INTERNATIONAL CIVIL AVIATION ORGANIZATION

THIRD MEVA II / REDDIG COORDINATION MEETING

(MR/3)

FINAL REPORT

Mexico City, Mexico
26 to 28 July 2006

Prepared by the Secretariat
August 2006

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE THIRD MEVA II / REDDIG COORDINATION MEETING

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HISTORICAL

ii.1 Duration and Site of the Meeting

The Third MEVA II / REDDIG Coordination Meeting (MR/3) was held at the ICAO North American, Central American and Caribbean Regional Office in Mexico City, Mexico, from 26 to 28 July 2006.

ii.2 Opening Ceremony

Mr. Jose Antonio Díaz de la Serna, Acting Regional Director of the ICAO North American, Central American and Caribbean Office, opened the Meeting and welcomed the participants; he emphasized the importance of the Meeting and its results and highlighted the need to have a close inter-regional cooperation in order to adopt actions to achieve the homogeneous integration or the interconnection of the MEVA II and REDDIG networks.

ii.3 Organization, Officers and Secretariat

Mrs. Dulce Roses from United States acted as Chairman and Mr. Alberto Singh from Argentina as Vice-Chairman; Mr. Aldo Martínez, Regional Officer, Communications, Navigation and Surveillance, from the ICAO NACC Regional Office, acted as Secretary with the assistance of Mr. Onofrio Smarrelli, Regional Officer Communications, Navigation and Surveillance from the ICAO SAM Regional Office, as well as Mr. Masoud Paydar, Technical Officer, CNS Section of ICAO Headquarters.

ii.4 Working Languages

The working languages of the Meeting were Spanish and English. The documentation and the Report of the Meeting were available to participants in both languages.

ii.5 Agenda

Agenda item 1: Follow-up to the Conclusions of GREPECAS, MR/2 and ALLPIRG/5 Meetings on the integration/interconnection of the VSAT MEVA II and REDDIG networks

Agenda item 2: Technical-operational and cost-benefit option analyses for the MEVA II and REDDIG networks integration/interconnection

Agenda item 3: Analysis of the administrative/institutional actions to implement the recommended option for the integration/interconnection of the MEVA II and REDDIG networks

Agenda item 4: Other matters

ii.6 List of Working Papers

WORKING PAPERS				
Number	**Agenda Item**	**Title**	**Date**	**Prepared and Presented by**
WP/01	--	Proposal on the Agenda, Explanatory Notes, Working Method and Schedule of the Third MEVA II / REDDIG Coordination Meeting	31/05/06	Secretariat
WP/02	1	Follow-up to the Conclusions related to the Integration/Interconnection/Interoperability of the VSAT MEVA II and REDDIG Networks	07/06/06	Secretariat
WP/03	2	Option Proposals for the Integration and Interconnection of the VSAT MEVA II and REDDIG Networks	30/06/06	Secretariat
WP/04	3	Administrative/Institutional arrangements proposed for the Integration/Interconnection of the VSAT MEVA II and REDDIG Networks	30/06/06	Secretariat
WP/05	2	MEVA Technical Management Group views on the results of the First MEVA/REDDIG Interconnection Task Force Meeting	25/07/06	MEVA TMG

ii.7 List of Information Papers

INFORMATION PAPERS				
Number	**Agenda Item**	**Title**	**Date**	**Prepared and Presented by**
IP/01	--	General Information	31/05/06	Secretariat
IP/02	--	List of Working and Information Papers	18/07/06	Secretariat
IP/03	1	An overview of VSAT for Aeronautical Communications	20/07/06	Secretariat

ii.8 List of Discussion Papers

DISCUSSION PAPERS				
Number	**Agenda Item**	**Title**	**Date**	**Prepared and Presented by**
ND/01	2	Cost analysis for the MEVA II and REDDIG homogeneous integration ***(Spanish only)***	27/07/06	Ad hoc Group Rapporteur

ii.9 **Schedule and Work Mode**

The Meeting agreed to hold its daily sessions from 09:00 to 14:30 hours, with two breaks. The Meeting also agreed to work as a whole and formed an Ad hoc Group.

ii.10 **Attendance**

The Meeting was attended by 30 participants from 16 States, Territories and one International Organization from the CAR/SAM Regions. A list of participants is shown in pages iii-1 and iv-1 to iv-6.

ii.11 **Conclusions**

NUMBER	TITLE	PAGE
3/1	Technical-Operational Analysis for the MEVA II / REDDIG Interconnection Solution	2-2
3/2	Administrative actions for the adoption of the integration of the MEVA II and REDDIG Networks	3-2
3/3	Update of the MEVA II / REDDIG Interconnection Task Force	3-3

LIST OF PARTICIPANTS

ARGENTINA

Alberto Miguel Singh
Gustavo Adolfo Chiri

BAHAMAS

Hilliard Walker

BRAZIL

Luiz Antonio Freitas de Castro
Athayde Licério Vieira Frauche

CHILE

Iván Galán Martínez
Guillermo Garcés Valenzuela

CUBA

Carlos Alberto Pérez Saavedra
Jorge Castellanos

DOMINICAN REPUBLIC

Elvis A. Collado
José Luis Fernández
Julio César Mejía

HAITI

Yves Andre Cesar
Jean-Claude Pierre

JAMAICA

Patrick Stern
Linvol Stephens

NETHERLANDS ANTILLES

Cedric D. Balentien
Phylogene Mattheeuw

PARAGUAY

Aldo Pereira
David Ricardo Torres J.

PERÚ

Paulo Vila M.

TRINIDAD AND TOBAGO

Veronica Ramdath

UNITED STATES

Dulce Roses
Olivier Delperdange

VENEZUELA

Víctor Rojas M.
Nelson Correa

COCESNA

Julio César Siu
Roger Alberto Pérez

ICAO

Masoud Paydar
Aldo Martínez
Onofrio Smarrelli

AGS

Tom Foust
Devaraj Sahu

LIST OF PARTICIPANTS
GENERAL INFORMATION

STATE INTERNATIONAL ORGANIZATION NAME POSITION	ADDRESS TELEPHONE FAX E-MAIL
Argentina	
Alberto Miguel Singh Jefe de Proyecto REDDIG Argentina	Av. Pedro Zanni 250 – Oficina 1063 Buenos Aires, Argentina Tel. + 54 11 4317 6667 Fax + 54 11 4317 6118 E-mail asingh@impsat1.com.ar
Gustavo Adolfo Chiri Jefe División Planificación	Av. Pedro Zanni 250, Décimo Piso, Oficina 1072 Buenos Aires, Argentina Tel. + 54 11 4317 6466 Fax + 54 11 4317 6118 E-mail gchiri@faa.mil.ar
Bahamas	
Hilliard Walker Chief Operations Office – Avionics	P.O. Box N – 3117 Department of Civil Aviation Nassau, Bahamas Tel. + 242 328 0993 Fax + 242 326 3592 E-mail hilliard_walker@hotmail.com
Brazil	
Luiz Antonio Freitas de Castro Jefe División Radio Ayudas	DECEA Av. General Justo 160 Castelo, Rio de Janeiro, Brasil Tel. + 55 21 2101 6109 Fax + 55 21 2101 6215 E-mail lantocastro@click21.com.br
Athayde Licério Vieira Frauche Jefe de la Sección de Comunicaciones Fijas	DECEA Av. General Justo 160 Castelo, Rio de Janeiro, Brasil Tel. + 55 21 2101 6581 Fax + 55 21 2101 6219 E-mail tel1@decea.gov.br
Chile	
Iván Galán Martínez Subdirector Planes y Proyectos	Dirección General de Aeronáutica Civil Av. Miguel Claro No. 1314 Providencia Santiago, Chile Tel. + 56 2 439 2510 Fax + 56 2 439 2454 E-mail igalan@dgac.cl

STATE **INTERNATIONAL ORGANIZATION** **NAME** **POSITION**	**ADDRESS** **TELEPHONE** **FAX** **E-MAIL**
Guillermo Garcés Valenzuela Jefe Sección Evaluación Proyectos	Dirección General de Aeronáutica Civil Av. Miguel Claro No. 1314 Providencia Santiago, Chile Tel. + 56 2 439 2384 E-mail ggarces@dgac.cl
Cuba	
Carlos Alberto Pérez Saavedra Especialista CNS	Dirección de Aeronavegación Instituto de Aeronáutica Civil de Cuba Calle 23 No. 64 Vedado, Plaza, La Habana, Cuba Tel. + 537 834 4571 E-mail carlos.saavedra@iacc.avianet.cu
Jorge Castellanos Ingeniero Control Técnico	ECASA Ave. Rancho Botero Km 15 ½ La Habana, Cuba Tel. + 537 266 4424 Fax + 537 266 4424 E-mail castellanos@aeronav.ecasa.avianet.cu
Dominican Republic	
Elvis A. Collado Encargado de Comunicaciones de Radio	Aeropuerto Internacional Las Américas División CNS Santo Domingo, República Dominicana Tel. + 809 549 1310 Fax + 809 549 0692 E-mail elviscollado@gmail.com
José Luis Fernández Encargado División Automatización SNA	Aeropuerto Internacional Las Américas División Automatización SNA Santo Domingo, República Dominicana Tel. + 809 549 9020 E-mail josenet2004@yahoo.com
Julio C. Mejía Encargado División ATM	Aeropuerto Internacional Las Américas Departamento de Navegación Aérea, 3er Piso Santo Domingo, República Dominicana Tel. + 809 549 1310 ext. 233 Fax + 809 549 0314 E-mail jmejia@verizon.net.do
Haiti	
Yves Andre Cesar Director of Equipments	Office National de l'Aviation Civile Boite Postale # 1346, Route de l'Aéroport Port-au-Prince, Haiti Tel. + 509 250-0052 Fax + 509 250-0998 E-mail yacesar@ofnac.org yacesar@hotmail.com

STATE **INTERNATIONAL ORGANIZATION** **NAME** **POSITION**	**ADDRESS** **TELEPHONE** **FAX** **E-MAIL**
Jean Claude Pierre Electronics and Telecom Engineer	Office National de l'Aviation Civile Boite Postale # 1346, Route de l'Aéroport Port-au-Prince, Haiti Tel. + 509 736 4788 E-mail ofnac@ofnac.org jcpierre@ofnac.org
Jamaica	
Patrick Stern Director Air Navigation Services	Jamaica Civil Aviation Authority 4 Winchester Road Kingston 10, Jamaica Tel. + 876 960 3965 Fax + 876 920 0194 E-mail dans@jcaa.gov.jm
Linvol Stephens Acting General Manager	Aeronautical Telecommunications Limited (Aerotel) 1 Braemar Ave. Kingston 5, Jamaica Tel. + 876 978 4037 Fax + 876 978 6080 E-mail linvol@cwjamaica.com
Netherlands Antilles	
Cedric D. Balentien Manager, Airway Facilities N.A.A.T.C. N.V.	Netherlands Antilles Air Traffic Control Inc. Seru Mahuma z/n Curaçao, Netherlands Antilles Tel. + 5999 9 839 3512 Fax + 5999 9 868 3012 E-mail cedric.balentien@gov.an
Phylogene Mattheeuw	Netherlands Antilles Air Traffic Control Inc. Seru Mahuma z/n Curaçao, Netherlands Antilles Tel. + 5999 9 839 3527 Fax + 5999 9 868 3012 E-mail phylogene@hotmail.com
Paraguay	
Aldo Pereira Jefe de Sección Radiocomunicaciones	Autopista Internacional Aeropuerto Internacional "Silvio Pettirossi" Asunción Paraguay Tel. + 595 2164 5708 Fax + 595 2164 5598 E-mail aopa_23@hotmail.com

STATE **INTERNATIONAL ORGANIZATION** **NAME** **POSITION**	**ADDRESS** **TELEPHONE** **FAX** **E-MAIL**
David Ricardo Torres J. Técnico Especialista en Telecomunicaciones y Electrónica Aeronáutica	Aeropuerto Internacional "Silvio Pettirossi" Sala de Líneas, Interno 366 Asunción Paraguay Tel. + 595 2164 5708 / REDDIG 55100 Fax + 595 2164 5598 + 595 646081 E-mail dr_torres33@yahoo.com
Peru	
Paulo Vila M. Inspector CNS – DGAC	Jr. Zorritos No. 1203, Piso 6 "C" Lima 1, Perú Tel. + 511 315 7880 Fax + 511 315 7881 E-mail pvila@mtc.gob.pe
Trinidad and Tobago	
Veronica Ramdath Manager, Telecommunications & Electronics	Trinidad and Tobago Civil Aviation Authority P.O. Box 2163 National Mail Centre, Golden Grove Road Piarco, Republic of Trinidad and Tobago, W.I. Tel. + 1 868 669 4706 Fax + 1 868 669 5239 E-mail vramdath@caa.gov.tt
United States	
Dulce M. Roses Program Manager, International Telecom	Federal Aviation Administration 5600 N.W. 36 St. Suite 433 Miami, Fl. 33166, United States Tel. + 305 526-2187 Fax + 305 526-2188 E-mail dulce.roses@faa.gov
Olivier Delperdange International Telecom Engineer ITT	ITT 901 D. Street SW, Suite 222 Washington, D.C. 20024, United States Tel. + 1 202 314-5966 E-mail olivier.ctr.delperdange@faa.gov
Venezuela	
Víctor J. Rojas M. Gerente de Sistemas de Información y Telecomunicaciones	Torre Británica Altamira Piso 2 Caracas, Venezuela Tel. + 58 212 277 4401 E-mail v.rojas@inac.gov.ve

STATE **INTERNATIONAL ORGANIZATION** **NAME** **POSITION**	**ADDRESS** **TELEPHONE** **FAX** **E-MAIL**
Nelson Correa Coordinador de Proyectos	Hangar No. 7 Base Aérea Francisco de Miranda La Carlota, Caracas Venezuela Tel. + 58 212 277 4465 Fax/Tel + 58 212 355 2227 E-mail n.correa@inac.gov.ve
COCESNA	
Julio César Siu Gerente Estación Honduras	Edificio COCESNA 150 mts al Sur Aeropuerto Toncontín Apartado 660 Tegucigalpa, Honduras Tel. + 504 234 3360 Fax + 504 234 3682 E-mail jsiu@cocesna.org juliocesarsiu@yahoo.com Web www.cocesna.org.com
Roger Alberto Pérez Jefe Área Técnica Regional Honduras	Edificio COCESNA 150 mts al Sur Aeropuerto Toncontín Apartado 660 Tegucigalpa, Honduras Tel. + 504 234 3360 Fax + 504 234 3682 E-mail rperez@cocesna.org
ICAO	
Masoud Paydar Technical Officer Communications, Navigation and Surveillance	Communications, Navigation and Surveillance Section 999 University Street Montreal, Québec Canada H3C 5H7 Tel + 514 954 8219 ext. 8210 E-mail MPaydar@icao.int Web: http://www.icao.int
Aldo Martínez Regional Officer Communications, Navigation and Surveillance	North American, Central American and Caribbean Office Av. Presidente Masaryk 29 – 3rd Floor Col. Chapultepec Morales México D.F., 11570, México Tel: (5255) 5250 3211 Fax: (5255) 5203 2757 E-mail: amartinez@mexico.icao.int icao_nacc@mexico.icao.int Web: http://www.icao.int/nacc

STATE **INTERNATIONAL ORGANIZATION** **NAME** **POSITION**	**ADDRESS** **TELEPHONE** **FAX** **E-MAIL**
Onofrio Smarrelli Regional Officer Communications, Navigation and Surveillance	South American Office Edificio CORPAC, 2o Piso, Zona Comercial Aeropuerto Internacional Jorge Chávez Lima (Callao), Perú Tel + 51 1 575 1646 Fax + 51 1 575 0974 E-mail os@lima.icao.int Web: http://www.lima.icao.int/
Americom Government Services (AGS)	
Tom Foust Sales Director	20140 Scholar Drive, Suite 311 Hagerstown, MD 21742, United States Tel. + 301 739 8993 Fax + 301 739 8994 E-mail tom.foust@ses-americom.com
Devaraj Sahu Systems Engineer	20140 Scholar Drive, Suite 311 Hagerstown, MD 21742, United States Tel. + 301 739 8993 Fax + 301 739 8994 E-mail devaraj.sahu@ses-americom.com

Agenda item 1: Follow-up to the Conclusions of GREPECAS, MR/2 and ALLPIRG/5 Meetings on the integration/interconnection of the VSAT MEVA II and REDDIG networks

Follow-up to the relevant conclusions of the GREPECAS, MR/2 and ALLPIRG/5

1.1 The Meeting recalled that the GREPECAS, through its Conclusion 10/27, adopted a preliminary material on interconnection of aeronautical communication digital networks. Also, through Conclusion 10/28 indicated the need for capacity provision for the massive exchange of information through digital aeronautical communication networks.

1.2 Subsequently, the GREPECAS/12 Meeting, highlighted the importance of continuing with efforts to achieve homogeneous inter-connection and inter-operability among regional and inter-regional digital communications networks in the CAR/SAM Regions, taking into account current and future voice and data communications requirements, therefore formulated Conclusion 12/39 – *Additional Inter-Connection Points for Regional and Inter-Regional Digital Networks*.

1.3 Recently, the GREPECAS/13 Meeting formulated Conclusion 13/70 (*Establishment of Agreements to achieve the MEVA II – REDDIG interconnection/interoperation*).

1.4 The Meeting followed-up all the aforementioned GREPECAS Conclusions and the result of this revision is presented in **Appendix A** to this part of the Report.

1.5 Based on the work of the First MEVA II / REDDIG Interconnection Task Force Meeting, held in Mexico City from 3 to 5 May 2006, among other aspects followed-up the three Conclusions related to the integration/interconnection of the VSAT MEVA II and REDDIG networks formulated by the MEVA II REDDIG Coordination Meeting, held in Lima, Peru from 20 to 22 March 2006. The results of the work carried out by the mentioned meeting are presented in **Appendix B** to this part of the Report.

1.6 Also, the Meeting noted Conclusion 5/16 - *Implementation of very small aperture terminals (VSATs)*, as well as Conclusion 5/17 - *Provisions for digital communication networks*, which were formulated by the Fifth Meeting of the ALLPIRG/Advisory Group (ALLPIRG/5) held in ICAO Headquarters, Montreal Canada from 23 to 14 March 2006, related to the issues associated to the VSAT networks implementation. **Appendix C** to this part of the Report presents the texts of these Conclusions.

ICAO Overview of the VSAT networks for aeronautical communications

1.7 The ICAO Headquarters CNS Technical Officer, gave a presentation titled *"An Overview of VSAT for Aeronautical Communications"*, which contained the ICAO vision (including the ALLPIRG/5 Meeting results) on this issue. The presentation is included in **Appendix D** to this part of the Report.

1.8 The Meeting noted the ICAO overview and highlighted some important aspects contained therein as follows:

a) Too many VSAT networks in the same satellite covering area, which are unnecessary and devising interfaces between dissimilar networks is very complex and costly.

b) The end-to-end performance also becomes degraded as a result of proliferation.

c) In accordance to ALLPIRG/5 Conclusion 5/16, we should discourage the proliferation of VSAT networks and work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP).

d) We should use the terminology of network integration or interconnection, but it is not appropriate to use the term network interoperability.

e) It should be taken into account that among the options to increase availability, the easiest and most cost-effective option is to use the Public Internet as a back-up of the VSAT network.

f) The bit error rate (BER) should be less than or equal to 10^{-7}.

g) The availability should be greater than or equal to 99.7%.

h) The voice blocking rate should be less than or equal to 0.25%.

i) The voice latency should be less than 400 ms, which means that only one satellite hop should be used for ATS voice communications.

j) The establishment of a call set-up delay should be less than or equal to 2 seconds.

k) Using expensive satellite resources for occasional voice and low speed AFTN is not cost effective.

l) AFTN cannot support the migration to the use of OPMET data in tabledriven (binary) codes which will be phased in (through Annex 3 amendments) between 2007 and 2016.

m) Any VSAT networks upgrade opportunity should be used to integrate existing VSAT networks.

n) No more dedicated circuits should be planned for the future as the Internet Protocol Suite (IPS) could be used for all voice and data applications.

1.9 The Meeting noted that ICAO is planning to produce performance requirements shown above for use by States in their VSAT-related implementation activities.

1.10 The Trinidad and Tobago delegate requested ICAO that this presentation be given during the forthcoming 30th E/CAR WG that will be held in Saint Lucia from 7 to 11 August 2006.

APPENDIX A

FOLLOW-UP TO THE RELEVANT CONCLUSIONS OF GREPECAS

CONCLUSION	ACTION FOR	COMMENTS AND FOLLOW-UP	STATUS/ DATE TARGET
CONCLUSION 10/27 - PRELIMINARY MATERIAL ON INTERCONNECTION OF AERONAUTICAL COMMUNICATION DIGITAL NETWORKS That States/International Organisations take into account the guidance material to begin aeronautical communication digital network interconnectivity and interoperability studies set out in **Appendix M**.	States, Territories and International Organizations	It is considered that the States, Territories and International Organizations have taken note of this Conclusion.	Completed
CONCLUSION 10/28 - CAPACITY PROVISION FOR THE MASSIVE EXCHANGE OF INFORMATION THROUGH DIGITAL AERONAUTICAL COMMUNICATION NETWORKS That States/International Organizations, when promoting the development, implementing or enhancing private digital voice and data aeronautical communication networks, take into account the advantages that may be obtained by implementing multi-services/multi-protocol networks of modern and adequate available technology and planning the inclusion of the new services resulting from CNS/ATM implementation in the CAR/SAM Regions with massive information transmission capacity, giving access priority to that information related with security in support of multiple aeronautical applications, including those corresponding to CNS/ATM systems.	States, Territories and International Organizations	It is considered that the States, Territories and International Organizations have taken note of this Conclusion.	Completed

CONCLUSION	ACTION FOR	COMMENTS AND FOLLOW-UP	STATUS/ DATE TARGET
CONCLUSION 12/39 - ADDITIONAL INTER-CONNECTION POINTS FOR REGIONAL AND INTER-REGIONAL DIGITAL NETWORKS That, CAR/SAM States/Territories/International Organizations, with the aim of achieving a digital platform that provides homogeneous inter-operability in the CAR/SAM Regions among Regional and Inter-Regional digital communications network, consider implementing the following additional inter-connection points: a) *Merida, Mexico*. Implementation of a MEVA II node at this site, which would interconnect the Mexican network with MEVA II, CAMSAT, and the NAM networks; b) *Barranquilla* or *Bogotá, Colombia*. That a proposal be made to implement a MEVA II node, which would facilitate the interconnection and interoperability of the REDDIG and the Colombian network with MEVA II, CAMSAT and the NAM networks; c) *Buenos Aires, Argentina*. Implementation of a CAFSAT node, meaning another REDDIG interconnection point with CAFSAT. In addition, a ground digital link would be implemented connecting the Buenos Aires and Recife CAFSAT nodes, to be a back-up to the aforementioned network interconnections; and d) other points of interconnection that might be considered between the MEVA II and the REDDIG networks, and between these and other networks. Among these, there is a need to study the implementation of another interconnection point of the E-CAR network with neighbouring networks.	States, Territories and International Organizations	The Council invited the corresponding States to establish the additional nodes indicated to improve the interoperability. Argentina has implemented its CAFSAT node. When following-up this Conclusion, the Third MEVA II / REDDIG Coordination Meeting (MR/3) noted with concern that according to the available information, Mexico is not implementing the node recommended in item a), nor has adhered to any regional/interregional network. The MR/3 Meeting assigned the MEVA II / REDDIG Interconnection Task Force to study an interconnection solution in Bogota (Installation of a MEVA II MODEM in Bogota).	Valid 2007

CONCLUSION	ACTION FOR	COMMENTS AND FOLLOW-UP	STATUS/ DATE TARGET
CONCLUSION 13/70 ESTABLISHMENT OF AGREEMENTS TO ACHIEVE THE MEVA II – REDDIG INTERCONNECTION/INTEROPERATION That, the MEVA II and REDDIG Networks Team Management Groups carry out a coordination meeting before 31 March 2006, coordinated through the NACC and SAM Regional Offices, aimed at studying and proposing the establishment of technical and institutional agreements for MEVA II and REDDIG interconnection/interoperation taking into consideration the feasibility analysis of the following alternatives: a) establishment of a Memorandum of Understanding (MoU) to achieve homogeneous interoperation between the indicated digital networks, taking into consideration the objectives and principles specified in Appendix AR to this part of the Report; b) analyze the convenience of establishing the following additional interconnection/interoperations: • A REDDIG node in Tegucigalpa (COCESNA), Honduras. • A dedicated ground digital circuit between a MEVA II node (Honduras or San Juan, Puerto Rico) and a REDDIG node (Bogotá or Maiquetía). • A MEVA II node in Maiquetía (Venezuela). • Other possible solutions.		The Conclusion is in a follow-up process. The Second MEVA II / REDDIG Coordination Meeting held in Lima, Peru from 20 to 22 March 2006. This Third Meeting also continues this Conclusion's follow-up. a) The Third MEVA II / REDDIG Coordination Meeting established a Task Force assigning the task to develop a MoU proposal in order to established agreements to achieve the MEVA II / REDDIG interconnection. b) According to the results of the Third MEVA II / REDDIG Coordination Meeting this action would be replaced by the indicated in Conclusion 3/1.	Valid 2007

APPENDIX B

FOLLOW UP TO THE CONCLUSIONS OF THE MEVA II / REDDIG COORDINATION MEETING

CONCLUSION	ACTION FOR	REMARKS AND FOLLOW-UP	STATUS/ TARGET DATE
CONCLUSION 2/1 - IMPLEMENTATION OF COMMUNICATIONS INTEROPERATION REQUIREMENTS AMONG THE CAR, NAM AND SAM REGIONS SUPPORTED BY VSAT NETWORKS That, taking into account current and future communications interoperation requirements among the CAR, NAM and SAM regions, whose summaries are presented in Appendices A and B to this part of the Report, and taking advantage of the hemispheric coverage of the satellites available, CAR/SAM States, Territories and International Organizations should implement the mentioned requirements through a simple MEVA II and REDDIG VSAT digital network integration/interconnection solution, to provide high performance at low cost and avoid the use of multiple VSAT networks.	States, Territories and International Organizations	Considering this Conclusion and Conclusion 5/16 of the ALLPIRG/5 Meeting, efforts should continue aimed at integrating the MEVA II and REDDIG networks simply with an operational control (centralized). The MR/3 Meeting considered that this could be carried out after 5 years.	Valid / Feb. 2007
CONCLUSION 2/2 - STUDY OF OPTIONS 1 AND 2 ON INTEGRATION/INTERCONNECTION AND INTEROPERABILITY SOLUTIONS That, the members of MEVA II and REDDIG networks, with the aim of broadening studies regarding implementation of either Options 1 or 2 described in this part of the Report, for the integration/interconnection and interoperability between MEVA II and REDDIG networks: a) establish a Task Force on Interconnection of MEVA II and REDDIG Networks composed by the following States, International Organization and enterprise: Argentina, Brazil, Colombia, United States, Venezuela, COCESNA, Americom Government Services (AGS), and the REDDIG Administrator, under the coordination of ICAO, to mainly analyze aspects related with control and technical-operational management, financial, security, technical-operational and other institutional aspects; b) propose the preliminary text of the Memorandum of Understanding presented in **Appendix 3D** to this part of the report; c) hold a meeting of the Task Force in the ICAO NACC Regional Office in Mexico, tentatively from 3 to 5 May 2006; and d) distribute the results of the mentioned Task Force meeting to the MEVA II and REDDIG parties involved, through the corresponding ICAO NACC and SAM Regional Offices.	MEVA II and REDDIG Members and Task Force	This MEVA II / REDDIG Interconnection Task Force Meeting should perform its tasks in accordance with this Conclusion. a) The MR/3 Meeting added Chile as member of this Group. b) It is expected that the Task Force proposes a Memorandum of Understanding before 31 October 2006.	Valid / Feb. 2007

CONCLUSION	ACTION FOR	REMARKS AND FOLLOW-UP	STATUS/ TARGET DATE
CONCLUSION 2/3 - ANALYSIS OF INSTITUTIONAL ARRANGEMENTS PROPOSED FOR AN INTEGRATION/INTERCONNECTION OF MEVA II AND REDDIG VSAT NETWORKS That, the Task Force created under Agenda Item 3 of this Meeting, as part of its work, takes into account the institutional arrangements: established for MEVA II and REDDIG networks, whose summaries are being presented in Appendices A and B to this part of the Report, and proposed for the integration/interconnection of MEVA II and REDDIG networks presented in Appendix C to this part of the Report.	MEVA II / REDDIG Task - Force	The First MEVA II / REDDIG Interconnection Task Force Meeting should propose institutional arrangements for the integration/interconnection of the MEVA II / REDDIG networks in accordance with this Conclusion. This task will continue performing for the interconnection option.	Completed

APPENDIX C

RELEVANT CONCLUSIONS OF THE ALLPIRG/5 MEETING

Conclusion 5/16: – Implementation of very small aperture terminals (VSATs)

That PIRGs:

a) discourage the proliferation of VSAT networks where one/some of the existing ones can be expanded to serve the new areas of interest;

b) work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP); and

c) give due consideration to managed network services (e.g. a virtual private network (VPN)), subject to availability and cost-effectiveness.

Conclusion 5/17: – Provisions for digital communication networks

That ICAO:

a) expedite the development of provisions relating to the use of the Internet Protocol Suite (IPS) in the aeronautical telecommunication infrastructure; and

b) initiate the development of provisions governing the end-to-end performance of digital communication networks, irrespective of the technologies and protocols utilized therein.

APPENDIX D

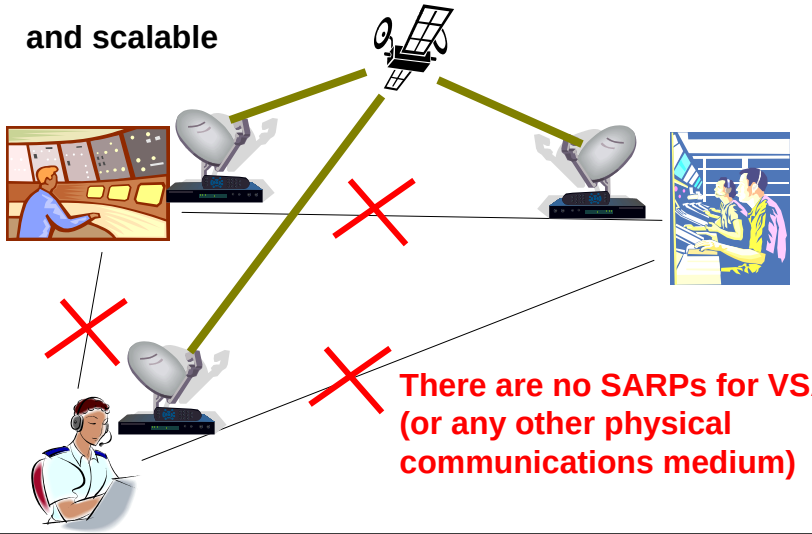
An Overview of VSAT for Aeronautical Communications

Very Small Aperture Terminal

By: Masoud Paydar

ICAO Secretariat

* VSATs are used in areas where leased circuits (for AFS) are unreliable (or uneconomical)
* VSATs networks are, in general, versatile, economical and scalable



There are no SARPs for VSATs (or any other physical communications medium)

Very Small Aperture Terminal (VSAT)

How small?

*** No universal definition!**

*** ETSI:** **Up to 3.8 m at Ku band (12-14 GHz)**

Up to 7.8 m at C band (4- 6 GHz)

*** Typical sizes available today (for C-band):**

1.8 and 2.4 m for remote TX/RX

7 to 9 m for HUBs.

VSAT Design Parameters……Typical figures

Traffic type and volume ……..Voice/Data

Bit rate per VSAT terminal……64 kbps

Band ……C – Band (for CAR/SAM)

Satellite……several choices

Network configuration (Star, mesh, hybrid)……mesh

Antenna size……2.4 m

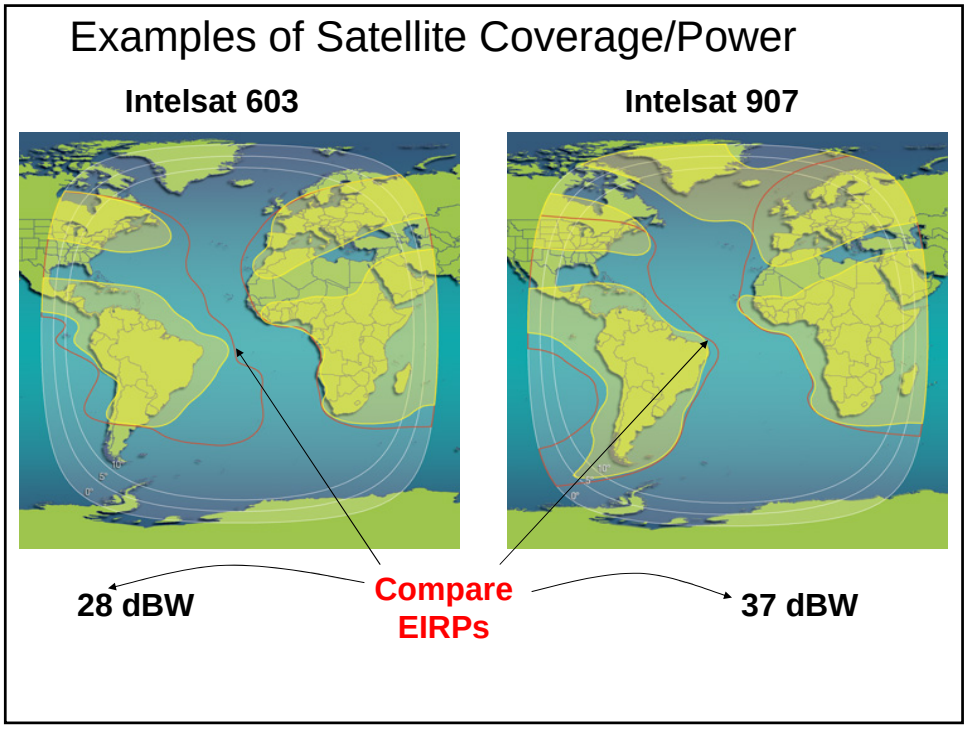
Access technique (FDMA, TDMA)……..TDMA

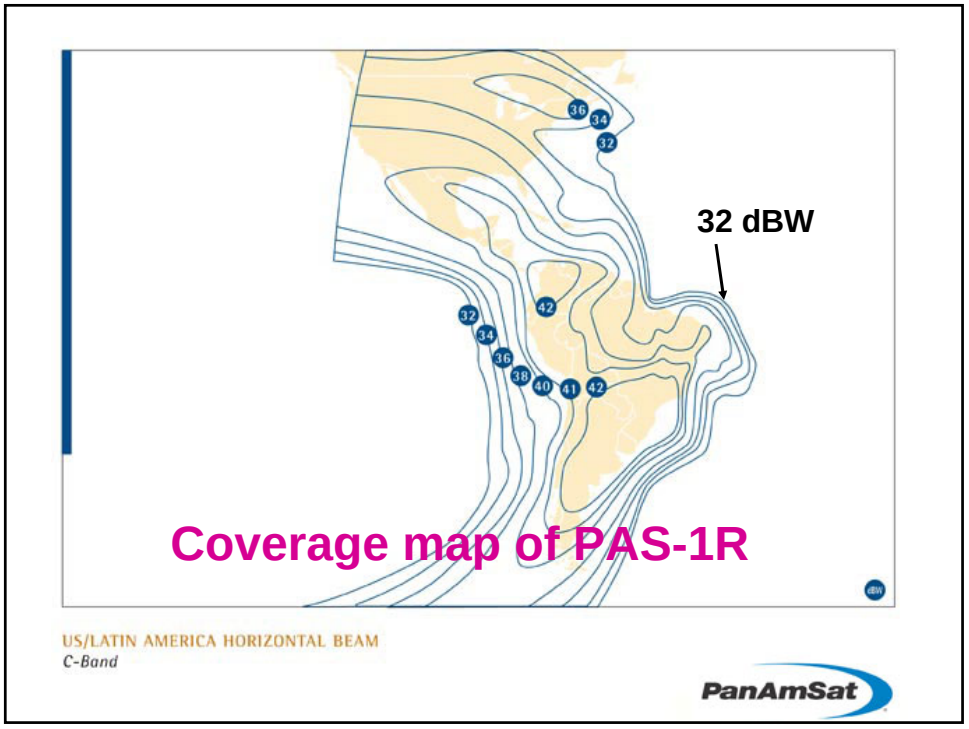
Mode of assignment……DAMA & PAMA

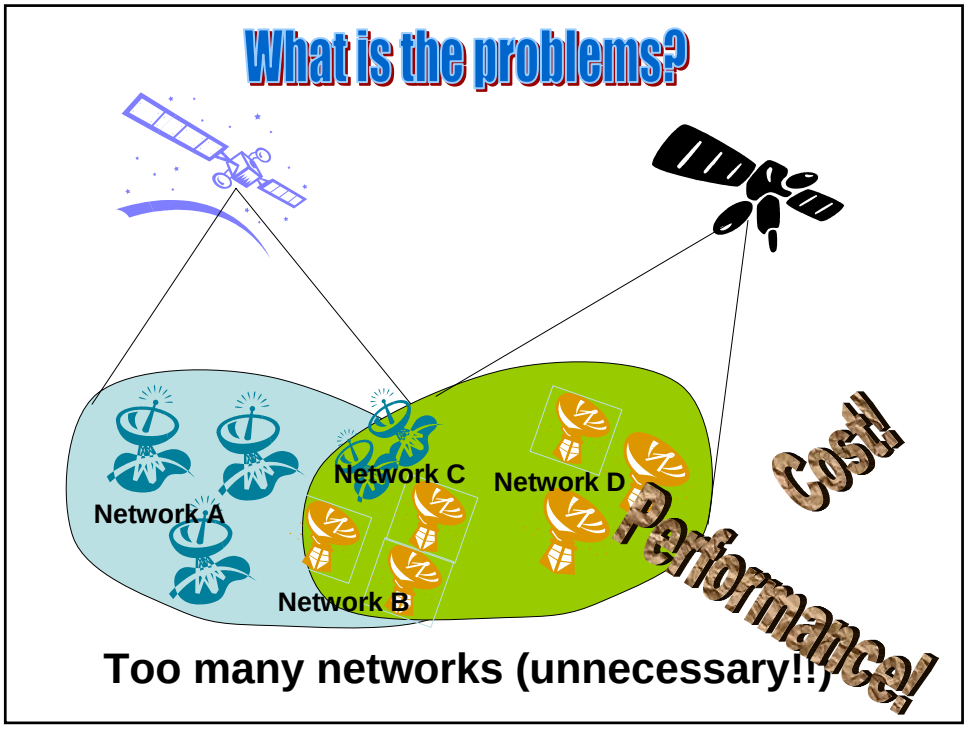
Protocols supported ……Several (e.g. IPS)

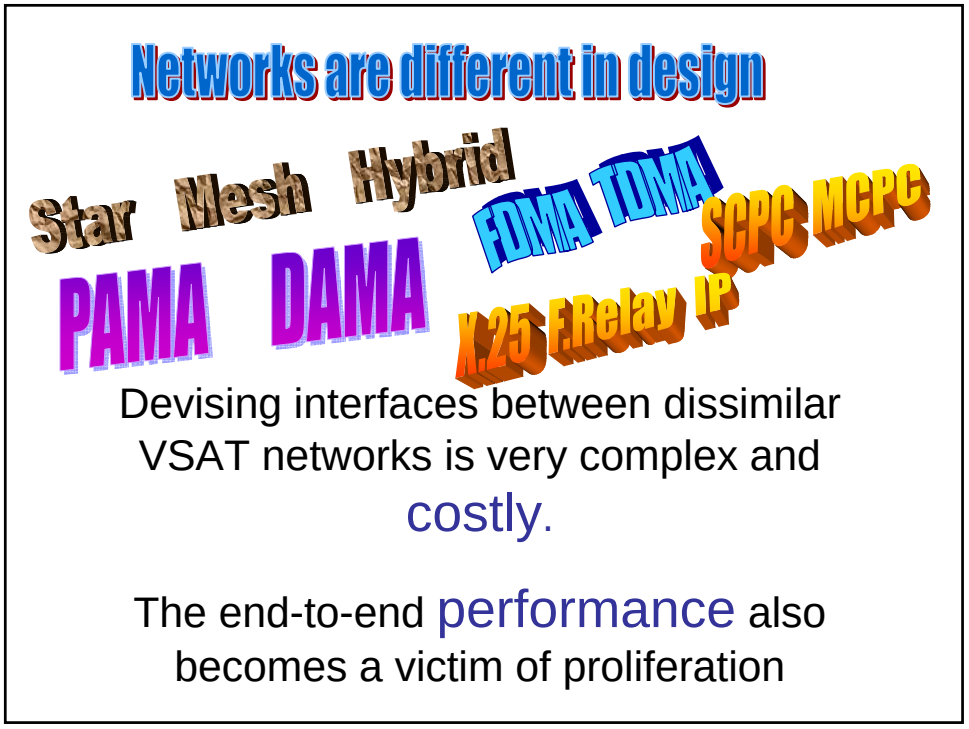
Satellite transponder capacity and charges…….Depends

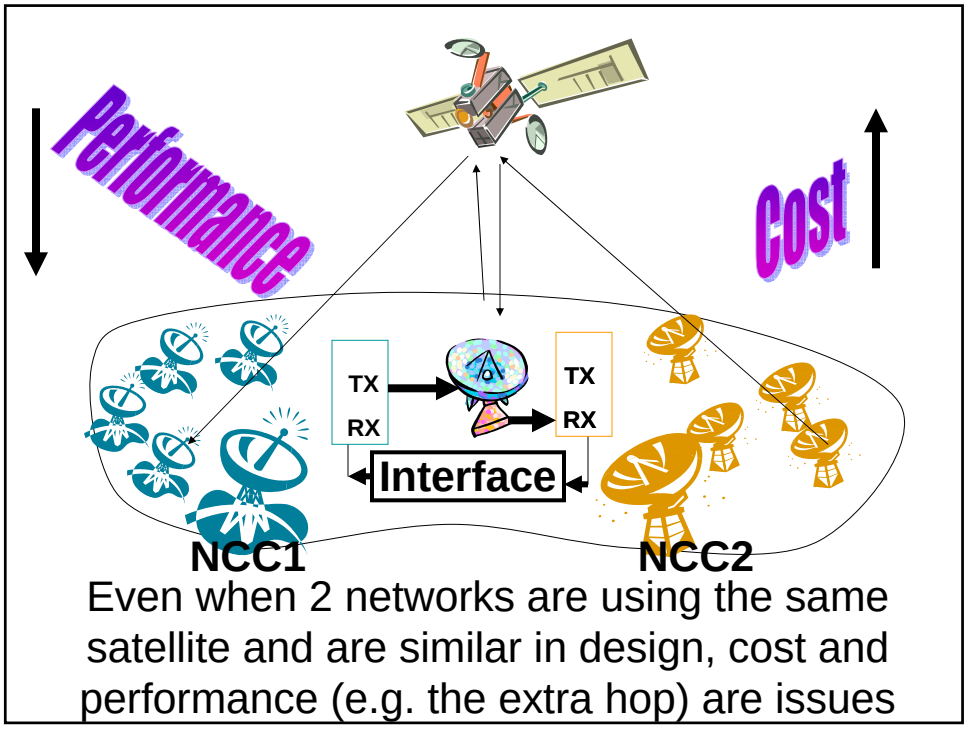
Network Control Centre……Depends


Examples of Satellite Coverage/Power
Intelsat 603
Intelsat 907
28 dBW
Compare EIRPs
37 dBW


32 dBW
Coverage map of PAS-1R
US/LATIN AMERICA HORIZONTAL BEAM
C-Band
PanAmSat


What is the problems?
Network A
Network B
Network C
Network D
Cost!
Performance!
Too many networks (unnecessary!!)


Networks are different in design
Star
Mesh
Hybrid
FDMA
TDMA
SCPC
MCPC
PAMA
DAMA
X.25
F.Relay
IP
Devising interfaces between dissimilar VSAT networks is very complex and costly.
The end-to-end performance also becomes a victim of proliferation



Even when 2 networks are using the same satellite and are similar in design, cost and performance (e.g. the extra hop) are issues

Use of correct terminology

Interconnection? ✓

Interoperability? ✗

integration? ✓

Integration means that the two networks effectively become one! (the preferred option if feasible)

ALLPIRG/5 Conclusions on VSAT (Approved by ICAO Council on 13 June 2006):

5/16 – Implementation of VSATs

That PIRGs

a) discourage the proliferation of VSAT networks where one/some of the existing ones can be expanded to serve the new areas of interest;

b) work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP); and

c) give due consideration to managed network services (e.g. a virtual private network (VPN)), subject to availability and cost effectiveness.

ALLPIRG/5 Conclusions (cont'd)

Conclusion 5/17 – Provisions for digital communication networks

That ICAO:

a) expedite the development of provisions relating to the use of the Internet Protocol Suite (IPS) in the aeronautical telecommunications infrastructure; and

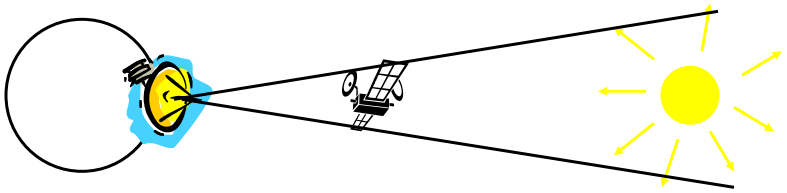
b) initiate the development of provisions governing the end-to-end performance of digital communication networks, irrespective of the technologies and protocols used therein.

PERFORMANCE PARAMETERS

AVAILABILITY

99%? - 99.999%? LET'S BE REASONABLE

Assuming no equipment failure, a single 2.4 m C-band VSAT in Mexico City looking at PAS-1R, will experience sun outages about 2 hours per year.

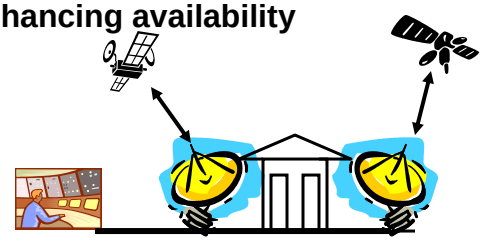


Maximum availability is therefore 99.97%

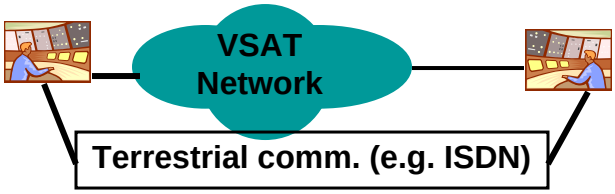
Allowing for other expected problems, 99.7% (about 26 hrs of outage per year) is a reasonable figure.

Options for enhancing availability

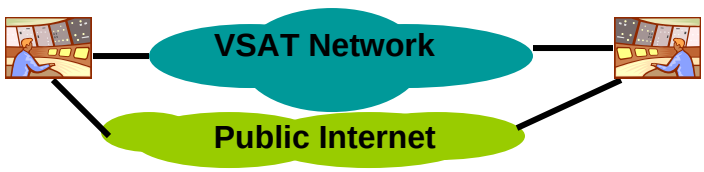
A



B



C



Option C is easiest and most cost effective

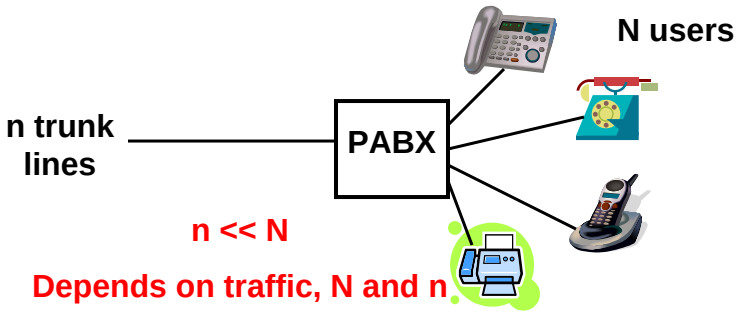
PERFORMANCE PARAMETERS
Bit Error Rate (BER)

Errors are caused by noise. Higher Signal to Noise Ratio (SNR) reduces BER.

- * More uplink power
- * Higher satellite EIRP
- * Larger Rx antenna size
- * Low noise Rx amplifier
- * Forward Error correction (FEC)

A reasonable figure for VSAT BER is 10^{-7}

PERFORMANCE PARAMETERS
Voice Blocking Probability



Similarly, if there are N VSAT terminals, it is too costly (& outdated) to have N voice channels available at all times for ATS-DS circuits (for total non-blocking performance).

In a modern VSAT network, a blocking probability of 0.25% is quite reasonable (i.e. one in 400 attempts will be unsuccessful).

PERFORMANCE PARAMETERS
Voice Delay (latency)

According to ITU-T Rec. G.114, one-way voice latency limits are:

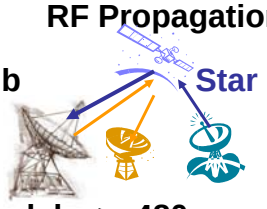
*** less than 150 ms for most users**

*** 150- 400 ms, acceptable if can be tolerated by users**

*** above 400 ms, unacceptable for general network planning purposes (though may be unavoidable in some cases)**

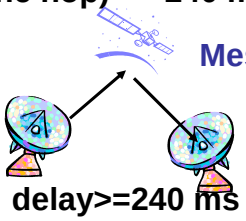
RF Propagation delay (one hop) >= 240 ms

Hub **Star**



delay>=480 ms
(unacceptable!!)

Mesh

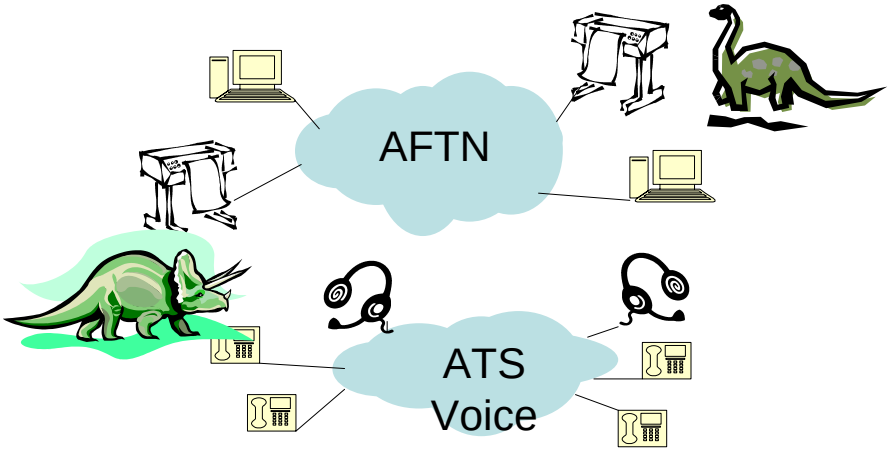


delay>=240 ms

Call set-up delay <= 2 Seconds

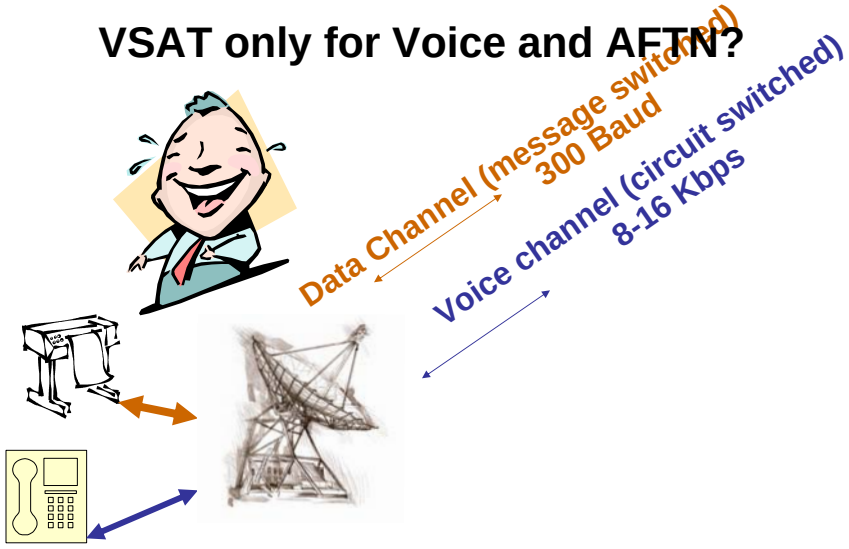
Aeronautical Voice and Data

Current Situation



Keeping two separate sets of dedicated circuits is too expensive. Moreover, the full capacity of circuits/channels is seldom used.

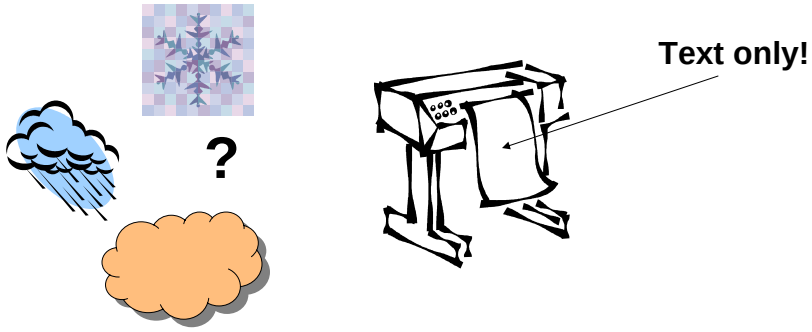
VSAT only for Voice and AFTN?



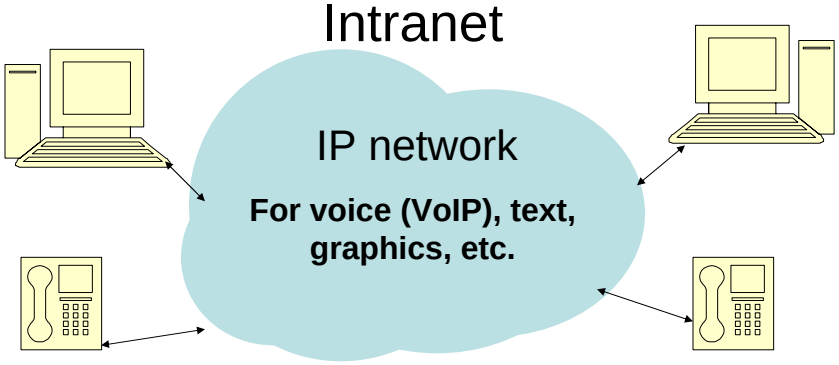
Using expensive satellite resources for occasional voice and low speed AFTN is not cost effective.

Why not use the full potential of a modern VSAT?

Moreover, AFTN cannot support the migration to the use of OPMET data in table-driven (binary) codes which will be phased in (through Annex 3 amendments) between 2007 and 2016.



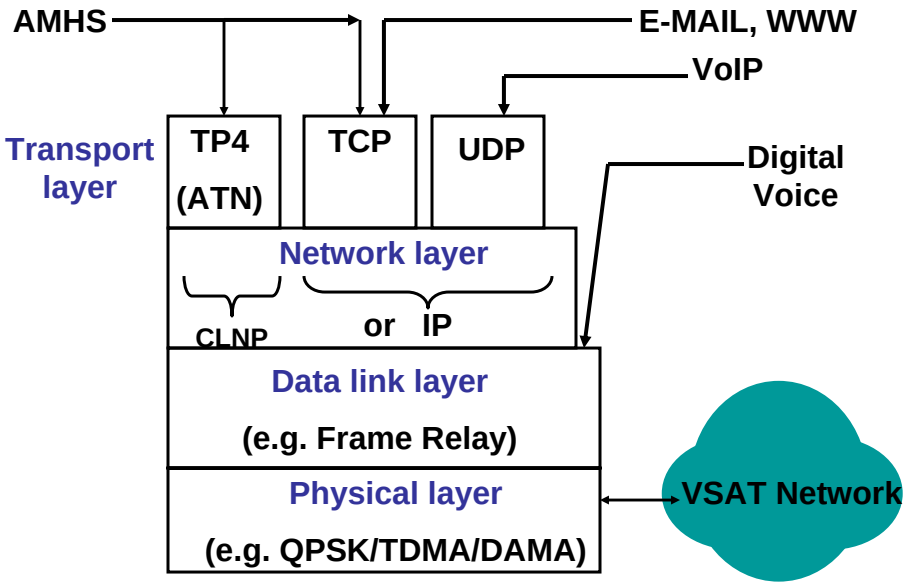
Potential alternative: An IP-based Intranet

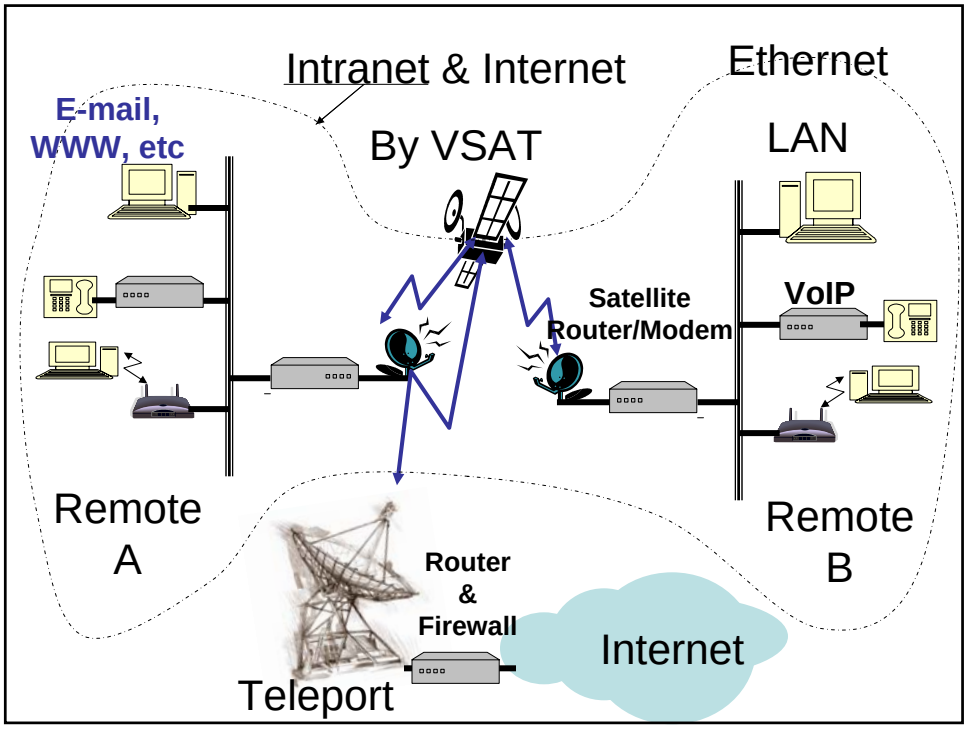


* AFTN messages can be sent via e-mail (before transition to AMHS)

* New MET and other applications supported

OVERVIEW OF COMMUNICATION LAYERS





An IP network?

*** IP can be a subnetwork of the ATN**

*** SARPs for the use of IPS for G-G being developed (adoption expected in 2008)**

*** Already in use in some States/Regions**

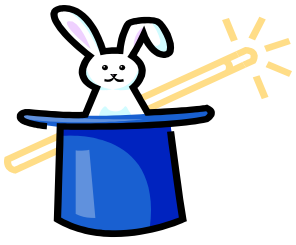
*** EUROCAE WG 67 is developing VoIP for ATM – Approval expected in 2008 (ACP is monitoring this activity)**

The future trend is "all IP"

Summary

* Proliferation of VSAT networks should be avoided
* Any upgrade opportunity should be used to integrate (i.e. under a single NCC) existing VSAT networks
* No more dedicated circuits! The trend is an IP-based VSAT network for all voice and data applications

Thank you for your attention



Any Questions?

Agenda item 2: Technical-operational and cost-benefit option analyses for the MEVA II and REDDIG networks integration/interconnection

2.1 Based on the Report of the Second MEVA II / REDDIG Coordination Meeting (MR/2), held in Lima, from 20 to 22 March 2006; on the Report of the MEVA II/ REDDIG Interconnection Task Force Meeting (MR TF/1), held in Mexico City from 3 to 5 May 2006; the Meeting analysed the technical options and the cost-benefit analysis for the integration and interconnection of the aforementioned networks, which are contained in the Report to Agenda Items 1 and 2 of the MR TF/1 Meeting.

2.2 Meeting reviewed the proposal of the MR TF/1 regarding the technical-operational study for the homogeneous integration of the MEVA II and REDDIG Networks, including the cost/benefit analysis, the definition of the necessary resources, the elaboration of proposals for the operation, control of the required services and other related aspects in order to achieve this objective.

2.3 To this end, the Meeting considered that the full integration or complete homogeneous represent the best technical operational solution since it would provide a unified control, easing the management, as well as the implementation of required services among the CAR and SAM Regions.

2.4 Notwithstanding, the REDDIG Members stated that the implementation of the integrated solution, as an initial phase, it would be hard to comply considering the current differences between the REDDIG and MEVA II operation and management.

2.5 Additionally, the Meeting created an ad hoc group to analyse the REDDIG operation costs as estimated by AGS (management and bandwidth cost) for the integration solution and to compare it with the current costs of the REDDIG. The ad hoc group was formed by Argentina, Brazil, Chile, Paraguay, Peru, Venezuela and AGS with the support of ICAO.

2.6 Starting from the current circuit requirements with its respective bandwidths in each of the REDDIG nodes, AGS presented the costs estimated for the integration of the MEVA II and REDDIG networks. These costs are included in **Appendix A** to this part of the Report.

2.7 The Meeting compared the afore mentioned costs estimated with the current cost of the subject REDDIG nodes as shown in **Appendix B** to this part of the Report.

2.8 As a result of the mentioned comparison, the Meeting was informed that the current costs of REDDIG was approximately 28% less than estimated AGS costs; AGS stated that its costs could be reviewed. The AGS representative expressed that the Ad hoc Group financial analysis did not take into consideration any economies of scale for either network management cost or bandwidth cost and savings. It should also be noted that if and when an integrated network analysis is completed that the MEVA II Members may also recognize potential cost savings.

2.9 Also, the Meeting noted that the implementation of new circuits in the current REDDIG management and bandwidth structure do not imply any additional cost to the total amount, since the leased space segment allows the implementation, even with the inclusion of additional nodes.

2.10 The Meeting noted that the REDDIG members stated to be satisfied with the current arrangements of the network, such as the cooperation aspects, training and maintenance. Also, they have obtained benefits; therefore, bearing this in mind, as well as other aspects, they do not want to integrate the REDDIG network to the MEVA II network, for the next 5 years.

2.11 Furthermore, the Members of the MEVA network stated that the arrangements adopted 10 years ago, have been accurate and satisfactory. Moreover, throughout the years, the operation and network services are the result of the compliance of the AFS communication requirements established in the FASID with an adequate performance. Currently, the network technology is being upgraded through the implementation of the MEVA II network in order to accomplish greater benefits, capacity and performance by reducing costs. Additionally, the MEVA members expressed in WP/05, their complete support of the MEVA II / REDDIG integration through the creation of a Pan-American homogeneous network.

2.12 In view of the aforementioned, the Meeting considered that the implementation of the homogeneous solution would not be possible in the initial phase and the interconnection solution was then analysed.

2.13 The Meeting considered that the interconnection solution to be analysed would include the installation of MEVA II MODEMs in the Colombia and Venezuela REDDIG nodes and the installation of a REDDIG MODEM in COCESNA. **Appendix C** presents a list of equipment to be added in the MEVA II and REDDIG nodes, to serve the communication requirements between the CAR and SAM Regions.

2.14 The Meeting considered that the interconnection solution presented changes with respect to the solution presented in the Report of the MEVA II / REDDIG Interconnection Task Force due to the elimination of the REDDIG MODEM in San Juan and Miami. Therefore, there is a need to have an additional technical operational analysis.

2.15 Therefore, the Meeting considered that this task would be assigned to the task force, which would start the work and would present the results at the next MEVA II / REDDIG Coordination Meeting. Considering the abovementioned, the Meeting drafted the following conclusion:

CONCLUSION 3/1 TECHNICAL-OPERATIONAL ANALYSIS FOR THE MEVA II / REDDIG INTERCONNECTION SOLUTION

That for the MEVA II / REDDIG integration/interconnection solution:

a) the best option based on technical-operational analysis, would be the integration, but the most viable in the initial phase would be the interconnection, with the objective of integration after a five-year period; and

b) it is required to thoroughly analyse the interconnection solution that would consist in the implementation of a MEVA II MODEM in Venezuela and Colombia and a REDDIG MODEM in COCESNA, as well as additional equipment in other involved nodes, specified in Appendix C.

APPENDIX A

REDDIG Costs under the AGS administration for the networks integration option /

Costos REDDIG bajo la administración de AGS para la opción de integración de las redes

Operate REDDIG / **Monthly Recurring Charges /**

Operación de REDDIG **Cargos mensuales recurrentes**

Site	Network Operation Fee	AFTN	Radar	GNSS	PAMA	DAMA	Bandwidth	Bandwidth & Network Access	Annual Cost
Argentina	1080.48	6.00	2.00	1.00	5.00	4.00	3202.00	4282.48	51389.76
La Paz	1080.48	3.00	0.00	1.00	2.00	3.00	1544.00	2624.48	31493.76
Curitiba, Brazil	1080.48	5.00	0.00	1.00	2.00	3.00	2034.00	3114.48	37373.76
Manuas, Brazil	1080.48	5.00	0.00	0.00	5.00	3.00	2104.00	3184.48	38213.76
Recife, Brazil	1080.48	1.00	0.00	0.00	0.00	5.00	835.00	1915.48	22985.76
Santiago	1080.48	3.00	0.00	1.00	2.00	4.00	1662.00	2742.48	32909.76
Bogota	1080.48	4.00	0.00	1.00	7.00	3.00	2314.00	3394.48	40733.76
Guayaquil, Ecuador	1080.48	3.00	0.00	0.00	2.00	3.00	1299.00	2379.48	28553.76
Cayenne, France	1080.48	2.00	0.00	0.00	0.00	3.00	844.00	1924.48	23093.76
Georgetown, Guyana	1080.48	3.00	0.00	0.00	0.00	3.00	1089.00	2169.48	26033.76
Asuncion, Paraguay	1080.48	3.00	0.00	0.00	1.00	3.00	1194.00	2274.48	27293.76
Lima	1080.48	7.00	0.00	1.00	4.00	5.00	2970.00	4050.48	48605.76
Paramaribo, Suriname	1080.48	3.00	0.00	0.00	0.00	3.00	1089.00	2169.48	26033.76
Montevideo, Uruguay	1080.48	2.00	2.00	0.00	5.00	3.00	1859.00	2939.48	35273.76
Caracas	1080.48	7.00	0.00	1.00	3.00	3.00	2629.00	3709.48	44513.76
Piarco, T&T	1080.48	2.00	0.00	0.00	3.00	2.00	1041.00	2121.48	25457.76
Subtotal	**17,287.68**						**$ 27,709**	**$ 44,997**	**$ 539,960**

AFTN Circuit/half circuit	**$**	**245.00**
PAMA Voice Channels/half circuit	**$**	**105.00**
DAMA Voice Channels/port	**$**	**118.00**
Radar & GNSS	**$**	**245.00**

APPENDIX B

CURRENT COST OF THE REDDIG NODES

Operate REDDIG	Monthly Recurring Charges							
Site	Annual Network Operation Fee	AFTN	Radar	GNSS	PAMA	DAMA	Annual Bandwidth	Annual Cost
Argentina	9285.43	6.00	2.00	1.00	5.00	4.00	34,794	44097.43
La Paz	9285.43	3.00	0.00	1.00	2.00	3.00	12,196	21490.43
Curitiba, Brazil	9285.43	5.00	0.00	1.00	2.00	3.00	26,544	35840.43
Manuas, Brazil	9285.43	5.00	0.00	0.00	5.00	3.00	12,375	21673.43
Recife, Brazil	9285.43	1.00	0.00	0.00	0.00	5.00	4,986	14277.43
Santiago	9285.43	3.00	0.00	1.00	2.00	4.00	23,997	33292.43
Bogota	9285.43	4.00	0.00	1.00	7.00	3.00	20,840	30140.43
Guayaquil, Ecuador	9285.43	3.00	0.00	0.00	2.00	3.00	6,995	16288.43
Cayenne, France	9285.43	2.00	0.00	0.00	0.00	3.00	10,904	20194.43
Georgetown, Guyana	9285.43	3.00	0.00	0.00	0.00	3.00	2,977	12268.43
Asuncion, Paraguay	9285.43	3.00	0.00	0.00	1.00	3.00	9,936	19228.43
Lima	9285.43	7.00	0.00	1.00	4.00	5.00	27,153	36455.43
Paramaribo, Suriname	9285.43	3.00	0.00	0.00	0.00	3.00	5,667	14958.43
Montevideo, Uruguay	9285.43	2.00	2.00	0.00	5.00	3.00	7,497	16794.43
Caracas	9285.43	7.00	0.00	1.00	3.00	3.00	12,016	21315.43
Piarco, T&T	9285.43	2.00	0.00	0.00	3.00	2.00	20,067	29359.43
Subtotal	**$148,567**						**238,944**	**$ 387,675**

APPENDIX C

INVESTMENT FOR ADDITIONAL EQUIPMENT FOR THE PARTIALLY HOMOGENEOUS INTERCONNECTION SOLUTION

REDDIG Nodes

Colombia
Two (2) MODEM Linkway with (1) Interface FR;
Two (2) L Band splitters/combinators and integration material: and
Two (2) SSPA de ***75*** W in the event the link budget for the transmission of two simultaneous carriers confirms it.
Four (4) digital voice modules in El DIM Card. (Equipment MEMOTEC CX950)

Venezuela
Two (2) MODEM Linkway with (1) Interface FR;
Two (2) L Band splitters/combinators and integration material: and
Two (2) SSPA de ***75*** W in the event the link budget for the transmission of two simultaneous carriers confirms it.
Four (4) Analogue voice Cards. (Equipment MEMOTEC CX950)

MEVA II Nodes

COCESNA
Two (2) MODEM Linkway with (1) Interface FR;
Two (2) L Band splitters/combinators and integration material: and
Two (2) SSPA de ***75*** W in the event the link budget for the transmission of two simultaneous carriers confirms it..
One analogue voice Card. (Equipment MEMOTEC CX. 960)
One I/0 universal Card. (Equipment MEMOTEC CX. 960)

The need of additional cards for the MEMOTEC equipment in the MEVA II network nodes that have service requirements with the SAM Region will be analysed by the Task Force.

Agenda item 3: Analysis of the administrative/institutional actions to implement the recommended option for the integration/interconnection of the MEVA II and REDDIG networks

3.1 The Meeting noted the administrative arrangements proposed by the MR TF/1 Meeting in order to implement the recommended options for integration or interconnection, including the need to establish a Memorandum of Understanding and administrative arrangements and other institutional aspects necessary for these MEVA II and REDDIG implementations. Considering the results of Agenda Item 2, the Meeting focused its attention in the analysis of the option that envisions that during the first phase, an interconnection option should be implemented by adding in Colombia and Venezuela a second Linkway MODEM tuned to the MEVA II carrier in the respective REDDIG nodes of Bogota, Caracas, as well as the need to study the feasibility of implementing a REDDIG MODEM in the MEVA II node of COCESNA.

Administrative arrangements for the implementation of interconnection options of the VSAT MEVA II and REDDIG networks

3.2 Moreover, the Meeting noted the aspects of the following three options related to supervision and control, space segment control, maintenance and administration of spare parts of the technical configuration for the interconnection:

Option A: *Addition of MEVA II Linkway MODEMs in REDDIG node involved*

Option B: Addition of REDDIG Linkway MODEMs in MEVA II node involved

Option C: Addition of *mixed Linkway* MODEMs

3.3 As per the results of the cost-benefit analysis of the interconnection options contained in the Report on Agenda Item 2, the meeting agreed that between the three options presented, Option C, limited to the installation of a MEVA II MODEM in Bogota and Caracas, , presented most benefits; therefore, the Meeting analysed the preliminary administrative arrangements for the implementation of this Option, described in **Appendix A** to this part of the Report.

3.4 Furthermore, the Meeting noted the general considerations for the interconnection solution that were developed by the Task Force:

a) That this implementation option only the administrative arrangements described in Appendix A would be needed.
b) The implementation of this option would not involve substantial modifications to the technical and operational management of the MEVA II and REDDIG networks and both networks control.
c) The interconnection solution would contribute to fulfil all the NAM/CAR/SAM AFS inter-regional requirements, nevertheless, due to its nature, it would not represent a total integration solution. Therefore this solution should be transition towards achieving the eventual integration of the two networks.

d) The information and security facilities established by FAA for MEVA II should also be fulfilled by the REDDIG Administration as it is with MEVA II.
e) REDDIG would have to present its security requirements to the Task Force.
f) The application of administrative arrangements described for this solution would need the application of operational administrative procedures, so that a problem on one network does not have an unfavourable impact on the other.

3.5 Also, the Meeting noted and considered the following aspects related to the aforementioned interconnection option:

- REDDIG Members have agreed to share the resulting costs of the Colombia and Venezuela interconnection.
- It is required to analyzed the possible cumbersome of the interconnection solution to implement at a technical, institutional, organizational aspects and it does not accomplish the integration goal suggested by the ALLPIRG/5 Meeting.
- A thorough analysis of power problems in one network can adversely affect the dual-MODEM nodes of the other network.
- Analyze the increase equipment count leading to decrease reliability (reduced Overall VSAT Station Mean Time Between Failure)
- Analyze the case of a circuit failure, the troubleshooting process has to be coordinated between 3 or 4 parties, which could complicate and delay the coordination and solution of the failure.
- As MEVA II Members have a total end-to-end lease contract, the necessary additions have to be negotiated with AGS (probable cost increase).
- REDDIG Members, Colombia and Venezuela would have to adhere to the MEVA II Network and negotiate a contract with AGS. Also, COCESNA would have to adhere to the REDDIG, defining the implicated aspects.

3.6 As a result of the review of this item, the Meeting formulated the following Conclusion:

CONCLUSION 3/2: ADMINISTRATIVE ACTIONS FOR THE ADOPTION OF THE INTEGRATION OF THE MEVA II AND REDDIG NETWORKS.

That, based on the results of technical-operational and cost-benefit analysis, for the interconnection option mentioned in Conclusion 3/1:

a) the Members of the MEVA II and REDDIG States/Territories/International Organization provide to the corresponding ICAO Regional Office their communication service requirements for the interconnection options in Colombia, Venezuela and COCESNA by 15 September 2006;

b) based on the action included in a) above, the MEVA II Service Provider and the REDDIG Administration analyze in regards to the costs, operational and administrative arrangements analysis for the mentioned solutions in order to be presented in the Second Task Force Meeting;

c) the Task Force prepare an appropriate Memorandum of Understanding (MoU); and

e) the Second MEVA II / REDDIG Task Force Meeting will be held before **31 October 2006.**

Update of the MEVA II / REDDIG Interconnection Task Force

3.7 Moreover, considering the results achieved, the Meeting developed Terms of Reference, assigned new tasks and reviewed the composition of the MEVA II / REDDIG Interconnection Task Force; this is presented in **Appendix B** to this part of the Report. Considering this analysis, the Meeting drafted the following Decision:

DECISION 3/3 UPDATE OF THE MEVA II / REDDIG INTERCONNECTION TASK FORCE

That the Terms of Reference, Tasks and Composition of the MEVA II / REDDIG Interconnection Task Force be updated as expressed in Appendix B to this part of the Report.

APPENDIX A

PROPOSAL OF ADMINISTRATIVE ARRANGEMENTS FOR THE ADDITION OF MIXED LINKWAY MODEM AND OTHER MEVA II SPARE PARTS IN THE REDDIG NODES IN CARACAS, BOGOTA AND REDDIG IN COCESNA

1. This option would represent that in the REDDIG nodes in Caracas, Venezuela and Bogota, Colombia MODEM Linkway and other MEVA II spare parts would be added; as well as the addition of a REDDIG MODEM in COCESNA. The Meeting analyzed the aspects related to the supervision and control, space segment and maintenance arrangements which results are described as follows:

Supervision and control

2. For this configuration, MEVA II MODEM in REDDIG nodes supervision and control will be carried out through MEVA II NCC. All REDDIG MODEMs will continue synchronized from the Manaos, Brazil ACC with Ezeiza NCC as alternate, while the MEVA II MODEMs installed in the REDDIG nodes will be synchronized by the Alexandria NCC with Miami NCC as alternate. The supervision and control of the REDDIG MODEMs in the MEVA II nodes will be carried out by the REDDIG NCC.

Space segment arrangements

3. The carriers, as well as the band width requirement for communications among REDDIG nodes will be the same currently leased with Panamsat. Payment of the space segment to Panamsat will continue being carried out through the ICAO Technical Cooperation, who will be in charge of collecting contributions from each SAM State member of REDDIG.

4. The carriers, as well as the band width requirement for communications among MEVA II nodes will be carried out through the MEVA II provider. MEVA II States will pay for the band width consumption to the MEVA II provider.

5. Band width requirements for communications between REDDIG nodes having MEVA II MODEM (Colombia and Venezuela) would be administrated by the MEVA II service provider, and the respective payment for services to the provider will be made through the ICAO Technical Cooperation (RLA/03/901 Project).

6. Band width requirements for communications between MEVA II nodes having REDDIG MODEM (COCESNA) would be administrated by the REDDIG. Band width consumption for the mentioned node would be measured by the REDDIG Administrator, and the respective payment to the provider will be made by COCESNA to the ICAO Technical Cooperation (RLA/03/901 Project).

Maintenance

7. The additional equipment that would installed in the two REDDIG nodes to communicate with MEVA II nodes, would be maintained by the respective REDDIG member States, under the coordination of the REDDIG Administrator. The additional equipment to be installed in the REDDIG nodes would be purchased by the REDDIG members.

8. Upon failure in a MEVA II MODEM in an associated REDDIG node, the person in charge of the REDDIG node maintenance will inform to the REDDIG Administrator, who will coordinate with the MEVA II Administrator to carry out appropriate procedures. Also, if the MEVA II Administrator detects a failure in a REDDIG node where a MEVA II MODEM is installed, he will inform the REDDIG Administrator for the carrying out of respective procedures for the repair. As possible, there will be no direct contact between the REDDIG nodes having a MEVA II MODEM installed there, with the MEVA II Administrator.

9. The additional equipment to be installed in each MEVA II nodes with REDDIG nodes communications requirements would be maintained by the MEVA II service provider. The additional equipment installed in the MEVA II nodes would be purchased by the MEVA II members (States, Territories, International Organization or the service provider AGS).

10. Likewise, upon failure in a REDDIG MODEM, the person in charge of the MEVA II node maintenance will inform of the event to the MEVA II Administrator, who will coordinate with the REDDIG Administrator to carry out appropriate procedures. Also, if the REDDIG Administrator detects a failure in a MEVA II node where a REDDIG MODEM is installed, he will inform so to the MEVA II Administrator for the carrying out of respective procedures for the repair. As possible, there will be no direct contact between the MEVA II node having a REDDIG MODEM installed there, with the REDDIG Administrator.

Spare parts management

11. The spare parts for the additional equipment to be installed at the REDDIG nodes with MEVA II MODEM requirements will be purchased by REDDIG and will form part of the spare parts lot existing in REDDIG.

12. Spares for the additional equipment to be installed at MEVA II nodes with REDDIG MODEM requirements shall be purchased from the MEVA II or by the MEVA II Member who owns the node, whatever applies.

APPENDIX B

UPDATING OF THE TERMS OF REFERENCE, WORK PROGRAMME AND COMPOSITION OF THE MEVA II / REDDIG TASK FORCE

1. Terms of Reference

1.1 In accordance to the guidelines of the MEVA II / REDDIG Coordination Meetings, develop assigned tasks in order to achieve the integration/interconnection of the VSAT MEVA II / REDDIG networks.

2. Work Programme

No.	Task	Priority	End Date
1	Summarize the communication requirements that will be directed through each MEVA II / REDDIG node (Caracas-Venezuela and Bogota-Colombia), as well as additional required equipment.	A	31/10/06
2	Analyse the feasibility to implement a REDDIG Linkway modem in the MEVA II node in Tegucigalpa, COCESNA or another alternative in order to provide the ATS voice communications between the ACC Guayaquil, Ecuador and the ACC Cenamer, COCESNA, keeping in mind the existing traffic.	A	31/10/06
3	Prepare a Memorandum of Understanding (MoU) for the MEVA II / REDDIG Interconnection, keeping in mind the preliminary Memorandum developed by the MR/2 Meeting (Appendix 3D).	A	31/10/06
4	Develop detailed coordination procedures and administrative and operational arrangements in order to efficiently achieve the MEVA II /REDDIG interconnection by keeping in mind Appendix A to the Report on Agenda Item 3 of the MR/3 Meeting.	A	31/10/06

3. Composition

Argentina, Brazil, Chile, Colombia, Venezuela, United States, COCESNA, the MEVA II Service Provider and the REDDIG Administrator.

4. Coordinator

Alberto Singh (Argentina)

Agenda item 4: Other matters

Next Meetings on MEVA II / REDDIG Interconnection

4.1 The Meeting agreed that the MEVA II / REDDIG Interconnection Task Force should perform its work through electronic mail and other communication means and, in case it is absolutely necessary, by holding a meeting so the assigned tasks be finalized before 31 October 2006.

4.2 Also, the Meeting recognized that it would be necessary to convene a Fourth MEVA II / REDDIG Coordination Meeting, subsequent to the finalization of the work performed by the Task Force.