COCESNA (Tegucigalpa, Honduras)
- Grand Cayman, Cayman Islands
- San Juan, Puerto Rico (redundant nodes)
- Panama City, Panama
- Phillipsburg, St. Maarten
- Havana, Cuba
- Willemstad, Curacao
- Port-au-Prince, Haiti (redundant nodes)
- Oranjestad, Aruba (redundant nodes)
- Kingston, Jamaica
- Merida, Mexico (not implemented)
- Santo Domingo, Dominican Republic (redundant nodes)
- Caracas, Venezuela (REDDIG)
- Bogota, Colombia (REDDIG)

MEVA III Technical Approach Solution

The Technical Approach Solution for MEVA III consider the network structure / requirements as follows.

- Demanding technical requirements are very selective for the choice of hardware platform
- Heterogeneous topology: hub&spoke data, meshed voice connectivity, scattered point-to-point links
- Support of high priority direct (PAMA) voice connections
- Support of legacy applications (synchronous X.25) and transition to new data communication applications
- Long-term hardware support (5-10 years contract) with continuous performance upgrades
- Reduction of costs,
- re-use of existing MEVA II equipment
- Increase of network reliability/availability
- Migration of an operational network to a new hardware platform with minimum impact on availability of active connections
- Premium quality support service in migration and implementation of MEVA III

MEVA III SkyWAN Solution

MEVA III VSAT network is based on NDSatcom SkyWAN solution in combination with Memotech FADs.

- **Seamless, optimized & flexible** network design possibilities to meet requirements best
  - **Seamless** Carrier Sizing
  - **Differentiated** modulation & coding schemes **per Carrier**
  - **Optimal Filling** rate per TDMA Frame and Slot
- **Reduced Voice Bandwidth** consumption (8kbps CN/ACELP) for PAMA and DAMA connections
- State-of-the-art modem performance (**Turbo Phi** coding) and **8PSK** modulation reduce ODU size requirements and **satellite bandwidth costs**
- Master/Back-up Master **resilience** for TDMA control

MEVA III SkyWAN Solution #1

MEVA III Network Structure:

- All stations with mesh capability to support required connectivity
- Master Station (TDMA Control) located in Atlanta
- Back-up Master located at Miami
- Network Management System (NMS) is operational from Teleport Opa-locka
  - Network Management System is configured for remote access from Germany (Secured Fallback Situation)

MEVA III Network Benefits on VSAT

COMSOFT is officially partnering with NDSatcom to MEVA III Network

Network design supported by manufacturer

- Highest possible guarantee on efficience and throughput

Network configuration approved by NDSatcom

- Highest possible guarantee on reliability and adaption of existing equipment in MEVA II Network

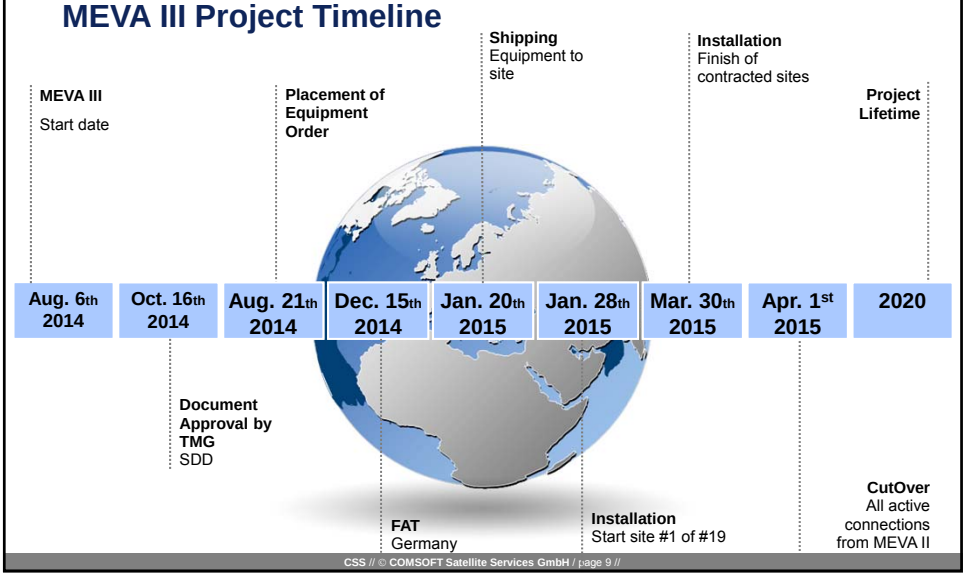
Network implementation supported by NDSatcom

- Highest possible guarantee on instandly working sites and network

Network operation supported by NDSatcom and local partners

- Faster response times and higher quality on Helpdesk Service

MEVA III Project Timeline



MEVA III Project Challenges

The MEVA III VSAT network provides network access to member states as follows:

- **Max. re-use of existing equipment**
  Antennae, cabling, ….
- **Co-existing of MEVA II & MEVA III**
  Keeping both networks running in parallel during transition
- **Minimum downtime**
  Keep network availability
- **Installation schedule**
  Organization of 5 installation teams
- **Equipment delivery**
  Customs, transportation, packing,…
- **Cut-over**
  All network sites to be cut-over at same date
- **Dismantling of MEVA II**
  Remove/disconnect MEVA II from MEVA III at sites

MEVA III Traffic Assignment

- **Several network services needs different bandwidth allocation at user port**
- **Traffic can be differentiated into PAMA and DAMA allocation**
  PAMA > Permanently Assigned Multiple Access
  DAMA > Dynamically Assigned Multiple Access
- **PAMA Voice (VSD) > bandwidth is perment reserved and available**
- **DAMA Voice (SWV) > bandwidth is dynamically allocated – ERLANG calculation**

Type of Traffic	PAMA					DAMA			
	AFTN synch	Radar	AIDC	Remote Radio link	PAMA Voice	AFTN asynch	AFTN asynch	AHMS IP	DAMA Voice
Bandwidth @ User Port	9,6kbps	9,6kbps	16,0kbps	12,6kbps	12,6kbps	2,4kbps	9,6kbps	64,0kbps	12,6kbps

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Overview Of Network Traffic

	PAMA					DAMA			
	AFTN synch	Radar	AIDC	Remote Radio link	PAMA Voice	AFTN asynch	AFTN asynch	AHMS IP	DAMA Voice
Data Rate	9,6kbps	9,6kbps	16,0kbps	12,6kbps	12,6kbps	2,4kbps	9,6kbps	64,0kbps	12,6kbps
Atlanta	13							7	1
Aruba	1				2				4
Bahamas, Nassau	2				1				9
Bahamas, Freeport	1								5
Cayman Islands	1				1			1	7
COCESNA	1	1		1				1	3
Colombia	2				3	1			8
Cuba	1	2			7		1	1	7
Curaçao	1	1	1		4	1		1	4
Dominican Republic		3	1		5			1	7
Haïti	1				3				5
Jamaica	1	1		1	7			1	5
Mexico					1		1		3
Panama	1				2	1			6
St Maarten	1	2			2			1	6
US, Puerto Rico		3			4				13
US, Miami		1			8				18
Venezuela	1				3	1			4
Total by Site	28	14	2	2	53	4	2	14	115
	268,8kbps	134,4kbps	32,0kbps	25,2kbps	667,8kbps	3,2kbps	6,4kbps	298,7kbps	126,0kbps
				PAMA:	1.128,2kbps			DAMA:	434,3kbps

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Network Traffic Calculation

- **Allocated PAMA services network traffic**

  1.128,2 kbps

- **Allocated DAMA services network traffic**

  434,3 kbps

- **Resulting overall network Traffic**

  1.562,5kbps (network traffic)

  312,5 kbps (TDMA overhead)

  1.875 kbps (Information Rate)

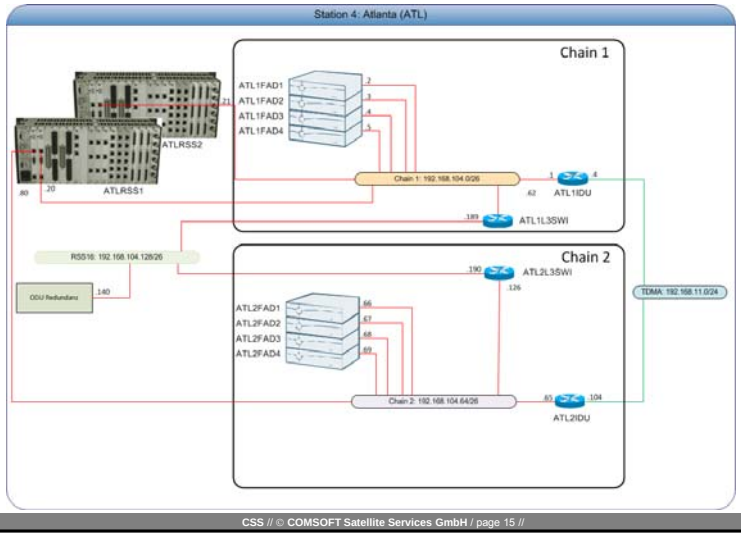
Spare Part Management Solution

COMSOFT´s Maintenance / Support Program provides the choice of two Spare Part Management Solutions to optimize the network availability.

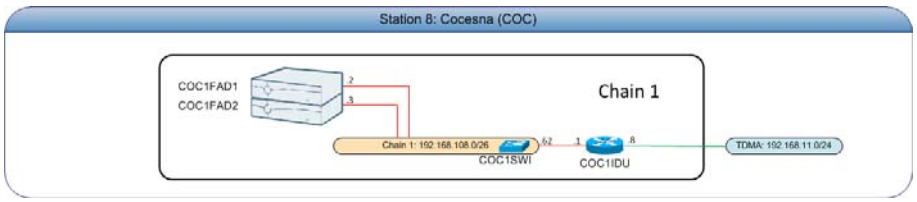
- **Centralized / Regional Spare Part Management (e.g. NOC)**
  - Cost effective for all Network Members (Cost Sharing)
  - Longer Response Times in equipment replacement (transport, customs)
- **Site related Spare Part Management (at each network site)**
  - Fast Response Times
  - Cost intensive (double equipment components, stock preparation)

COMSOFT implemented a centralized / regional Spare Part Management based on cost sharing and investment in favour of each involved State.

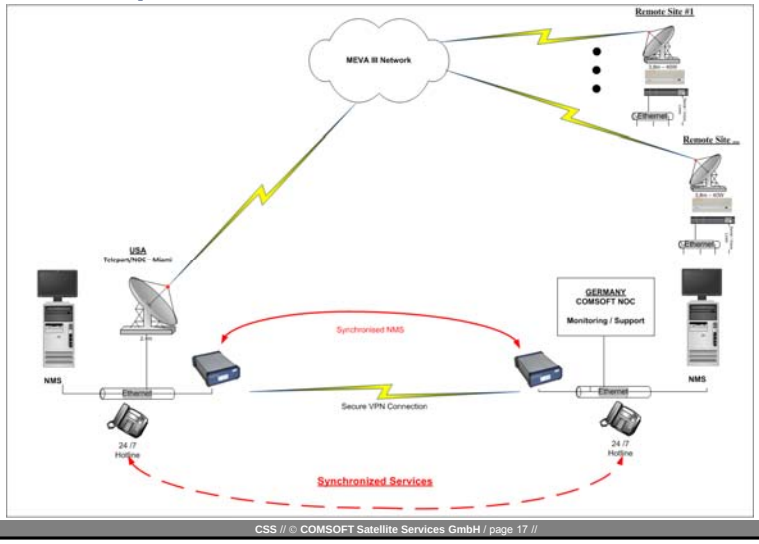
Redundant Station Design (Atlanta)



Non - Redundant Station Design (COCESNA)



Network Operations Overview



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Topic

- MEVA III – REDDIG Interconnection

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MEVA III – REDDIG Interconnection

One challenge in the MEVA III REDDIG network interconnection is the combination of the asynchronous traffic received from the REDDIG network and related conversation to synchronous traffic to serve the MEVA III needs.

Involved stations are:

- Caracas, Venezuela (REDDIG) – 1 circuit
- Bogota, Colombia (REDDIG) – 2 circuits

In the former MEVA II network the PAD (Packet Assembling De-Assembling) was done by the Memotech CX multiplexers.

Since Memotech has stopped service/production on the CX series these units cannot be used any longer (no spares available).

The actual multiplexer series offered by Memotech (92X0) does not longer support PAD functionallity.

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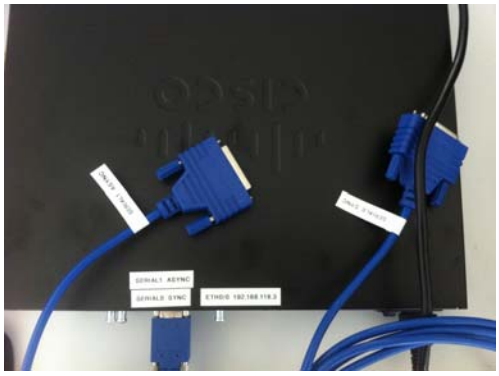
MEVA III – REDDIG Interconnection #1

In common agreement with MEVA TMG COMSOFT is going to implement PAD functionallity based on CISCO (1921) devices.

COMSOFT will first serve Caracas to test correct PAD function. After successful integration Colombia is to follow.

The picture shows the rear view

of the Caracas PAD



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MEVA III – REDDIG Interconnection #2

The PAD devices are remotely configurable to permit configuration adaption without the need of local assistance.

The picture shows the rear view of the Colombia PAD.

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Thank you for your attention!

REDDIG Nodes:

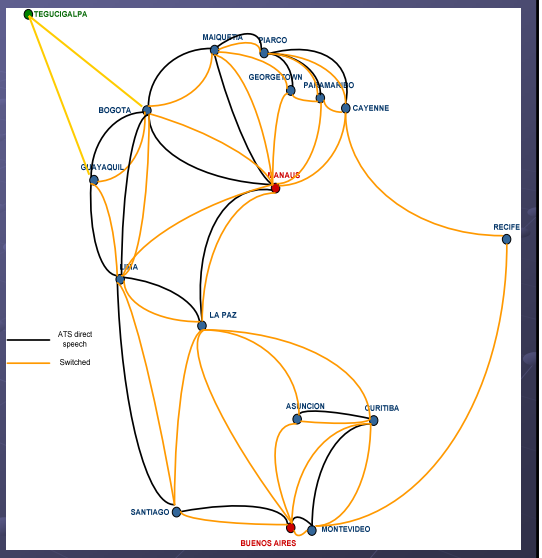
- 16 nodes
- 14 countries
- 1 MEVA interconnection node (Tegucigalpa-COCESNA)
- 2 Master stations (Manaus & Ezeiza)

Nodes connections

The network is meshed in terms of communications.

<u>Masters</u> (Manaus and Ezeiza)

<u>Nodes</u> (Maiquetia, Lima, Bogota, La Paz, Piarco, Asuncion, Curitiba, Guayaquil, Santiago, Montevideo, Recife, Cayenne, Paramaribo, Georgetown, COCESNA)



Master station features

Master stations, Manaus and Ezeiza will have two special features:

- NMS (Network Management System)
- Satellite network synchronization

NMS role means those stations will gather information from all the sites in order to have a global view and administration of the network.

Update

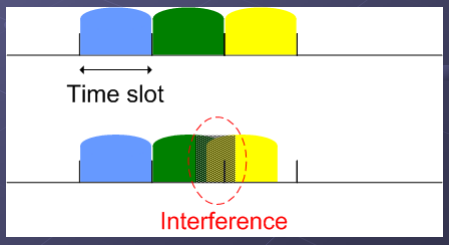
<u>Master station</u>
Local NMS +
Global NMS

<u>Remote station</u>
Local NMS

Master station features

Satellite network synchronization is related to TDMA. The modems need to be synchronized in order to avoid that two time slots overlap which would produce interference

Thus, every station calculates the round trip time to satellite and this value is controlled and corrected by the master stations.



Services on the REDDIG II

The following services are transported on REDDIG II network

- AFTN and AMHS → Async. for AFTN, Eth/IP for AMHS
- RADAR and ADS → Serial and Eth/IP
- ATS – telephony → FXS, FXO, E&M, E1
- NMS system →Eth/IP
- Future services over IP → Eth/IP

The network must transport legacy data (serial and analog lines) as well as new IP-based services.

REDDIG II Node Identification

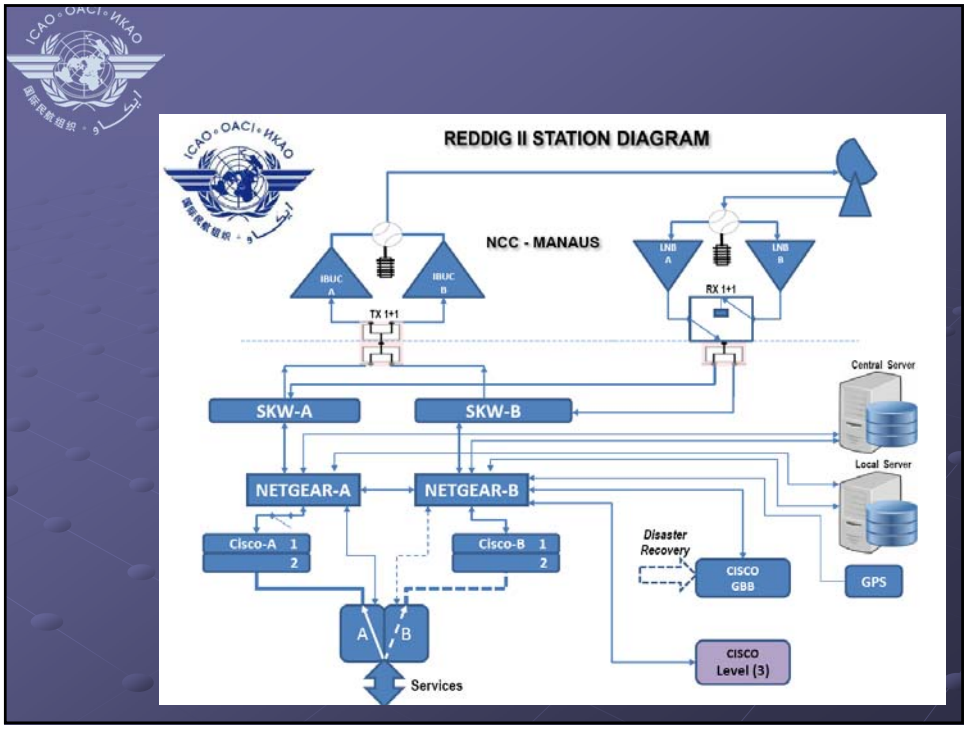
Country	Code	ID
Argentina	SAEZ	20
Bolivia	SLLP	25
Brazil (Curitiba)	SBCT	30
Brazil (Manaus)	SBMN	36
Brazil (Recife)	SBRF	38
Chile	SCEL	40
Colombia	SKED	45
Ecuador	SEGU	50
French Guyana	SOCA	92
Guyana	SYGC	90
Paraguay	SGAS	55
Peru	SPIM	60
Suriname	SMPM	94
Trinidad and Tobago	TTZP	91
Uruguay	SUMU	65
Venezuela	SVMI	80
Honduras	MHTG	21

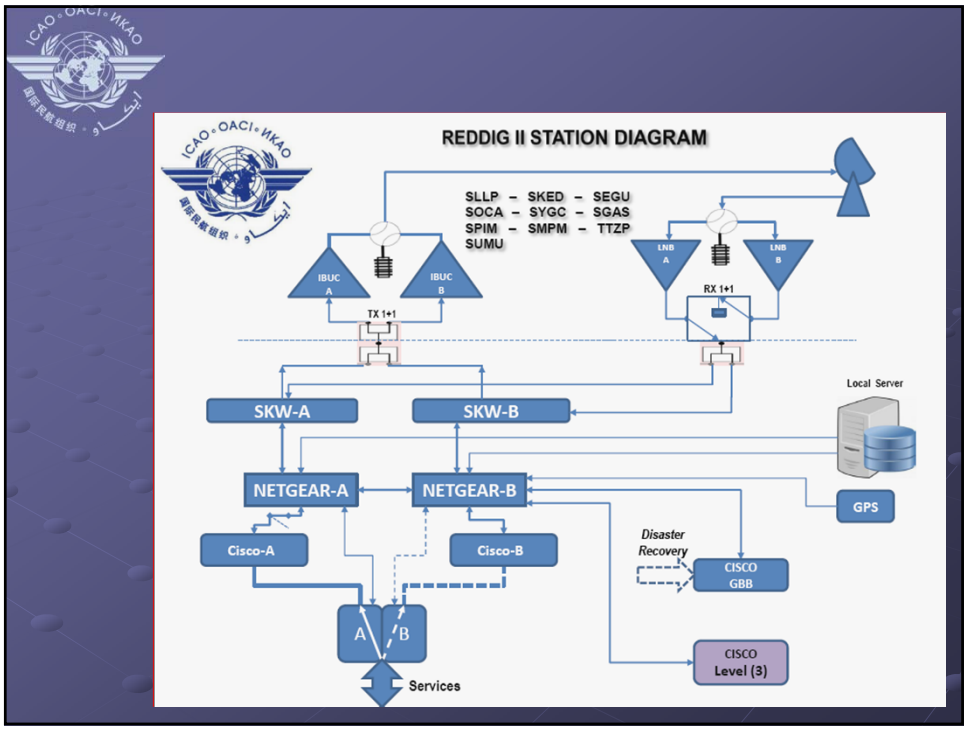
REDDIG II Node Architecture

- **Fully redundant**
- **Two chains**
- **Baseband switch for analog, serial and Eth interfaces**

Divided in 4 sections:

- **Outdoor Unit (Antenna, RF, IFL)**
- **Indoor Unit (BB SW, Routers, Eth SW, SatModems)**
- **NMS (Network Management System & WUG)**
- **Back-up Ground Network (Level 3 router)**


REDDIG II STATION DIAGRAM
NCC - MANAUS
IBUC A
IBUC B
TX 1+1
LNB A
LNB B
RX 1+1
Central Server
SKW-A
SKW-B
Local Server
NETGEAR-A
NETGEAR-B
Cisco-A 1 2
Cisco-B 1 2
Disaster Recovery
CISCO GBB
GPS
A
B
CISCO Level (3)
Services


REDDIG II STATION DIAGRAM
SLLP – SKED – SEGU
SOCA – SYGC – SGAS
SPIM – SMPM – TTZP
SUMU
IBUC A
IBUC B
TX 1+1
LNB A
LNB B
RX 1+1
Local Server
SKW-A
SKW-B
NETGEAR-A
NETGEAR-B
GPS
Cisco-A
Cisco-B
Disaster Recovery
CISCO GBB
A
B
CISCO Level (3)
Services

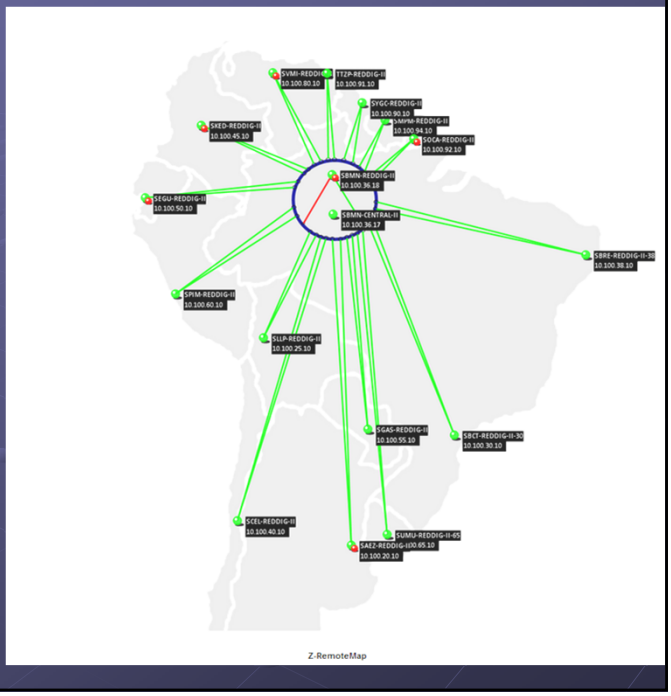
REDDIG II NMS

The NMS system is composed of a workstation equipped with “WhatsUp Gold” (monitoring software), a VPN router for remote access and control, a GPS time reference and an UPS

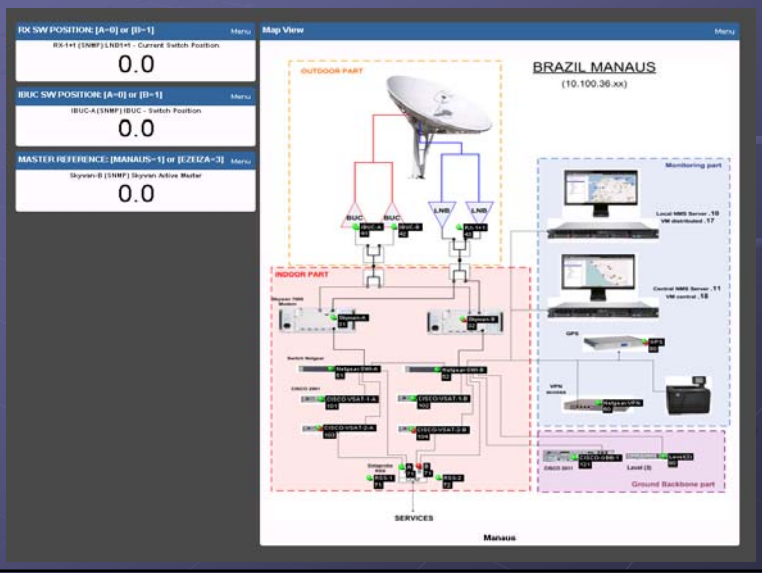
NMS

‘WhatsUp Gold’

Global Monitoring



NMS 'WhatsUp Gold' Local Monitoring



Backup Ground Network

In each node, the backup ground network is composed of a REDDIG gateway router (A or B or GBB) and a Level 3 MPLS access router.

The gateway router is used to gather all the aeronautical services converted to IP protocol and bring them automatically to the MPLS access router in case there is no satellite access at the node.

This backup ground service is provided by Level 3 through its ground backbone network.

APPENDIX C
MEMORANDUM OF UNDERSTANDING BETWEEN STATES/TERRITORIES/INTERNATIONAL ORGANISATIONS MEMBERS OF MEVA III AND REDDIG II PROJECT ORGANISATION

1. SECTION 1. INTRODUCTION AND PURPOSE OF THIS DOCUMENT

1.1 INTRODUCTION

1.1.1 With the aim of effectively and efficiently fulfilling aeronautical telecommunications requirements in these regions, the members of the MEVA II and REDDIG VSAT networks decided to interconnect the two networks. For this purpose, the Members agreed to establish this Memorandum of Understanding (MoU). This Agreement is being established jointly under coordination of the ICAO North American, Central American, and Caribbean (NACC) Office in Mexico City, Mexico and the ICAO South American (SAM) Office, in Lima, Peru.

1.1.2 The Third MEVA II / REDDIG Coordination Meeting (MR/3) concluded that the interconnection implementation will operate for a five-year period, as an initial basis, after finalising the implementation.

1.1.3 The First MEVA III / REDDIG II Coordination Meeting concluded that the interconnection implementation will be renewed for five initial year period, after finalizing the implementation.

1.1.4 The main body of this document consists of four (4) sections and 2 Appendices. The content of the sections and appendices is summarised below: In accordance with the interconnection development, when considered necessary, and if the interested Parties of both networks agree to do so, other Appendices could be added as necessary.

a) Section 1.0: Presents a brief overview and statement of purpose.

b) Section 2.0: Provides an explanation of the Technical Cooperative Agreement process.

c) Section 3.0: Describes the technical terms of reference.

d) Section 4.0: Describes the financial responsibilities of the parties to this agreement.

e) Appendix A: A list of reference documents used in support of this Agreement.

f) Appendix B: Technical-operational coordination agreement for the establishment of VSAT MEVA III and REDDIG II networks interconnection

1.1.5 This document is based on the former MEVA II - REDDIG Memorandum of Understanding (MoU).

1.2 **SECTION 1 – PURPOSE**

1.2.1 The goal of this MoU is to foster a coordinated plan for in the development of MEVA III and REDDIG II networks and its interconnection implementation.

1.2.2 This MoU is a living document through which members of the MEVA III and REDDIG II networks shall convene, as necessary and at locations agreed upon, to review or amend the details of the Agreement. Revised versions of this Agreement, or paragraph changes, shall be coordinated and distributed by the ICAO NACC and SAM Regional Offices to the signatory parties of the Agreement as appropriate.

1.2.3 This MoU document establishes the following coordination and cooperation process:

a) The holding of coordination meetings, if required, to analyse and identify the new service requirements for the MEVA III and REDDIG II VSAT networks interconnection.

b) The exchange of technical reports and documentation, program plans and schedules, as may become necessary, to assure the successful and timely completion of these efforts.

c) Operational-technical coordination between the Parties involved in MEVA III and REDDIG II networks, as necessary.

d) Planning, technical coordination, and development participating member States/Territories/International Organisations of the MEVA III and REDDIG II Networks.

2. **SECTION 2 – THE TECHNICAL COOPERATIVE AGREEMENT PROCESS**

2.1 To reach the goal of this MoU, the MEVA III and REDDIG II members have developed an interconnection solution to operate during a five-year phase after the implementation of the interconnection of the MEVA III and REDDIG II Networks.

2.2 **RELATIONSHIPS AND RESPONSIBILITIES OF THE PARTIES**

2.2.1 In order to achieve the interconnection of the networks in a timely and mutually beneficial way, the parties to this Agreement recognise the need to coordinate their actions and exchange updated operational-technical information.

2.2.2 The Parties also recognise the need to develop common technical solutions for interconnecting and/or integrating these networks, in a manner that shall not negatively impact the planned operation, performance, or management of the either network.

2.2.3 ICAO NACC and SAM Regional Offices shall convene coordination meetings, as needed.

2.2.4 The Parties of this MoU agree to exchange reports, technical documents, plans and programming that may be necessary in order to guarantee the interconnection and the implementation of the new services.

2.2.5 The Parties of this MoU agree to implement during a 5 year phase the MEVA III / REDDIG II interconnection solution as presented in Appendix B.

3. SECTION 3 – TECHNICAL TERMS OF REFERENCE

3.1 The interconnection solution's objectives and their technical operational principles are described under the Appendix B of this document.

4. SECTION 4 – FINANCIAL RESPONSIBILITIES OF THE NETWORK PARTIES

4.1 MEVA III / REDDIG II Members shall, as individual administrations, be responsible for their own financial obligations, in accordance with the Agreement contained in Appendix B.

4.2 The Parties to this Agreement understand that they shall not commit to any action that may result in a financial obligation to other Parties, without first obtaining an Agreement, in writing, from all other parties to this Agreement.

NOTES:

MEVA III - The term "MEVA III", as used in this document, refers to the VSAT network currently providing voice and data aeronautical telecommunications services to States/Territories/International Organisations in the Caribbean Region. The network is managed by Caribbean States/Territories/International Organisations members, through the Technical MEVA Group (TMG), and is coordinated by the ICAO NACC Regional Office.

REDDIG II - The term "REDDIG II", as used in this document, refers to the VSAT network presently implemented in the South American region under the technical cooperation project RLA/03/901 coordinated by the ICAO Lima Office.

APPENDIX A

A LIST OF REFERENCE DOCUMENTS USED IN SUPPORT OF THIS AGREEMENT

- Contract N| 2250128 between the International Civil Aviation Organization and COMSOFT GmbH for the provision of the Interconnection of the MEVA III and REDDIG II Satellite Telecommunications Network for MEVAIII and REDDIG II Member States/Territory/International Organization
- Acuerdo de gestión de servicios entre la Cooperación Centroamericana de Servicios de Navegación Aérea (COCESNA) y la OACI Proyecto RLA/09/901 Interconexión del Nodo MEVAII de COCESNA a la REDDIG
- Contract No. 22501200 between the International Civil Aviation Organization and the consortium consisting of INEO Engineering and Systems and LEVEL 3 PERÚ S.A. for the Provision of a New Regional Aeronautical Telecommunication Network (REDDIG II)and associated equipment and services
- Manual de operación de la REDDIG II
- MEVA III Document of Agreement
- MEVA III Service Level Agreement

APPENDIX B

TECHNICAL-OPERATIONAL COORDINATION AGREEMENT FOR THE ESTABLISHMENT OF VSAT MEVA III AND REDDIG II NETWORKS INTERCONNECTION

1. SECTION 1 – PURPOSE OF THIS AGREEMENT

1.1 PURPOSE

1.1.1 To establish technical, operational and administrative aspects necessary for the digital VSAT MEVA III and REDDIG II networks interconnection, to meet aeronautical telecommunications requirements between the CAR/SAM Regions.

2. SECTION 2 – CO-OPERATIONAL TECHNICAL PROCESS OF THE AGREEMENT

2.1 RELATIONSHIP AND RESPONSIBILITIES OF THE PARTIES

2.1.1 During this stage, the management of MEVA III and REDDIG II shall continue with their respective service providers, i.e, REDDIG II shall continue with its REDDIG Administration, and MEVA III, with the MEVA III Service Provider.

2.1.2 States/Territories/International Organisations members of MEVA III and REDDIG II networks shall be responsible for the normal operation of each of their nodes, having to establish mechanisms necessary to ensure the degree of availability required for each of the services under consideration.

3. SECTION 3 – TECHNICAL TERMS OF REFERENCE

3.1 TECHNICAL TERMS OF REFERENCE

3.1.1 Members of MEVA III and REDDIG II networks have mutual interest in establishing the interconnection of their respective communications networks in a manner that they provide the capacity for current and future voice and data aeronautical telecommunications services between the designated nodes within these networks, so as to support aeronautical telecommunications in the CAR/SAM Regions.

3.1.2 The interconnection technical solution shall be carried out under premise that the REDDIG II and MEVA III VSAT network is developed under a full mesh network topology, using TDMA satellite access, as well as a IS-14 satellite transponder with a beam directed over United states / Latin America, C-band operation frequencies and co-linear vertical polarisation.

3.1.3 For the interconnection of the additional equipments to be initially installed at each node involved, MODEM, as well as any other necessary equipment required.

3.1.4 The interconnection implies the following implementations:

a) Additional equipment at Bogota (Colombia) and Caracas (Venezuela), REDDIG II nodes; and

b) Additional equipment at Tegucigalpa, Honduras, COCESNA MEVA III node.

3.2 MANAGEMENT TERMS OF REFERENCE

3.2.1 Implementation of the interconnection option shall not involve modifications to the technical, operational and control management of MEVA III and REDDIG II networks, with exception of the necessary maintenance coordination procedures detailed in paragraph 3.2.5 of this Attachment.

3.2.2 The configuration, synchronisation, supervision and control of additional MODEMs participating in the interconnection and installed at REDDIG II nodes, shall be carried out by the MEVA III Network Control Centre (NCC). Also, the configuration, synchronisation, supervision and control of additional MODEMs participating in the interconnection and installed at MEVA III nodes, shall be carried out by the REDDIG NCC.

3.2.3 The bandwidth, number and type of circuits installed in the MEVA III node for communications with REDDIG II, shall be managed by REDDIG II.

3.2.4 The bandwidth, number and type of circuits installed in the REDDIG II node for communications with MEVA III, shall be managed by MEVA III.

3.2.5 Maintenance coordination procedures between the NCCs

3.2.5.1 When there is any problem in a REDDIG II node, with the MODEM or other equipments involved in the interconnection with MEVA III, the following shall be applied:

a) MEVA III Service Provider shall call the REDDIG II Administration informing of the happening;

b) The REDDIG II Administration shall phone the respective node and shall establish an audio teleconference between MEVA III Service Provider and Caracas or Bogota local technicians, as necessary;

c) REDDIG II NCC, under control of the REDDIG II Administration, shall supervise communications between MEVA III Service Provider and REDDIG II nodes technicians.

d) The MEVA III Service Provider is the only one that may call the REDDIG II Administration to start or close the respective trouble ticket.

3.2.5.2 When there is any problem in a MEVA III node, with the MODEM or other equipment affect the interconnection with REDDIG, the following shall be applied:

a) The REDDIG II Administration shall call the MEVA III Service Provider informing of the happening;

b) The MEVA III Service Provider shall call the respective node and shall establish an audio conference between REDDIG II Administration and local technicians, as necessary;

c) MEVA III NCC, under control of the Service Provider, shall supervise communications between REDDIG II Administration and MEVA III nodes technicians.

d) The REDDIG II Administration is the only one that may call the MEVA III Service Provider to start or close the respective trouble ticket.

3.2.6 **Security requirements**

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

a) MEVA III network have no direct communications with public networks.

b) The equipment is not shared with services different to MEVA III.

c) Access restriction to equipment belonging to the network, through the use of a password.

d) The network must exclusively support services to which it was originally constituted for.

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

a) REDDIG II network have no direct communications with public networks.

b) The equipment is not shared with services different to REDDIG II.

c) Access restriction to equipment belonging to the network, through the use of a password.

d) The network must exclusively support services to which it was originally constituted for.

SECTION 4 – FINANCIAL RESPONSIBILITIES OF THE PARTIES

4.1 EQUIPMENT PURCHASING

4.1.1 Additional equipment to be installed at REDDIG II nodes, with MEVA III MODEMs requirements, can be included in the leased contract established between ICAO, in behalf of the REDDIG II members, and the MEVA III Service Provider in accordance with the requirements established for the interconnection.

4.1.2 Additional equipment to be installed at MEVA III nodes, with REDDIG II MODEMs requirements, can be purchased by MEVA III members (States, Territories, Organisations) in accordance with the requirements established for the interconnection.

4.2 SPARE PARTS LOT PURCHASING

4.2.1 The spare parts for the additional equipment to be installed at the REDDIG II nodes, with MEVA III MODEM and other device requirements, can be included in the leasing contract established between ICAO, on behalf of the REDDIG II States, and the MEVA III Service Provider.

4.2.2 The spare parts for the additional equipment to be installed at the MEVA III nodes, with REDDIG II MODEM and other device requirements, shall be purchased by MEVA III Members.

4.3 MAINTENANCE

4.3.1 The additional equipment that would be installed in the REDDIG II nodes and that would route communications requirements with MEVA III nodes, shall be maintained by the MEVA III Service Provider, under the coordination of the REDDIG II Administration.

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

4.4 SPACE SEGMENT

4.4.1 The carriers, as well as the band width requirement for communications between REDDIG II nodes shall be the same as those currently rented with INTELSAT. The payment of the space segment to INTELSAT shall continue being carried out through the REDDIG II Administration, who shall be in charge of collecting contributions from each SAM State member of REDDIG II.

4.4.2 The carriers, as well as the band width requirement for communications between MEVA III nodes shall be done through the MEVA III Service Provider. MEVA III members shall pay the bandwidth consumption to the MEVA III Service Provider.

4.4.3 The circuits necessary for communications between a REDDIG II node having MODEMs participating in the interconnection with MEVA III shall be administrated by the MEVA III Service Provider. The amount charged for circuits used by the REDDIG II Member of the aforementioned node mentioned shall be provided by the MEVA III Service Provider, and the respective consumption payment to the provider shall be made through REDDIG II Administration.

4.4.4 The circuits necessary for communications between a MEVA III node having MODEMs participating in the interconnection with REDDIG II shall be administrated by REDDIG II. The amount charged for circuits used by the mentioned node shall be provided by the REDDIG Administration, and the respective consumption payment shall be made by the MEVA II member of the aforementioned node to the REDDIG II Administration.

- END -

APPENDIX D
NETWORK OPERATION CENTER INFORMATION FOR COORDINATION BETWEEN MEVA III and REDDIG II NETWORK MANAGEMENT

MEVA III NETWORK OPERATION CENTER

COMSOFT Helpdesk (Normal Problem Reporting)	**mailto:** noc@comsoft-sat.com	PSTN: +1-305-627-6010 MEVA III extension 2400

Point of Contact:

Markus Tenbeck	Markus.tenbeck@comsoft-sat.com	+49 7062 91651 14 (Phone) +49 7062 91651 99 (Fax)

REDDIG II NETWORK OPERATION CENTER

NOC REDDIG II Helpedesk	lalejos@icao.int	+55 92 3652 5713 / 5714

Point of Contact Luis Alejos SAM REDDIGII Administrator	l.alejos@icao.int	55 92 3652 5713 / 5714