



Agenda Item 3: Institutional aspects for the management and control of multinational systems and facilities

d) Implementation of the new REDDIG II digital network

IMPLEMENTATION OF THE NEW REGIONAL DIGITAL NETWORK REDDIG II

(Presented by the Secretariat)

SUMMARY	
This working paper presents information on the background, current status and foreseen implementation of the new digital network REDDIG II, and proposes that the Meeting approve the initiation of the bidding process for the implementation of the new digital network.	
References: <ul style="list-style-type: none">• CAR/SAM Air Navigation Plan (Doc 8733);• GREPECAS/6 meeting report (Mexico City, Mexico, 1-7 October 1996);• Project RLA/98/019 – <i>Implementation of the SAM Digital Network (REDDIG)</i>;• Project RLA/03/901 – <i>REDDIG and satellite segment management system</i>;• Report of the Twelfth REDDIG Coordination Meeting (Lima, Peru, 9-10 March 2009); and• Report of the Fourteenth REDDIG Coordination Meeting (Lima, Peru, 16-18 March 2011).	
ICAO strategic objectives:	<i>C – Environmental protection and sustainable development of air transport</i>

1. Background

1.1 The CAR/SAM Air Navigation Plan (Doc. 8733) contains the aeronautical fixed communication requirements to be implemented by the States in support of air navigation services. In the past, the States have normally implemented the requirements of the Plan based on bilateral agreements, leasing voice and data (AFTN) circuits to local communication providers.

1.2 Before the advent of the digital communications technology, analogue communication services had limited transmission capacity and low availability that required continuous corrective maintenance with mean repair time of failures that, in most cases, exceeded acceptable limits. Although there were alternate procedures to prevent disruption of communications, they suffered from the same limitations. In addition to the aforementioned technical limitations, the leased services were expensive and the communication system that supported the aeronautical fixed service (AFS) was not systematically implemented and was inadequately managed.

1.3 Consequently, ICAO and the States started looking for an integrated aeronautical communication solution. In this regard, the formulation of the FANS concept and its endorsement by the Tenth Air Navigation Conference as a CNS/ATM systems concept provided the requirements for a South American aeronautical communication solution, envisaging extensive use of available digital technology.

1.4 Studies were initiated within the CAR/SAM Regional Planning and Implementation Group (GREPECAS) mechanism. In this regard, the former Communications Subgroup (COM/SG) was tasked with developing plans for the deployment of digital telecommunication networks, taking into account the requirement to implement the Aeronautical Telecommunication Network (ATN) and its applications, as to transmit voice and data. Through Conclusion 6/27, GREPECAS requested the ICAO SAM Regional Office to coordinate with the States in order to analyse and propose the most appropriate mechanism and the best technological solution for an early implementation of a digital network in the SAM Region.

1.5 A series of informal meetings and consultations with the telecommunication industry were carried out. These meetings, in response to GREPECAS Conclusion 6/27, recommended States to implement a hubless VSAT network using the ICAO technical cooperation mechanism. In this regard, SAM States/Territory approved Regional Technical Cooperation Project RLA/98/019 – *Implementation of the SAM Digital Network (REDDIG)* as the implementation tool.

1.6 Under Project RLA/98/019, detailed specifications for the network were drafted, an international bidding process was carried out, and the network was implemented. Thus, the REDDIG started operations in September 2003. All SAM States/Territory, except Panama, are members of the REDDIG. In 2006, Trinidad and Tobago joined the REDDIG.

1.7 Project RLA/98/019 served States as an administrative agreement to operate and maintain the multinational aeronautical communication facility. REDDIG was born with great expectations, with the primary objective of providing efficient and reliable aeronautical communications, with high quality service and a reduced maintenance and operating cost. REDDIG specifications respond to current and future communication requirements specified in the CAR/SAM Air Navigation Plan. Project RLA/03/901 (*REDDIG System Management and Satellite Segment Administration*) superseded Project RLA/98/019 in November 2003, and nowadays this project continues to manage and maintain the REDDIG network.

1.8 The ICAO technical cooperation mechanism is the tool for managing the REDDIG on behalf of member States. The States cover the operating costs of the REDDIG through annual contributions to the ICAO Technical Cooperation. These contributions are used mainly to pay the satellite bandwidth, maintain the stock of spare parts, provide regular training to technical personnel, upgrade software/hardware as necessary, and hold annual coordination meetings to review and plan future REDDIG requirements and operation.

1.9 The RLA/03/901 Technical Cooperation Project manages the operations and maintenance of the REDDIG network. For the administrative function, the project hired a Network Administrator that operates from the main NCC (Manaus) of the REDDIG network. As the counterpart, the State keeps technical staff with the appropriate skills to operate the nodes and participate in maintenance activities conducted by the NCC under the supervision of the Network Administrator. States are responsible for the maintenance of their stations.

1.10 The aeronautical administration of Brazil supports REDDIG through the provision of the necessary facilities for the operation of the Manaus NCC, including round-the-clock availability of a group of technicians. The same is carried out by the aeronautical administration of Argentina, when the NCC is under its responsibility.

1.11 The implementation of REDDIG as a multinational aeronautical communication facility is a complete success of ICAO and the States. Regional communication problems were resolved and the States now had a robust platform to implement services envisaged by ICAO, taking into account the ATM operational concept. The key to this success was the high degree of collaboration and cooperation that characterises the States in the Region. Within this cooperation environment, plans are being developed for the implementation of a Multinational Regional Organisation (MRO), where REDDIG could be the first system to be incorporated into this organisation.

1.12 REDDIG is not only a network; it is a regional concept that provides reliable and efficient aeronautical communications under a multinational scheme. In this regard, the operation of REDDIG is continuously being reviewed to adjust it to the satellite segment market, and to the evolving digital telecommunication technologies. It is expected that, in the short term, new services will be implemented, such as the exchange of radar and flight data information, AMHS connectivity and other important operational data in support of CNS/ATM emerging technologies.

1.13 The REDDIG is a high availability, continuous operation network, even in adverse natural conditions such as the earthquake that occurred in Chile in 2010, and is the only seamless international means of communication.

1.14 In order to harmonise the development and requirements of communications between the CAR and SAM Regions as specified in the CAR/SAM Regional Air Navigation Plan, the interconnection between the REDDIG and the MEVA II VSAT network was established in March 2010.

2. Discussion

2.1 The technology used in the equipment of the REDDIG nodes, as well as in the REDDIG control and management centres (NCC/NMS), dates back to the year 2002. Their life cycle is about to end and the main pieces of equipment of the REDDIG nodes (FRAD and MODEM) are no longer commercially available.

2.2 The complete technological shift must be aligned with ICAO requirements for the implementation of the aeronautical telecommunication network (ATN) based on the Internet protocol (IPS), better known as the ATN/IPS (Annex 10, Volume III, Chapter 3 and Document 9896 - *Manual for the implementation of ATN using the standards and protocols of the internet protocol suite (IPS)*). The REDDIG II will be the regional ATN, and will be based on the Internet protocol (IPS).

2.3 New operational requirements are foreseen in the short and medium term, such as the interconnection of automated systems between adjacent ACCs (exchange of radar data, flight plans (AIDC/OLDI), new ATS speech circuit requirements, ATS, surveillance to meet the requirements between ATFM units of the Region, as well as other new services foreseen in the *Plan for the implementation of the performance-based air navigation system in the SAM Region*.

2.4 The REDDIG member States, in order to address maintenance difficulties in the current network, maintain the high availability rates of the service as foreseen by ICAO, meet the new service requirements of the Region, and implement an ATN network consistent with that specified by ICAO, prepared an action plan for the implementation of a new digital network in the SAM Region, which will imply a complete technological shift from the current REDDIG equipment [Twelfth Meeting of the REDDIG Coordination Committee (RCC/12) (Lima, Peru, 9-10 March 2009)] . **Appendix A** to this working paper contains the updated action plan for the implementation of the new REDDIG II digital network.

2.5 As part of the activities of the action plan for the implementation of REDDIG II, a study on the implementation of a new digital network was conducted with the support of Project RLA/06/901 – *Assistance for the implementation of a regional ATM system, taking into account the ATM operational concept and the support of communication, navigation and surveillance (CNS) technology*.

2.6 The study conducted included an analysis of the current status of REDDIG, the bandwidth requirements to support current aeronautical fixed services, radar data, as well as the new services foreseen for supporting air navigation, the different network configurations (satellite, ground and mixed), a technical and financial comparison of the networks analysed, and proposed a mixed digital network structure (satellite + ground).

2.7 The study of the digital network was presented at the sixth workshop/meeting of the SAM implementation group (SAM/IG/6), which considered that the study should be circulated to the States so that they could make comments before 31 January 2011. Accordingly, it formulated Conclusion SAM/IG/6-10 – *Review of the study on a new digital network for the SAM Region*.

2.8 The study of the digital network was sent to all SAM States, and at the fourteenth meeting of the REDDIG Coordination Committee (RCC/14) held in Lima, Peru, on 16-17 March 2011, the group reviewed the study based on the comments received from the States, and approved it.

2.9 The results of this study were sent to all SAM States for comments, and responses were received from Argentina, Brazil, Chile and Panama. Argentina and Brazil informed that they had no comments on the study of the new digital network. Panama informed that, being member of MEVA II and since the connection with the REDDIG nodes was envisaged in the MEVA II/REDDIG interconnection, it supported the implementation of the ground network to support the satellite network. In this regard, the REDDIG RCC/14 meeting reviewed and approved the aforementioned study.

2.10 The Seminar/Workshop on New Technologies in Satellite and Ground Networks was held on 18-20 July 2011 in Lima, Peru. At this seminar/workshop, communication service providers, integrators and manufacturers of network equipment presented their technical solution to the study on the digital network.

2.11 Taking into account the study and the results of the seminar/workshop, a group of experts in communications from Argentina and Brazil, in coordination with ICAO, and with the support of Project RLA/06/901, prepared a document with the technical specifications for the acquisition and implementation of the REDDIG. This document was circulated to REDDIG member States for comments.

2.12 This document will be improved with the comments received from the States, and will serve as the basis for a bidding process.

2.13 The Meeting of Directors should consider starting the bidding process for the acquisition and implementation of the new SAM digital network by the first quarter of 2012, as foreseen in the action plan for the implementation of the new REDDIG II digital network.

2.14 The REDDIG II would consist of two network platforms: a satellite platform and a ground MPSL platform. The ground network would support the new short- and medium-term service requirements not envisaged in the satellite network, and would serve as backup in case of failure of one or more nodes of the satellite network, or in case of total failure of the satellite network, and also as means of transportation for new administrative applications.

2.15 The implementation of the new network would imply two types of costs: non-recurring costs, which include the cost of equipment, spare parts, documentation, courses, preparation and installation; and recurring costs to keep the network operational. According to the study for the new digital network, the estimated non-recurring costs would amount to **four and a half million dollars**, which represents an investment of USD 281,250 per node.

2.16 The recurring costs include the payment for the bandwidth required for the space segment and the ground network, as well as the management and administration of the REDDIG II. The recurring costs corresponding to the payment for the bandwidth and REDDIG administration should not differ much from the current cost of the REDDIG. Additionally, there is the recurring cost that corresponds to the bandwidth required for the ground network, estimated in **2,000 dollars per month** per node, in average (**24,000 dollars per year per node**). **Appendix B** contains a table with an estimate of the non-recurring and recurring costs, by node, in the REDDIG member States.

2.17 It is proposed that the REDDIG II bidding process be conducted through the ICAO technical cooperation mechanisms, with active participation of all its members, starting in the first half of 2012.

2.18 If the RAAC/12 meeting agrees to start the process of implementation of the REDDIG II, member States should include the estimated cost of the implementation of the new digital network in their 2012 budget. Likewise, they should support the process by seconding communication network experts. Accordingly, the following draft conclusion is submitted to the consideration of the Meeting:

Conclusion RAAC/12-X - Start-up of the bidding process for the implementation of the new REDDIG II digital network

In order to give continuity to the activities of the action plan for the implementation of the new digital network (REDDIG II):

- a) ICAO is requested to begin, through its technical cooperation mechanism, the bidding process for the implementation of the REDDIG II, foreseen to begin on the first quarter of 2012;

- b) REDDIG member States of the SAM Region are requested to include in their budget the expenses corresponding to the non-recurring and recurring costs mentioned in Appendix B to this working paper; and
- c) REDDIG member States of the SAM Region are requested to provide the support required so that communication experts of their administrations may participate in the bidding process.

3. **Suggested action**

3.1 The Meeting is invited to:

- a) Take note of the information contained in this working paper;
- b) Taking into account the comments on the implementation of the new REDDIG II digital network contained in paragraphs 2.1 to 2.19, and Appendices A and B, review draft conclusion RAAC/12-X for its approval, with a view to starting a bidding process, through the ICAO technical cooperation mechanism, for the implementation of the new REDDIG II digital network; and
- c) Analyse other matters that it may deem appropriate.

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APPENDIX A

ACTION PLAN FOR THE IMPLEMENTATION OF A NEW DIGITAL NETWORK FOR THE SAM REGION (SAM ATN NETWORK)

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
1 Identify current voice and data services requirements, as well as those scheduled to be implemented in the short, medium and long term in the Region, in support of air navigation	SAM/IG Group for the implementation of CNS improvements	List of services requirements in support of air navigation for the Region, including those scheduled for the short, medium and long term	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II
2 Analysis of band width required for the services identified in Activity 1	SAM/IG Group for the implementation of CNS improvements	Amount of band width required to support the requirements specified in Activity 1	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II
3 Determination of costs for the band width increase in REDDIG	SAM/IG Group for the implementation of CNS improvements	Implementation costs of new REDDIG services	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II
4 Study of the new REDDIG technological platform and determination of its cost	SAM/IG Group for the implementation of CNS improvements	Definition of the REDDIG technological platform	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II
5 Study of a ground regional IP structure supporting the services required and defined in Activity 1, as well as of the band width requirements defined in Activity 2	SAM/IG Group for the implementation of CNS improvements	Definition of a regional ground IP network model structure	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
6 Determination of costs for the implementation of Activity 5	SAM/IG Group for the implementation of CNS improvements	Implementation costs of a digital ground IP network structure	SAM/IG/6	Completed Cost estimates were identified in the study for the implementation of the new REDDIG II regional digital network and consulted with some communications service providers
7 Study on the structure of a mixed (ground and satellite) regional digital network structure	SAM/IG Group for the implementation of CNS improvements	Model definition	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II
8 Determination of the costs for the implementation of Activity 7	SAM/IG Group for the implementation of CNS improvements	Implementation costs of a mixed (ground and satellite) digital network structure	SAM/IG/6	Completed Cost estimates were identified in the study for the implementation of the new REDDIG II digital network and consulted with the industry (manufacturers, integrators and communications service providers)
9 Comparisons between the network infrastructure models specified in Activities 4, 5 and 7	SAM/IG Group for the implementation of CNS improvements	Comparative study between the ground IP and mixed (satellite and ground) satellite network models	SAM/IG/6	Completed Identified in the study for the implementation of the new digital network, REDDIG II

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
10 Determination of the regional network infrastructure model, on the basis of results of Activity 9	SAM/IG Group for the implementation of CNS improvements	Final review to the study of the new digital network, REDDIG II	SAM/IG/7	Completed The study for the new SAM digital network was distributed to all REDDIG member States and Panama for comments. Replies were received from Argentina, Brazil, Chile and Panama. REDDIG RCC/14 meeting (Lima, Peru, 16-18 March 2011) examined and approved the infrastructure model formulated in the study. In addition, SAM/IG/7 meeting endorsed RCC/14 meeting's approval.
11 Holding of a seminar/workshop on new satellite and ground networks technology	Secretariat	Technological solutions for the new REDDIG II regional network configuration	Lima, Peru, 18-20 July 2011	Completed During this seminar/workshop, the communications services providers, integrators and manufacturers will present initial implementation proposals on the new REDDIG II digital network
12 Acceptance process for the implementation of the network infrastructure model determined by Activity 10, through a public bidding process	SAM/IG Group for the implementation of CNS improvements	Acceptance of the public bidding process for the implementation of a SAM network infrastructure	SAM/IG/7	Completed REDDIG RCC/14 meeting examined and approved the infrastructure model formulated in the study. In addition, SAM/IG/7 meeting endorsed RCC/14 meeting's approval.

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
13 Preparation of technical specifications for the implementation of the SAM network infrastructure specified in Activity 10	SAM/IG Group for the implementation of CNS improvements	Technical specifications for the implementation of a SAM network infrastructure	Aug 2011	Completed The technical specifications were drafted with the support of RLA/06/901
14 Circulation to States of the technical specifications for the implementation of the SAM network infrastructure	States of the Region	Approval of technical specifications for the implementation of the SAM network infrastructure	Sep 2011	Completed Circulated to all REDDIG members for comments
15 Presentation of REDDIG network study and technical specifications to RAAC/12 meeting	Secretariat	Go ahead for the public bidding process through ICAO	Oct 2011	
16 Evaluation of offers presented	SAM/IG Group for the implementation of CNS improvements	Assessment of offers	Mar 2012	
17 Determination of winning bidder	SAM/IG Group for the implementation of CNS improvements	Designation of winning bidder for the network implementation	Jun 2012	

APPENDIX B / APENDICE B

REDDIG MEMBER STATES/ ESTADOS MIEMBROS DE LA REDDIG	NON RECURRENT ESTIMATE COST FOR REDDIG II (GROUND + SATELLITE NETWORK)/ COSTO NO RECURRENT ESTIMADO PARA REDDIG II (RED TERRESTRE + SATELITAL)	ANNUAL ESTIMATE RECURRENT COST COSTO RECURRENT ESTIMADO ANUAL	
		Average estimate management and satellite bandwidth/ Gestión y ancho de banda satelital promedio estimado	Management and ground bandwidth/ Gestión y ancho de banda terrestre
Argentina	281,250	40,000	24,000
Bolivia	281,250	30,000	24,000
Brazil (three nodes)/ Brasil (tres nodos)	843,750	110,000	72,000
Chile	281,250	38,000	24,000
Colombia	281,250	38,000	24,000
Ecuador	281,250	28,000	24,000
French Guiana (France)/ Guyana Francesa (Francia)	281,250	24,000	24,000
Guyana	281,250	24,000	24,000
Paraguay	281,250	24,000	24,000
Perú	281,250	40,000	24,000
Suriname/Surinam	281,250	24,000	24,000
Uruguay	281,250	32,000	24,000
Venezuela	281,250	30,000	24,000
Trinidad & Tobago Trinidad y Tabago	281,250	28,000	24,000
TOTAL US\$	4,500,000	510,000	384,000

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