



Agenda Item 3: Review of the progress achieved in the implementation of the CNS/ATM Subgroup work programmes

3.4 Follow-up to activities taken into account in the ground-ground and ground-air communication infrastructure programme

ACTIVITIES CARRIED OUT UNDER THE CAR/SAM ATN ARCHITECTURE PROJECT

(Presented by D1 Project Coordinator)

SUMMARY	
This working paper presents the status of the deliverables foreseen in the CAR/SAM ATN Architecture Project.	
References:	
<ul style="list-style-type: none">• First Meeting of the GREPECAS CNS/ATM Group (Lima, Peru, 15-19 March 2010);• Fifth Workshop/Meeting of the SAM Implementation Group (SAM/IG/5) - Project RLA/06/901 (Lima, Peru, 10-14 May 2010); and• Study for the implementation of a new South American digital network (REDDIG).	
ICAO Strategic Objectives:	<i>A – Safety</i> <i>D – Efficiency</i>

1. Introduction

1.1 The first meeting of the CNS/ATM Subgroup (CNS/ATM/SG/1), held in Lima, Peru, on 15-19 March 2010, decided that the Subgroup should work under the project management modality instead of using working groups, to ensure a better coordination on ATM and CNS matters and develop performance-based CAR/SAM plans with a view to the implementation of the global ATM system.

1.2 The structure of the CNS/ATM Subgroup includes four programmes, namely:

- a) PBN;
- b) ATFM;
- c) ATM automation and situational awareness; and
- d) Ground-ground and ground-air communication infrastructure.

1.3 The Ground-Ground and Air-Ground Communication Infrastructure Programme includes two projects, namely:

- a) CAR/SAM ATN architecture; and
- b) ATN ground-ground and ground-air applications.

1.4 This working paper describes all the documents involved, the activities carried out in 2010, and the difficulties encountered for attaining the objectives (deliverable) of the project.

2. Discussion

2.1 Project documents

2.1.1 The documents that make up the CAR/SAM ATN Architecture Project are:

- a) Work programme;
- b) Project description;
- c) Project file; and
- d) Analytical structure of the Project.

2.1.2 The original deliverables assigned to the CAR/SAM ATN Architecture Project and contained in the Work Programme are described in the table shown in **Appendix A** to this working paper.

2.1.3 Decision CNS/ATM/1-8 reflected the need for Project and Programme Coordinators to review the content of work programmes.

2.1.4 A simple analysis of the table contained in Appendix A leads to the conclusion that deliverable D 1.4 is the main activity to be carried out for the definition of an IP backbone for the CAR/SAM Regions. This means that task D 1.3 is part of deliverable D 1.4.

2.1.5 Regarding deliverables D 1.1 and D 1.2, Programme and Project Coordinators concluded that they had to participate in the work to be carried out by ICAO together with the MEVA II and REDDIG networks Administrations. That is, the results will not be under the responsibility of the Project Coordinator.

2.1.6 Regarding deliverable D 1.5, it was felt that it would better be carried out by ICAO and not by the Project Coordinator.

2.1.7 A well-designed communication network is aimed at transporting all the applications that are transmitted through it. Accordingly, deliverables D 1.6 and D 1.7 go beyond the simple consideration of network bandwidth, and will warrant projects separate from the CAR/SAM ATN Architecture Project.

2.1.8 As a result of the analysis, the deliverables of the CAR/SAM ATN Architecture Project are shown in the Project Description document.

2.1.9 The Project Description document shown in **Appendix B** to this working paper contains a summary of the main project phases, from inception to the closure of activities.

2.1.10 The Project file contained in **Appendix C** allows for the management of all project variables, such as scope, time, resources, quality, human resources and others.

2.1.11 The EAP shown in **Appendix D** is a hierarchical tree-shaped structure whose terminals (branches) are the deliverables and tasks related to project completion. Appendix D shows a summarised section of the Project EAP.

2.2 Development of activities

2.2.1 All project deliverables were developed under the procedure harmonisation concept. That is, the same tasks were assigned to the delegates of the two Regions (CAR/SAM) in order to have a better control of project activities.

2.2.2 The difference between the deliverables of the two Regions is the date of completion of the activities. In other words, the same tasks had different target dates. This is due to the fact that in the SAM Region, the associated studies are already underway.

2.2.3 The States offered ICAO to make available CNS experts to assist the Coordinator of the CAR/SAM ATN Architecture Project. Since the Project Coordinator does not know the competencies of the individuals assigned in the CAR Region, the Project assigned tasks to more than one individual so that the experts would coordinate and select one person responsible.

2.2.4 The CNS/ATM/SG/1 meeting considered that the method to be used for performing project tasks should be electronic media and/or teleconferences.

2.2.5 Considering that all project tasks are scheduled for completion by December 2011, it was felt more appropriate for the members designated by CAR States to schedule actions for 2011.

2.2.6 The Project Coordinator, as a follow-up to Decision CNS/ATM/1/8 - *Review of the work programme of CNS/ATM Subgroup projects*, reviewed the work programme of the project and, upon completion, sent an e-mail to all the experts designated by the States asking them to assess the tasks assigned, with a target date for receiving comments and the name of the responsible parties, by mid September 2010. However, no answers were received in relation to the documents presented.

2.2.7 The Fifth Workshop/Meeting of the SAM Implementation Group (SAM/IG/5) considered conducting studies on the implementation of a new regional satellite, ground or mixed (satellite and ground) digital network to serve as backbone of the SAM Aeronautical Telecommunication Network (ATN SAM). This new network would have to support the current aeronautical fixed requirements for voice and data, the exchange of radar data and flight plans, as well as the new ATN ground-ground applications between SAM States/Territories foreseen for the short and medium term.

2.2.8 The studies for selecting the IP backbone of the SAM Region were completed and submitted to the consideration of the States of the Region at the SAM/IG/6 meeting.

2.2.9 Thus, the deliverables foreseen for the SAM ATN Architecture Project are practically completed.

2.2.10 **Appendix E** to this working paper shows the progress of the deliverables foreseen for the CAR/SAM ATN Architecture Project.

3. **Suggested action**

3.1 The Meeting is invited to:

- a) Take note of the information presented;
- b) Review the activities of Project D1 described in Section 2 of this working paper, including Appendices A, B, C, D; and
- c) Analyse the progress made with the deliverables of the project activities described in Appendix E.

APPENDIX A / APENDICE A

PROJECT WORK PROGRAMME / PROGRAMA DE TRABAJO DEL PROYECTO

PROGRAMME/PROGRAMA: GROUND-GROUND AND AIR-GROUND TELECOMMUNICATIONS INFRASTRUCTURE/
INFRAESTRUCTURA DE COMUNICACIONES TIERRA-TIERRA Y TIERRA-AIRE


PROJECT/PROYECTO: D1. CAR/SAM ATN ARCHITECTURE / ARQUITECTURA DE LA ATN CAR/SAM

**PROJECT COORDINATOR/
COORDINADOR DEL PROYECTO:** Athayde Frauche

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	2	3	4	5	6
D 1.1	Guide the interconnection/integration of Communications digital networks Guiar la interconexión/ integración de redes digitales de comunicaciones	Mar-Dec 2010 / Mar-Dic 2010	ICAO REDDIG Administration MEVA TMG Group OACI Administración REDDIG Grupo MEVA TMG	Valid/Válida	Evaluation of the performance of the interconnection of MEVA II/REDDIG Evaluación del desempeño de la interconexión MEVA II REDDIG
D 1.2	Technical revision of Regional Telecommunication Network for ATN implementation Revisión técnica de redes regionales de telecomunicaciones para la implantación de la ATN	Jun 2009- Jul 2011	ICAO REDDIG Administration MEVA TMG Group OACI Administración REDDIG Grupo MEVA TMG/	Valid/Válida	Technical study of MEVA II and REDDIG networks for ATN implementation Estudio técnico de las redes MEVA II y REDDIG para la implementación de la ATN
D 1.3	Trial implementation to determine ATN bandwidth to support ground application Implantación de pruebas para determinar el ancho de banda de la ATN para soportar las aplicaciones terrestre	2009-Sep 2010	Project D1 / Proyecto D1	Valid/Válida	Evaluation of the preliminary trials results on the definition of the CAR/SAM ATN bandwidth requirement Evaluación de los resultados de las pruebas preliminares para determinar ancho banda requerido para la red ATN en las Regiones CAR y SAM

No.	Tarea/Task	Inicio Fin / Start End	Responsible / Responsible	Estado/Status	Deliverable/Entregable
1	2	3	4	5	6
D 1.4	Study for an IP ATN CAR/SAM backbone network configuration Estudio para la configuración de una red medular IP para las Regiones CAR/SAM	2009-Dec 2011 / 2009-Dic 2011	Project D1 / Proyecto D1	Valid/Válida	Study for the configuration of an IP backbone network Estudio para la configuración de una red medular IP
D 1.5	Update of CAR/SAM Router Plan Actualización del plan regional CAR/SAM de encaminadores	Jan 2012 / Ene 2012	OACI /ICAO	Valid/Válida	Update to CAR/SAM Regional Plan on ATN Routers Actualización al Plan regional CAR/SAM de encaminadores del ATN
D 1.6	Analyze proposals for data Communications infrastructure in support of ATFM implementation This activity supports the activity <i>Support PBN and ATFM implementation, optimization of ATM routes and guidance for ATM service automation</i> covered in the communication area. Analizar las propuestas de infraestructura de comunicaciones de datos en apoyo de la implantación de la ATFM Esta actividad apoya la actividad <i>Soporte a la implantación del PBN el ATFM, optimización de las rutas ATM y guías para el servicio de automatización ATM</i> cubierta en el área de comunicaciones.	2009 - Dec 2011 / 2009 - Dic 2011	Project D1 / Proyecto D1 Note: Coordination needed with Programmes A (PBN), B (ATFM) and C (Situational Awareness) Nota: Coordinación requerida con Programas A (PBN), B (ATFM) y C (Comprensión Situacional)	Valid/Válida	Study of communication requirements to support ATFM implantation Estudio de requerimientos de las comunicaciones para soportar la implantación de la ATFM
D 1.7	Elaborate a CAR/SAM plan for the establishment of the communications system needed for the migration towards aeronautical MET messages exchange (METAR/SPECI and TAF) in the new format to be defined Elaborar un plan CAR/SAM para establecer el sistema de comunicaciones necesario para la migración hacia el intercambio de mensajes aeronáuticos MET (METAR/SPECI y TAF) en el nuevo formato a definirse	Jun 2011- Jun 2012	ICAO/OACI Note: Coordination needed with AERMET/SG Nota: Coordinación requerida con AERMET/SG	Valid/Válida	Study of communication requirement to support the migration to new OPMET format Estudio de requerimientos de comunicaciones para soportar la migración al nuevo formato OPMET

APPENDIX B

	PROJECT DESCRIPTION	PD N°	
		Date: 25/06/10	Page: 1/4
Ground-Ground/Air-Ground Communications Infrastructure Programme	Title of the Project CAR/SAM ATN Architecture	Start: 05/2010 End: 12/2011	

Objective of the Project

Develop the optimum architecture for an IP backbone network, with a view to defining the CAR/SAM ATN router plan.

Scope of the Project

1. Study for the establishment of a CAR/SAM IP backbone, with an optimum configuration and that includes, *inter alia*, the following deliverables:
 - A technical analysis of the regional (ground, satellite or mixed) telecommunication networks for the implementation of the ATN, based on a cost-benefit analysis.
 - Conduction of tests to determine the ATN bandwidth required to support ground applications.
 - IP (IPv4 and IPv6) addressing scheme and analysis of the data communications infrastructure in support of short-, medium- and long-term ATS operational requirements.

Strategy of the Project

All work will be done by experts designated by CAR/SAM States and organisations members of the *CAR/SAM ATN Architecture Project*, under the direction of the Project Coordinator. Communications between members of the project, as well as between the project coordinator and the programme coordinator shall take place through teleconferences and the Internet.


Once the study is completed, the results will be sent to the ICAO Programme Coordinator in the form of a final consolidated document for analysis, revision and approval.

Justification of the Project

The First Meeting of the GREPECAS Communications, Navigation and Surveillance/Air Traffic Management Subgroup (CNS/ATM/SG/1), held in Lima, Peru, on 15-19 March 2010, approved the project-based methodology for the implementation of CNS/ATM activities, to replace the methodology based on the conduction of activities through Task Forces.

Projects will be coordinated by ICAO. Regarding the Ground-Ground and Ground-Air Communications Infrastructure Programme, two projects have been established: CAR/SAM ATN Architecture, and Ground-Ground and Ground-Air ATN Applications.

A study of the CAR/SAM ATN IP backbone will define the optimum architectural structure for CAR/SAM communication networks, which are currently based on two digital satellite telecommunication networks: the

	PROJECT DESCRIPTION		PD N°
			Date: 25/06/10 Page: 2/4
Ground-Ground/Air-Ground Communication Infrastructure Programme	Title of the Project CAR/SAM ATN Architecture		Start: 05/2010 End: 12/2011

REDDIG (SAM) and the MEVA II (CAR).

In order to decide on the best network infrastructure, it is important to determine the bandwidth requirements of the existing applications. In this respect, the States are already conducting tests, mainly of the AMHS, in order to determine the associated space segment. This action is considered to be the beginning of the cost-benefit analysis of the networks.

Furthermore, there is a growing demand of bandwidth by new services, such as automation, surveillance, ATFM and meteorology. Likewise, a close link with other programmes and their respective projects is necessary in order to collect information on the operational requirements of the aforementioned applications and their respective tentative implementation dates.

Project Coordinator: Athayde Licério Vieira Frauche (Brazil).

Inter-related projects

The following projects were defined at the First Meeting of the Communications, Navigation and Surveillance/Air Traffic Management Subgroup (CNS/ATM/SG/1) and are related to the project subject matter of this project description:


- Air navigation systems in support of PBN;
- Automation (interconnection of systems);
- Enhancement of ATM situational awareness;
- Implementation of the new ICAO flight plan format;
- ATN ground-ground and air-ground applications.

Although not directly considered in this task, the aeronautical communication experts of all CAR/SAM States shall assess the internal networks of their countries, taking into account the results of this work.

Project deliverables


Target date

Project deliverables	Target date
Project Description document	Jul 2010
Analytical structure of the Project	Jul 2010
Analysis of the current status of the SAM communication network (REDDIG)	Aug 2010
Analysis of the current status of the CAR communication network (MEVA II)	Jul 2011
Analysis of the current status of the MEVA II/REDDIG interconnection	Jun 2011
Tests for determining the bandwidth required for AMHS	Sep 2010

	PROJECT DESCRIPTION		PD N°
			Date: 25/06/10 Page: 3/4
Ground-Ground/Air-Ground Communication Infrastructure Programme	Title of the Project CAR/SAM ATN Architecture		Start: 05/2010 End: 12/2011

Analysis of the impact of the AMHS bandwidth on the current satellite infrastructure of the REDDIG	Sep 2010
Analysis of the impact of the AMHS bandwidth on the current satellite infrastructure of the MEVA II	Jan 2011
Analysis of the impact of the AMHS bandwidth on the current satellite infrastructure of the MEVA II/REDDIG	Jan 2011
Historical application requirements in the SAM Region	Sep 2010
Historical application requirements in the CAR Region	Mar 2011
Comparative study of IP-based satellite, ground and mixed (satellite and ground) models for the SAM Region	Oct 2010
Definition of the ATN IP network infrastructure model for the SAM Region	Oct 2010
Comparative study of the IP-based satellite, ground and mixed (satellite and ground) network models for the CAR Region	Aug 2011
Definition of the IP-based network infrastructure model for the CAR Region	Aug 2011
Develop the safety guide for the MEVAII/REDDIG networks	Aug 2011
Draft the IP Routing Policy document	Sep 2011
Complete the IPv4 addressing plan for the SAM Region	Aug 2010
Complete the IPv4 addressing plan for the CAR Region	Jan 2011
Develop the IPv6 addressing plan for the SAM Region	Aug 2011
Develop the IPv6 addressing plan for the CAR Region	Aug 2011
Final consolidation document for the CAR/SAM IP-based networks and delivery to ICAO	Dec 2011

Resources required	Target date
Test equipment for measuring AMHS traffic	
Team of experts: Argentina, Bolivia, Chile, Brazil, Cuba, COCESNA, United States, IATA and SITA.	

	PROJECT DESCRIPTION		PD N°
			Date: 25/06/10
Ground-Ground/Air-Ground Communication Infrastructure Programme	Title of the Project CAR/SAM ATN Architecture		Start: 05/2010 End: 12/2011

Main stakeholders

CAR/SAM States, Territories, International Organisations

Assumptions

- 1- Project team dedicated to the delivery of outputs;
- 2- Easy access to information and documentation requested for ICAO;
- 3- Easy communication between States; and
- 4- Availability of technical resources for tests.

Restrictions

- 1- Delivery of the study document in December 2011;
- 2- Compliance with ICAO standards; and
- 3- Development of ATM applications.

Project risks

- 1- Team of expert not available for providing the service;
- 2- Communication problems between team members;
- 3- Planning of new actions for the proposals rejected by ICAO;
- 4- Difficulty of the States to obtain test equipment; and
- 5- Delay in the delivery of project outputs.

PLANIFICACION PROPUESTA
ESTUDIO DE UNA ARQUITECTURA DE RED ATN EN LAS REGIONES CAR/SAM
Lista de Actividades

ID	Nombre de la tarea	Start	Finish	Timeline											
				21 10/4	February 11 1/10	September 4/18	March 21 7/25	October 11 10/31	May 1 2/6	November 5/15	August 21 8/21	October 11 11/27	May 1 3/4	November 6/10	December 23 9/16
1	STUDY OF THE CAR/SAM ATN ARQUITECTURE / ESTUDIO DE LA ARQUITECTURA ATN CAR/SAM	Fri 3/19/10	Fri 11/4/11	[Gantt bar]											
2	PROJECT MANAGEMENT PROCESS / PROCESOS DE GERENCIAMIENTO DEL PROYECTO	Fri 3/19/10	Mon 7/12/10	[Gantt bar]											
3	FORMALIZATION OF THE PROJECT / FORMALIZACIÓN DEL PROYECTO	Fri 3/19/10	Mon 7/12/10	[Gantt bar]											
4	DP (Description of the Project / Descripción del Proyecto)	Fri 3/19/10	Mon 7/12/10	[Gantt bar]											
5	Selection of the Project Coordinator / Elección del Coordinador del Proyecto	Fri 3/19/10	Tue 3/23/10	[Gantt bar]											
6	Selection of the Project Team of Brazil / Elección del Equipo de Proyecto de Brasil	Mon 3/22/10	Wed 4/7/10	[Gantt bar]											
7	Analysis of ICAO strategic planning / Analizar planificación estratégica OACI	Thu 4/8/10	Fri 5/7/10	[Gantt bar]											
8	DRAFTING OF DP / ELABORACIÓN DE LA DP	Fri 3/19/10	Mon 6/21/10	[Gantt bar]											
9	Project application environment / Ámbito de aplicación del Proyecto	Fri 3/19/10	Mon 4/19/10	[Gantt bar]											
10	Project background / Antecedentes del Proyecto	Mon 5/10/10	Fri 5/21/10	[Gantt bar]											
11	Definition and analysis of main results / Definición y análisis de los principales resultados	Thu 5/20/10	Tue 6/8/10	[Gantt bar]											
12	Selection of whole Project team / Selección del equipo completo de Proyecto	Tue 6/8/10	Mon 6/21/10	[Gantt bar]											
13	Assumptions definition and analysis / Definición y análisis de los supuestos	Mon 6/14/10	Fri 6/18/10	[Gantt bar]											
14	Restrictions definition and analysis / Definición y análisis de restricciones	Mon 5/10/10	Fri 5/28/10	[Gantt bar]											
15	Risk definition and analysis / Definición y análisis de riesgo	Mon 5/10/10	Fri 5/28/10	[Gantt bar]											
16	Human resources definition and analysis / Definición y análisis de los recursos necesarios	Mon 5/10/10	Fri 6/18/10	[Gantt bar]											
17	Related projects definition and analysis / Definición y análisis de los proyectos relacionados	Mon 5/10/10	Wed 6/2/10	[Gantt bar]											
18	Project responsibility matrix / Matriz de responsabilidad del proyecto	Mon 5/10/10	Fri 6/18/10	[Gantt bar]											
19	Document delivery/approval (DP) / Entrega/aprobación del Documento (DP)	Wed 6/30/10	Mon 7/12/10	[Gantt bar]											
20	EAP	Wed 6/2/10	Fri 7/9/10	[Gantt bar]											
21	Define initial project scope / Definir alcance inicial del proyecto	Wed 6/2/10	Thu 6/10/10	[Gantt bar]											
22	Define initial project framework / Definir marcos iniciales del proyecto	Fri 6/11/10	Thu 6/17/10	[Gantt bar]											
23	Define initial analytical structure of the project / Definir la estructura analítica inicial del proyecto	Fri 6/18/10	Tue 6/29/10	[Gantt bar]											
24	EAP DELIVERY/APPROVAL / ENTREGA/APROBACIÓN DEL EAP	Wed 6/30/10	Fri 7/9/10	[Gantt bar]											
25	PROCESS FOR THE STUDY OF A CAR/SAM ATN INFRASTRUCTURE / PROCESOS DE ESTUDIOS DE UNA INFRAESTRUCTURA DE LA ATN CAR/SAM	Wed 5/19/10	Fri 11/4/11	[Gantt bar]											
26	START OF THE PROJECT / INICIO DEL PROYECTO	Wed 5/19/10	Wed 9/14/11	[Gantt bar]											
27	Collect and analyze current networks infrastructure and applications/services / Levantar y analizar la infraestructura y aplicaciones/servicios de las redes actuales	Wed 5/19/10	Wed 9/14/11	[Gantt bar]											
28	Analysis of the current SAM communications network (REDDIG) / Analisis de la situación actual de la red de comunicaciones SAM (REDDIG)	Wed 5/19/10	Tue 8/3/10	[Gantt bar]											
29	Analysis of REDDIGs current infrastructure / Análisis de la infraestructura actual de la REDDIG	Wed 5/19/10	Tue 6/22/10	[Gantt bar]											
30	Analysis of bandwidth used in REDDIG / Análisis del ancho de banda utilizado en la REDDIG	Wed 5/19/10	Mon 7/26/10	[Gantt bar]											
31	Analyze bandwidth for AFTN service / Analizar ancho de banda para el servicio AFTN	Wed 5/19/10	Mon 7/26/10	[Gantt bar]											
32	Identify and analyze traffic generated by the application / Identificar e analizar el tránsito generado por la aplicación	Wed 5/19/10	Mon 7/26/10	[Gantt bar]											

Proyecto: ESTRUCTURA ANALÍTICA P
Data: Fri 11/5/10

Tarefa	[Blue bar]	Etapa	[Diamond]	Tarefas externas	[Grey bar]
Divisão	[Dotted bar]	Resumo	[Arrow]	Etapa externa	[Diamond]
Andamento	[Black bar]	Resumo do projeto	[Arrow]	Data limite	[Down arrow]

PC = Project Coordinator/Coordinador Programa
AF = Athayde Frauche
OG = Omar Gouarnalusse

DR = Dulce Roses
GC = Gustavo Chiri
CP = Carlos Pérez Saavedra

RP/EV = Roger Alberto Pérez/Eduardo Vegas

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PLANIFICACION PROPUESTA
ESTUDIO DE UNA ARQUITECTURA DE RED ATN EN LAS REGIONES CAR/SAM
Lista de Actividades

ID	Nombre de la tarea	Start	Finish	21	February 11	September	March 21	October 11	May 1	November			
				10/4	1/10	4/18	7/25	10/31	2/6	5/15	8/21	11/27	3/4
33	Analysis of the bandwidth used by the application / Análisis del ancho de banda utilizado por la aplicación	Wed 5/19/10	Mon 7/26/10										
34	Analyze band for voice over frame relay / Analizar banda para voz over frame relay	Wed 5/19/10	Mon 7/26/10										
35	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Wed 5/19/10	Mon 7/26/10										
36	Analysis of the bandwidth used with DAMA / Análisis del ancho de banda utilizado con la utilización de DAMA	Wed 5/19/10	Mon 7/26/10										
37	Analysis of the bandwidth used with PAMA / Análisis del ancho de banda utilizado con la utilización de PAMA	Wed 5/19/10	Mon 7/26/10										
38	Analyze band for surveillance/automated systems / Analizar banda para sistemas de vigilancia/automatizados	Wed 5/19/10	Mon 7/26/10										
39	Identify and analyze traffic generated by the application / Identificar e analizar el tránsito generado por la aplicación	Wed 5/19/10	Mon 7/26/10										
40	Analysis of the bandwidth used by the application / Análisis del ancho de banda utiliza	Wed 5/19/10	Mon 7/26/10										
41	Identify possible logistical problems in terms of equipment discontinuity / Identificar posibles problemas logísticos en términos de discontinuidad de equipos	Wed 6/23/10	Wed 7/14/10										
42	Final report / Informe final	Tue 7/27/10	Tue 8/3/10										
43	Analysis of the current CAR communications network (MEVA II) / Análisis de la situación actual de la red de comunicaciones CAR (MEVA II)	Mon 10/25/10	Fri 7/22/11										
44	Analysis of the MEVA II current infrastructure / Análisis de la infraestructura actual de la MEVA II	Mon 10/25/10	Fri 5/20/11										
45	Analysis of the bandwidth used by MEVA II / Análisis del ancho de banda utilizado en la MEVA II	Mon 10/25/10	Fri 5/20/11										
46	Analyze bandwidth for AFTN service / Analizar ancho de banda para el servicio AFTN	Mon 10/25/10	Fri 5/20/11										
47	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Mon 10/25/10	Fri 5/20/11										
48	Analysis of the bandwidth used by the application / Análisis del ancho de banda utilizado por la aplicación	Mon 10/25/10	Fri 5/20/11										
49	Analyze band for voice over frame relay / Analizar banda para voz over frame relay	Mon 10/25/10	Fri 5/20/11										
50	Identify and analyze traffic generated by the application / Identificar e analizar el tránsito generado por la aplicación	Mon 10/25/10	Fri 5/20/11										
51	Analysis of the bandwidth used with DAMA / Análisis del ancho de banda utilizado con la utilización de DAMA	Mon 10/25/10	Fri 5/20/11										
52	Analysis of the bandwidth used with PAMA / Análisis del ancho de banda utilizado con la utilización de PAMA	Mon 10/25/10	Fri 5/20/11										
53	Analyze band for surveillance/automated systems / Analizar banda para sistemas de vigilancia/automatizados	Mon 10/25/10	Fri 5/20/11										
54	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Mon 10/25/10	Fri 5/20/11										
55	Analysis of the bandwidth used by the application / Análisis del ancho de banda utilizado por la aplicación	Mon 10/25/10	Fri 5/20/11										
56	Identify possible logistical problems in terms of equipment discontinuity / Identificar posibles problemas logísticos en términos de discontinuidad de equipos	Mon 5/23/11	Mon 6/13/11										
57	Final report / Informe final	Tue 6/14/11	Tue 7/19/11										
58	Remittance of information to Project Coordinator / Envío de información al Coordinador de Proyecto	Fri 7/22/11	Fri 7/22/11										

Proyecto: ESTRUCTURA ANALÍTICA P Data: Fri 11/5/10	Tarefa		Etapa		Tarefas externas	
	Divisão		Resumo		Etapa externa	
	Andamento		Resumo do projeto		Data limite	

PC = Project Coordinator/Coordinador Programa
 AF = Athayde Frauche
 OG = Omar Gouarnalusse

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PLANIFICACION PROPUESTA
ESTUDIO DE UNA ARQUITECTURA DE RED ATN EN LAS REGIONES CAR/SAM
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				10/4	1/10	4/18	7/25	10/31	2/6	5/15	8/21	11/27	3/4
59	Analysis of the current MEVA II/REDDIG interconnection / Analisis de la situacion actual de la interconexión MEVA II/REDDIG	Mon 9/13/10	Fri 6/3/11										
60	Analysis of the current interconnection infrastructure / Análisis de la infraestructura actual de interconexión	Mon 9/13/10	Tue 12/21/10										
61	MEVA II/REDDIG interconnection performance analysis / Análisis del desempeño de la interconexión MEVA II / REDDIG	Mon 9/13/10	Tue 12/21/10										
62	Analysis of the bandwidth used in the interconeciton / Análisis del ancho de banda utilizado en la interconexión	Mon 9/13/10	Fri 4/22/11										
63	Analysis of bandwidth for AFTN service / Analizar el ancho de banda para el servicio AFTN	Mon 9/13/10	Fri 4/22/11										
64	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Mon 9/13/10	Tue 12/21/10										
65	Analysis of the bandwidth used by the services / Análisis del ancho de banda utilizado por los servicios	Mon 9/13/10	Fri 4/22/11										
66	Analyze band for voice over frame relay / Analizar banda para voz over frame relay	Mon 9/13/10	Tue 12/21/10										
67	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Mon 9/13/10	Tue 12/21/10										
68	Analysis of the bandwidth used with DAMA / Análisis del ancho de banda utilizado con la utilización de DAMA	Mon 9/13/10	Tue 12/21/10										
69	Analysis of the bandwidth used with PAMA / Análisis del ancho de banda utilizado con la utilización de PAMA	Mon 9/13/10	Tue 12/21/10										
70	Analyze band for surveillance/automated systems / Analizar banda para sistemas de vigilancia/automatizados	Mon 9/13/10	Tue 12/21/10										
71	Identify and analyze traffic generated by the application / Identificar y analizar el tránsito generado por la aplicación	Mon 9/13/10	Tue 12/21/10										
72	Analysis of the bandwidth used by the application / Análisis del ancho de banda utilizado por la aplicación	Mon 9/13/10	Tue 12/21/10										
73	Identify possible logistical problems in terms of equipment discontinuity / Identificar posibles problemas logísticos en términos de discontinuidad de equipos	Wed 12/22/10	Wed 1/12/11										
74	Final report / Informe final	Mon 4/25/11	Mon 5/30/11										
75	Remittance of information to Programme Coordinator / Envío de información al Coordinador de Programa	Fri 6/3/11	Fri 6/3/11										
76	Consolidated report on the survey and analysis of the current network infrastructure and applications/services / Informe consolidado del levantamiento y análisis de la infraestructura y aplicaciones/servicios de la red actual	Thu 7/21/11	Wed 9/14/11										
77	DEVELOPMENT OF THE PROJECT / DESARROLLO DEL PROYECTO	Wed 5/19/10	Wed 9/7/11										
78	Communications data in support of ATM / Comunicaciones de datos en apoyo a la ATM	Wed 5/19/10	Tue 3/29/11										
79	Trials to determine the ATN bandwidth to support ATM applications / Pruebas para determinar el ancho de banda de la ATN para soportar aplicaciones ATM	Wed 5/19/10	Mon 8/16/10										
80	Trials guideline for AMHS bandwidth / Guía de pruebas de ancho de banda AMHS	Wed 5/19/10	Mon 8/16/10										
81													
82													
83													
84													
85	Carry out trials between Argentina (Ezeiza) and Brazil (Manaos) / Realizar pruebas entre Argentina (Ezeiza) y Brasil (Manaos)	Wed 7/28/10	Wed 8/4/10										

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PLANIFICACION PROPUESTA
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				10/4	1/10	4/18	7/25	10/31	2/6	5/15	8/21	11/27	3/4
86	Análisis de los Datos y Determinación del Ancho de Banda para AMHS	Thu 8/5/10	Mon 8/16/10										
87	Análisis de los datos de las pruebas de AMHS entre Argentina (Ezeiza) y Brasil (Manaos)	Thu 8/5/10	Mon 8/16/10										
88	Final report on bandwidth necessary for AMHS / Informe final determinación ancho de banda necesario para AMHS	Wed 8/25/10	Wed 9/1/10										
89	Analysis of the impact of the bandwidth on the current satellite infrastructure / Análisis del impacto del ancho de banda en la infraestructura actual satelital	Wed 9/1/10	Mon 1/10/11										
90	Inform REDDIG Administration of the trial results between Ezeiza and Manaos / Informar a la Administración de la REDDIG los resultados de las pruebas entre Ezeiza y Manaos	Wed 9/1/10	Thu 9/2/10										
91	Informe MEVA II Administration (TMG) on the trial results between Ezeiza and Manaos / Informar a la Administración de la MEVA II (TMG) los resultados de las pruebas entre Ezeiza y Manaos	Mon 11/1/10	Tue 11/2/10										
92	Bandwidth in REDDIG / Ancho de Banda en la REDDIG	Thu 9/2/10	Thu 9/30/10										
93	Study the message statistics among States / Estudiar las estadísticas de mensajes entre Estados	Wed 5/19/10	Wed 5/26/10										
94	Prepare the simulation script / Preparar el "script" para la simulación	Wed 5/19/10	Wed 5/26/10										
95	Trials schedules / Cronogramas de pruebas	Thu 7/15/10	Fri 7/16/10										
96	Trials types / Tipos de pruebas	Thu 7/15/10	Tue 7/27/10										
97													
98	Estudio y analisis de la utilización de las redes MEVA II/ REDDIG	Mon 11/1/10	Mon 1/10/11										
99	Determine the costs increase for AMHS / Determinar el incremento de costos para AMHS	Mon 1/3/11	Fri 1/7/11										
100	Determinación de los costos para el incremento de banda en la MEVAII/REDDIG	Mon 1/3/11	Mon 1/10/11										
101	Identificar y estudiar los nuevos servicios e aplicaciones ATN em las Regiones CAR/SAM	Wed 5/19/10	Tue 3/29/11										
102	Long term applications requirements for the SAM Region / Requerimientos de aplicaciones a lo largo del tiempo en la Región SAM	Wed 5/19/10	Wed 9/8/10										
103	ATM AUTOMATION AND SITUATIONAL AWARENESS / AUTOMATIZACION ATM Y COMPRESION SITUACIONAL	Wed 5/19/10	Wed 9/8/10										
104	Automation (systems interconnection) / Automatización (interconexión de sistemas)	Wed 5/19/10	Wed 6/30/10										
105	Analysis of bandwidth requirements for AIDC/OLDI application / Analizar los requerimientos de ancho de banda para la aplicación AIDC/OLDI	Wed 5/19/10	Wed 6/30/10										
106	Analysis of bandwidth requirements for radar data application / Analizar los requerimientos de ancho de banda para la aplicación de datos radar	Wed 5/19/10	Wed 6/30/10										
107	Improvement to the situational awareness / Mejora a la comprensión situacional	Wed 7/28/10	Wed 9/8/10										
108	Analysis of bandwidth requirements for ADS application / Analizar los requerimientos de ancho de banda para la aplicación ADS	Wed 7/28/10	Wed 9/8/10										
109	Analysis of bandwidth requirements for Multilateration I application / Analizar los requerimientos de ancho de banda para la aplicación Multilateración I	Wed 7/28/10	Wed 9/8/10										
110	AIM	Wed 5/19/10	Wed 6/30/10										
111	Analyze the bandwidth requirements for related applications / Analizar los requerimientos de ancho de banda para las aplicaciones relacionadas	Wed 5/19/10	Wed 6/30/10										
112	ATFM	Wed 5/19/10	Wed 6/30/10										

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				10/4	1/10	4/18	7/25	10/31	2/6	5/15	8/21	11/27	3/4
113	Analysis of bandwidth requirements for applications in support of ATFM implementation / Analizar los requerimientos de ancho de banda para las aplicaciones en apoyo de la implantación de la ATFM	Wed 5/19/10	Wed 6/30/10			PC							
114	MET	Wed 5/19/10	Wed 6/30/10										
115	Analysis of bandwidth requirements for MET applications / Analizar los requerimientos de ancho de banda para las aplicaciones MET	Wed 5/19/10	Wed 6/30/10			PC							
116	Consolidated report on the study for new services and ATM/ATN applications in the SAM Region / Informe consolidado del estudio de nuevos servicios y aplicaciones ATM / ATN en la Región SAM	Mon 8/23/10	Mon 9/6/10			PC							
117	Long term applications requirements for the CAR Region / Requerimientos de aplicaciones a lo largo del tiempo en la Región CAR	Mon 1/3/11	Fri 3/11/11										
118	ATM AUTOMATION AND SITUATIONAL AWARENESS / AUTOMATIZACION ATM Y COMPRENSION SITUACIONAL	Mon 1/3/11	Fri 3/11/11										
119	Automation (systems interconnection) / Automatización (interconexión de sistemas)	Mon 1/3/11	Fri 3/11/11										
120	Analysis of bandwidth requirements for AIDC/OLDI application / Analizar los requerimientos de ancho de banda para la aplicación AIDC/OLDI	Mon 1/3/11	Fri 3/11/11				DR,CP						
121	Analysis of bandwidth requirements for radar data application / Analizar los requerimientos de ancho de banda para la aplicación de datos radar	Mon 1/3/11	Fri 3/11/11				DR,CP						
122	Improvement to the situational awareness / Mejora a la comprensión situacional	Mon 1/3/11	Fri 3/11/11										
123	Analysis of bandwidth requirements for ADS application / Analizar los requerimientos de ancho de banda para la aplicación ADS	Mon 1/3/11	Fri 3/11/11				DR,CP						
124	Analysis of bandwidth requirements for Multilateration I application / Analizar los requerimientos de ancho de banda para la aplicación Multilateración I	Mon 1/3/11	Fri 3/11/11				DR,CP						
125	AIM	Mon 1/3/11	Fri 3/11/11										
126	Analyze the bandwidth requirements for related applications / Analizar los requerimientos de ancho de banda para las aplicaciones relacionadas	Mon 1/3/11	Fri 3/11/11				DR,CP						
127	ATFM	Mon 1/3/11	Fri 3/11/11										
128	Analysis of bandwidth requirements for applications in support of ATFM implementation / Analizar los requerimientos de ancho de banda para las aplicaciones en apoyo de la implantación de la ATFM	Mon 1/3/11	Fri 3/11/11				DR,CP						
129	MET	Mon 1/3/11	Fri 3/11/11										
130	Analysis of bandwidth requirements for MET applications / Analizar los requerimientos de ancho de banda para las aplicaciones MET	Mon 1/3/11	Fri 3/11/11				DR,CP						
131	Consolidated report on the study for new services and ATM/ATN applications in the CAR Region / Informe consolidado del estudio de nuevos servicios y aplicaciones ATM / ATN en la Región CAR	Mon 3/14/11	Fri 3/25/11				DR,CP						
132													
133	Study of the desired scenario / Estudio del escenario deseado	Mon 8/16/10	Fri 8/19/11										
134	Remittance of information to the Project Coordinator / Envío de información al Coordinador del Proyecto	Mon 3/28/11	Tue 3/29/11				DR,CP						
135	Infrastructure of a satellite network / Infraestructura de una red satélite	Mon 8/16/10	Mon 9/6/10										
136													
137	Determination of SAM satellite network costs / Determinación de los costos de red SAM satelital	Mon 8/23/10	Mon 9/6/10			OG,AF							

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				10/4	1/10	4/18	7/25	10/31	2/6	5/15	8/21	11/27	3/4
138	Study on a SAM satellite IP network structure / Estudiar una estructura de red IP SAM satelital	Mon 8/16/10	Mon 8/30/10										
139													
140	Determination of SAM ground network costs / Determinación de los costos de red SAM terrestre	Mon 8/23/10	Mon 9/6/10										
141	Study on a SAM ground IP network structure / Estudiar una estructura de red IP SAM terrestre	Mon 8/16/10	Mon 8/30/10										
142													
143	Determination of SAM mixed network costs / Determinación de los costos de red SAM mixta	Mon 8/23/10	Mon 9/6/10										
144	Study on a SAM mixed IP network structure (satellite + ground) / Estudiar una estructura de red IP SAM mixta (satélite + terrestre)	Mon 8/16/10	Mon 8/30/10										
145	Analysis of desired platform implementation costs / Análisis de costos de implementación de la plataforma deseada	Mon 9/6/10	Mon 10/4/10										
146	Definition of desired platform / Definición de la plataforma deseada	Wed 10/6/10	Fri 10/22/10										
147	CAR network / Red CAR	Mon 2/21/11	Fri 8/19/11										
148	Infrastructure of a satellite network / Infraestructura de una red satélite	Mon 2/21/11	Fri 5/6/11										
149													
150	Determination of MEVA II satellite network costs / Determinación de los costos de red MEVA II satelital	Mon 4/18/11	Fri 5/6/11										
151	Infrastructure of a ground network / Infraestructura de una red terrestre	Mon 2/21/11	Fri 5/6/11										
152													
153													
154	Infrastructure of a mixed network (satellite + ground) / Infraestructura de una red mixta (satélite + terrestre)	Mon 2/21/11	Fri 5/6/11										
155	Determination of MEVA II ground network costs / Determinación de los costos de red MEVA II terrestre	Mon 4/18/11	Fri 5/6/11										
156													
157	Study on a MEVA II mixed IP network structure (satellite + ground) / Estudiar una estructura de red IP MEVA II mixta (satélite + terrestre)	Mon 2/21/11	Fri 4/15/11										
158	Determination of MEVA II mixed network costs / Determinación de los costos de red MEVA II mixta	Mon 4/18/11	Fri 5/6/11										
159													
160	Analysis of desired platform implementation costs / Análisis de costos de implementación de la plataforma deseada	Mon 6/20/11	Fri 7/29/11										
161	Definition of desired platform / Definición de la plataforma deseada	Mon 8/1/11	Fri 8/19/11										
162	Networks addressing / Direcccionamiento de las redes	Mon 7/19/10	Wed 9/7/11										
163	Completion of guide on MEVA II/REDDIG network communications security / Completar el guía de seguridad para las redes de comunicaciones MEVA II/REDDIG	Mon 8/2/10	Fri 8/26/11										
164	Completion of IP routing policy document / Completar el documento IP Routing Policy (desplazar a lo largo del tiempo fin de año)	Wed 12/1/10	Wed 9/7/11										
165	IPv4 addressing / Direcccionamiento IPv4	Mon 7/19/10	Mon 1/3/11										
166	CAR network / Red CAR	Mon 11/1/10	Mon 1/3/11										
167													

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168	SAM network / Red SAM	Mon 7/19/10	Mon 8/30/10										
169													
170	IPv6 addressing guide / Guía de direccionamiento IPv6	Tue 1/4/11	Thu 8/25/11										
171	Completion of IPv4 addressing plan / Completar el plan de direccionamiento IPv4	Mon 11/1/10	Mon 1/3/11										
172	Drafting of an IPv6 addressing plan for the CAR Region / Elaborar un plan de direccionamiento IPv6 para la Región CAR	Tue 1/4/11	Thu 8/25/11										
173	IMPLEMENTATION MONITORING / MONITOREO DE IMPLANTACIÓN	Thu 9/1/11	Fri 11/4/11										
174													
175													
176	PROJECT CLOSING / CIERRE DEL PROYECTO	Fri 11/4/11	Mon 12/12/11										
177	Bandwidth in MEVA II / Ancho de banda en la MEVA II	Fri 11/26/10	Fri 1/7/11										
178	Study the bandwidth necessary for AMHS under current configuration / Estudiar el ancho de banda necesario para AMHS con la configuración actual	Thu 9/2/10	Thu 9/23/10										
179	Study the bandwidth necessary for AMHS under current configuration / Estudiar el ancho de banda necesario para AMHS con la configuración actual	Fri 11/26/10	Fri 12/31/10										
180	Determine the costs increase for AMHS / Determinar el incremento de costos para AMHS	Thu 9/23/10	Thu 9/30/10										
181	Estudiar el ancho de banda necesario para AMHS con la configuración actual	Mon 11/1/10	Fri 12/31/10										
182	Study on a MEVA II satellite IP network structure / Estudiar una estructura de red IP MEVA II satelital	Mon 2/21/11	Fri 4/15/11										
183	Study on a MEVA II ground IP network structure / Estudiar una estructura de red IP MEVA II terrestre	Mon 2/21/11	Fri 4/15/11										
184	Comparative analysis between network infrastructures / Análisis comparativo entre las infraestructuras de red	Mon 5/9/11	Fri 6/17/11										
185	Reception of project documentation by CNS/ATM/SG / Recibo de documentación del proyecto por el CNS/ATM/SG	Fri 11/4/11	Mon 11/7/11										
186	ICAO acceptance of studies / Aceptación de los estudios por la OACI	Mon 11/14/11	Mon 12/5/11										
187	Consolidation of final project study documentation / Consolidación de la documentación final del estudio del proyecto	Thu 9/1/11	Thu 10/13/11										
188	Delivery of final study documentation to ICAO SAM RO / Entrega de la documentación final de los estudios a la OR SAM OACI	Thu 11/3/11	Fri 11/4/11										
189	Documentation archiving / Archivo de la documentación	Mon 12/5/11	Mon 12/12/11										
190	Drafting of guide on development of information security / Elaborar guía de desarrollo de seguridad de la información	Mon 8/2/10	Fri 8/26/11										
191	Drafting of document on IP routing policy / Elaborar el documento IP routing policy	Wed 12/1/10	Wed 9/7/11										
192	Completion of IPv4 addressing plan / Completar el plan de direccionamiento IPv4	Mon 7/19/10	Mon 8/30/10										
193	Drafting of an IPv6 addressing plan for the SAM Region / Elaborar un plan de direccionamiento IPv6 para la Región SAM	Tue 1/4/11	Thu 8/25/11										
194	SAM network / Red SAM	Mon 8/16/10	Fri 10/22/10										
195	Infrastructure of a ground network / Infraestructura de una red terrestre	Mon 8/16/10	Mon 9/6/10										
196	Infrastructure of a mixed network (satellite + ground) / Infraestructura de una red mixta (satélite + terrestre)	Mon 8/16/10	Mon 9/6/10										
197	Comparative analysis between network infrastructures / Análisis comparativo entre las infraestructuras de red	Wed 9/8/10	Wed 10/6/10										

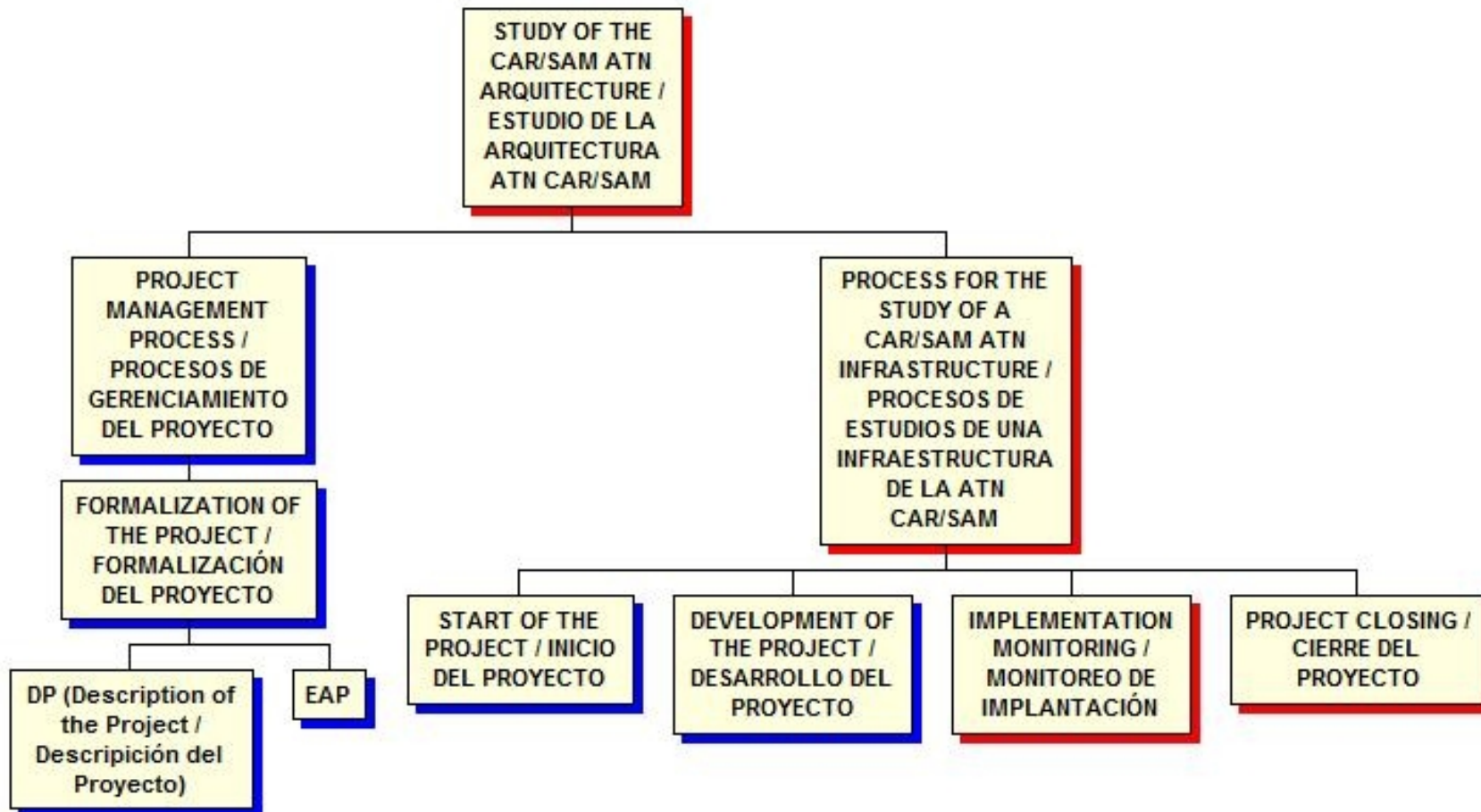
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APPENDIX D



APPENDIX E

PROGRESS MADE IN THE ACTIVITIES OF THE PROJECT ON CAR/SAM ATN ARQUITECTURE

Analysis of the SAM – REDDIG (D 1.3) communications network current situation and application requirements in the long term in the SAM Region (D 1.8).

1.1.1 The current services transmitted by REDDIG, arising from the Air Navigation Plan for the Caribbean and South American Regions are almost fully operational to date, and are described in Table CNS1A (AFTN Plan) and Table CNS1C (ATS direct speech circuit plan).

1.1.2 There are a number of future services, for the short, medium and long term that should be supported by REDDIG, namely:

1.1.2.1 Those emerging from the MEVA II – REDDIG interconnection.

1.1.2.2 The teleconference service for flow management units (FMU) or flow management positions (FMP) to be provided on a daily basis between all units in the Region, initially for twenty users.

1.1.2.3 The exchange of flight plans and/or radar information, using conventional methods, according to the respective MoUs (Memoranda of Understanding) already signed or to be signed.

1.1.2.4 AMHS interconnection requirements, gradually replacing the AFTN service, according to the respective MoUs signed or to be signed.

1.1.2.5 AIDC interconnection requirements, gradually replacing the ATS speech service.

1.1.2.6 ADS-B data exchange and multilateration between all the ACCs of adjacent FIRs.

1.1.2.7 The interconnection of automated systems, using Asterix 62 and 63, of all the ACCs of adjacent FIRs, as well as the exchange of radar data using Asterix protocols (1, 2, 34, 48).

1.1.2.8 AIM requirements: to date, there are no concrete requirements.

1.1.3 With the above, it was determined that Table 1 describes a summary of interfaces necessary for the REDDIG telecommunications equipment supporting all current and future requirements:

State	Location	Minimum interfaces					
		Universal I/O	Ethernet	Digital	E&M	FXO	FXS
Argentina	Ezeiza	11	1	0	11	0	1
Bolivia	La Paz	4	1	0	4	0	4
Brazil	Curitiba	4	1	0	6	2	1
	Manaus	6	1	0	7	0	5
	Recife	1	1	0	7	0	1

State	Location	Minimum interfaces					
		Universal I/O	Ethernet	Digital	E&M	FXO	FXS
Chile	Santiago	2	1	0	8	0	0
Colombia	Bogota	7	1	1	0	0	0
Ecuador	Guayaquil	3	1	1	0	0	0
French Guiana	Rochambeau	2	1	0	0	0	5
Guyana	Georgetown	4	1	0	0	0	5
Paraguay	Asunción	3	1	0	3	0	3
Peru	Lima	9	1	1	0	0	0
Suriname	Paramaribo	3	1	0	0	0	4
Trinidad and Tobago	Piarco	2	1	0	0	0	6
Uruguay	Montevideo	2	1	0	0	4	5
Venezuela	Maiquetía	10	1	0	7	0	4

Table 1: Interfaces of the Future Routers

1.1.4 With regard to the bandwidth for the current and future applications, the needs for REDDIG are reflected in Table 2.

State	Site	Service (each in Kbps)		
		Radar	AMHS	ADS-B
Argentina	Ezeiza	76.8	28.8	19.2
Bolivia	La Paz	115.2	14.4	19.2
Brazil	Curitiba	76.8	19.2	19.2
	Manaos	134.4	33.6	19.2
	Recife	0	4.8	19.2
Chile	Santiago	57.6	9.6	19.2
Colombia	Bogotá	76.8	38.4	19.2
Ecuador	Guayaquil	38.4	14.4	19.2
French Guiana	Rochambeau	38.4	9.6	19.2
Guyana	Georgetown	57.6	19.2	19.2
Paraguay	Asunción	57.6	9.6	19.2
Perú	Lima	96	43.2	19.2
Suriname	Panamaribo	76.8	14.4	19.2
Trinidad & Tobago	Piarco	19.2	9.6	19.2
Uruguay	Montevideo	19.2	9.6	19.2
Venezuela	Maiquetía	76.8	38.4	19.2

State	Site	Service (each in Kbps)		
		Radar	AMHS	ADS-B
Partial (Kbps)		1017.6	316.8	307.2
Partial global (Kbps)		1641.6		
Difference AFTN		-103.2		
Net bandwidth increase		1538.4		

Table 2: Additional bandwidth estimate

1.1.5 An analysis to Tables 1 and 2 leads to the following observations:

1.1.5.1 It should be noted that what is not used in the AFTN shall be deducted from the cited increases, since the service is either AFTN or AMHS, never in parallel. Therefore, the value obtained from Table 2 is inserted, providing the net value of the required increase in bandwidth.

1.1.5.2 **No bandwidth increase is required for the ATS speech circuits** as there are no additional operational requirements in Table CNS1C for direct or switched circuits.

1.1.5.3 The additional bandwidth requirement due to radar data Exchange will be for the exclusive function of the MoU (memoranda of understanding) signed or to be signed by States. Therefore, in order to count with an initial calculation, it is estimated that, at least, each State will transmit or receive, either data from a radar or summarized information from their neighbouring States, **for which the total bandwidth for radar applications amount to approximately 1 Mbps.**

1.1.5.4 For the teleconference service for ATFM purposes, it has been estimated that the interfaces and bandwidth capacity remaining in REDDIG is enough to absorb the demand, even at peak voice and data traffic, **for which no additional bandwidth is required.**

1.1.5.5 For the AMHS application, the initial conclusions to the trials carried out between Manaus and Ezeiza have been adopted to calculate the additional bandwidth. **It has been estimated that an addition 320 kps bandwidth would be required for this application.**

1.1.5.6 For the AIDC application, it has been estimated that the message traffic increase to be generated, will be compensated by the decrease in the ATS speech circuit. Only during the transition period, while AIDC is implemented is that the bandwidth may suffer an increase. Once this phase ends, and upon progressively deactivating speech communications will the bandwidth consumption start to diminish, until the time when the need to continue using voice circuits will completely disappear. **Therefore, no additional bandwidth will be required for AIDC.**

1.1.5.7 For the automated systems in the exchange of radar data using Asterix 62 y 63, the bandwidth increase will be the same as for AIDC. The moment of greater bandwidth need will occur when this service is completely disseminated throughout the Region, while the temporary mandatory transmission in radar form to the automated centre is kept. **Therefore, there will be no additional bandwidth requirement for the application.**

Trials to determine the bandwidth necessary for AMHS applications (D1.7)

1.1.6 With the aim of determining the minimum bandwidth necessary for the operation between MTAs of the AMHS application, trials were carried out between the Ezeiza (CIPE) and Manaus MTAs.

1.1.7 The scenario used, including the IP addressing plan, is described in Figure 1.

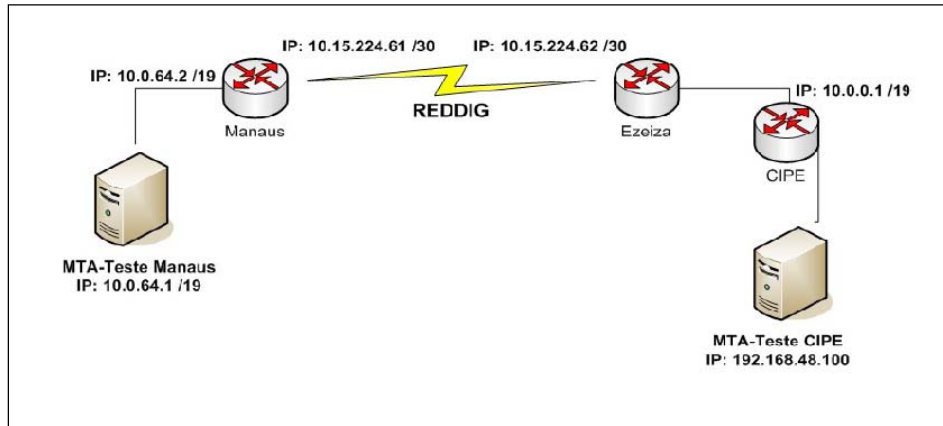


Figure 1: Connectivity scheme

1.1.8 With regard to the trials, Table 3 presents a part of the trials that used 1KB message sizes and 64, 32 and 4.8 kbps transmission speeds configured in REDDIG.

Trial No.	Description	Speed Link (Kbits/s)	total time (hh/mm/ss)	Message Time / Hour	Message Exchange / Second	Message Transit Time (seconds)
1	Remittance 5000 1KB messages	64	0:59:21	5000	1.39	0.72
2	Remittance 5000 1KB messages	32	2:18:00	2174	0.6	1.66
3	Remittance 25 1KB messages	4.8	11:42:00 (*)	427	0.12	8.43

(*): if the test had been with 5000 messages

Table 3: Trials and results obtained

1.1.9 The conclusion arrived at was that a 4.8 kbps bandwidth is enough for the peak hour message exchange between Argentina and Brazil, which has the greater traffic in South America.

1.1.10 Therefore, in terms of bandwidth estimating for the future REDDIG, the referred speed is to be considered between all South American MTAs.

1.1.11 With regard to the messages between Brazil and United States, a 9.6 or 16 kbps speed may be enough for the application.

Comparative study among the satellite, ground and mixed (satellite and mixed) IP based network models for the SAM Region (D 1.10)

1.1.12 Hereunder is a summary of the studies carried out for the selection of an IP platform for the SAM Region:

1.1.13 The studies conducted in the SAM Region deemed a mixed structure most appropriate for the future REDDIG.

1.1.14 The costs comparison between a satellite and a ground network produced an advantage of the first option, as can be noted in Figure 2.

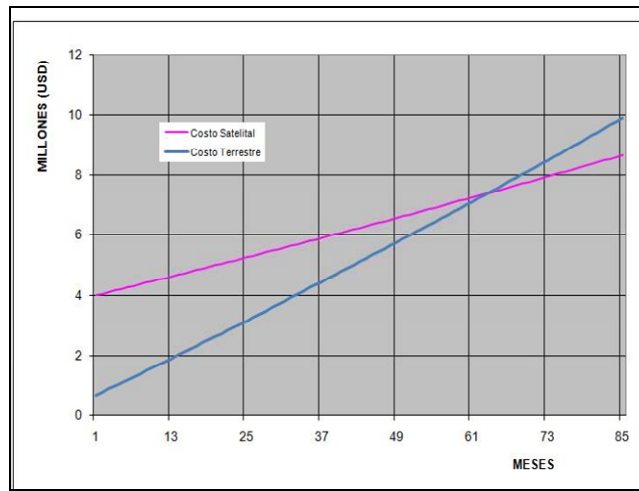


Figure 2: Satellite and ground costs comparison

1.1.15 From the economical and technical-operational point of view, the satellite structure is an advantage for the South American States versus a ground network, but the hiring of a parallel ground network will ensure availability (first of all) and, also, dispose of a natural increase of same, presenting a mixed network configuration that could be applied until the establishment of the South American Air Navigation and Safety Organization.

1.1.16 This infrastructure is based on the scheme presented as Figure 3.

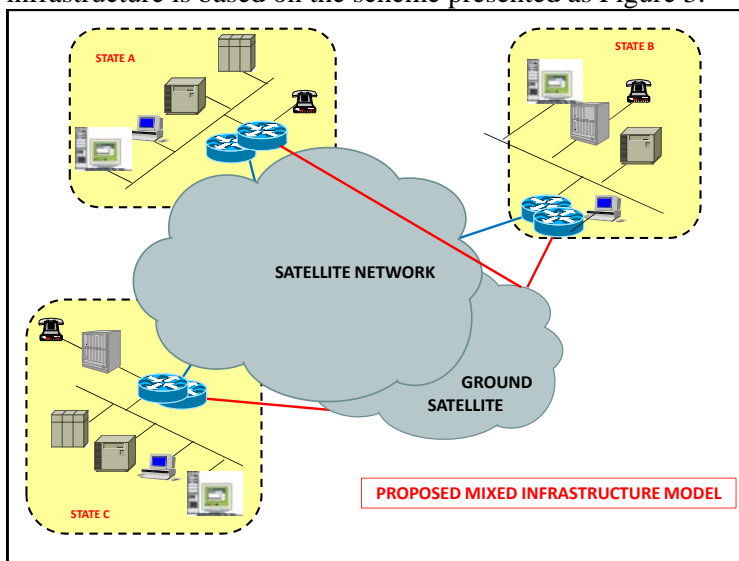


Figure 3: Proposed infrastructure scheme

1.1.17 The referred network would be a mixture of a *main satellite network and a ground one*, to serve for the increase in network capability, for the transit of new ATN applications and, also, as extensively indicated, for the increase in the availability of the system.

1.1.18 To that end, the satellite segment would count with duplicate chains to guarantee a high availability; the ground segment would have a practical availability chain provided by the majority of the ground networks.

- END -