CNMC/6– WP/08A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

WESTERN AND CENTRAL AFRICA OFFICE

Sixth Meeting of the Central Atlantic FIR Satellite Network (CAFSAT) Management Committee (CNMC6)

(Lisbon, Portugal, 6 -7 June 2016)

Agenda Item 4: CAFSAT Re-engineering and Modernization

REDDIG II NETWORK OVERVIEW

(Presented by the Secretariat)

EXECUTIVE SUMMARY	
This Working Paper presents general information about REDDIG II architecture and the current operation status	
Action:	Suggested Action is presented in Section 3.
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency
References:	• ICAO contract No. 22501200 with INEO&LEVEL 3 consortium • First MEVAIII/REDDIGII Interconnection Coordination Meeting (MIII-RII/INTERCON/01) Aruba Oranjestad, Aruba, 25 to 26 May 2015. • Nineteenth meeting of the coordination committee (RCC/19 Lima Peru 7-9 March 2016) • Seventeenth workshop/meeting of the SAM implementation group (SAMIG/17 Lima Peru 9 to 13 May 2016)

1. Introduction

1.1 The SAM Digital Network – REDDIG – is the result of the cooperation spirit existing between the member States which under the ICAO Regional Project RLA/03/901 has the objective of sharing an own network that provides them with the current and future aeronautical telecommunications services.

1.2 The REDDIG I, supporting both Frame Relay and IP protocols, began to operate in 2003 and ended in January 2015. During all this period the REDDIG I provided the aeronautical services with the highest standards of quality and availability. The main reason to replace the REDDIG I platform, except the antenna, was the obsolescence of network components as FRAD and Satellite Modem.

1.3 After a process of study of requirement for a new digital network in the SAM Region, the elaboration of technical specification and the establishment of a bid process, a Contract No. 22501200, between ICAO, on behalf of all REDDIG II member States, and the INEO & LEVEL 3 consortium for the implementation of REDDIG II was signed the 9th of May 2013. .

1.4 The contract includes, in addition to the installation and operation of satellite network equipment, the leasing of the MPLS service on the Level 3 fiber optics ground network for a period of 6 months, starting on final acceptance of REDDIG II.

1.5 Following the initial six months, depending on the quality of the service during this initial period, the REDDIG II member States will decide whether or not to renew the service for an additional period of 4 years and six months, renewable every year, maintaining the monthly costs established for the first 6 months of the service.

2 Analysis

2.1 The REDDIG II, was launched in February 2015 by the consortium INEO & Level (3), is a digital network totally based on IP protocol on a mixed satellite-ground network .The main satellite equipment of the REDDIG II are the CISCO 2900 routers, the SKYWAN IDU 7000 satellite modems that will act as masters (Manaus and Ezeiza), and the SKYWAN IDU 1070 modems in the other REDDIG II nodes, which will act as slaves. The block structure of a satellite network node is shown in *Figure 1* of **Appendix A** to this working paper.

2.2 The REDDIG II continues operating in the same transponder of IS-14 satellite (bandwidth 4.4 MHz and frequency operation 6013.62/3788.62 - 6018.02/3793.02 Mhz), the same satellite segment with three carriers but employing new modulation scheme 8PSK and FEC 2/3. Likewise, the hardware platform continues to be fully redundant.

2.3 Once REDDIG II network was enabled, some initial problems were presented as the lack of IP telephone service operation designed to support the control centers in managing the flow of Air Traffic Management (ATFM), false alarms and quality in the presentation of the Management System (NMS) of the REDDIG II, the quality of the AFTN messages and modem satellite freezing in some nodes. At present, the network has a stable and highly reliable behaviour leaving only one aspect to solve, which is the random freezing of some satellite modems which is under solution.

2.4 The ground network is based in fiber optic on the MPLS protocol. Access to ground network services is through the CISCO 1921 router. Each node has an access capacity of 256k bits/sec. The configuration for accessing the MPLS network is shown in *Figure 2* of Appendix A. The ground network provider is LEVEL 3, after the initial 6 month period from July to December 2015 of services through the MPLS network , considering the good availability of the ground network, in January 2016 started the 4 year and sixth month contract between LEVEL 3 and the REDDIG II project RLA/06/901 of communication services in the fiber optic network.

2.5 At the end of April 2015 the interconnection between the new digital VSAT network in the CAR Region MEVA III and the new REDDIG II entries in operation. The new MEVA III came in operation at the beginning of April 2015 , the MEVA III network is composed by 18 nodes belonging to 13 States and 2 Territories of the CAR Region, 1 SAM State, and COCESNA. The MEVA III VSAT network is based on NDSatcom SkyWAN solution in combination with Memotech Frame relay Access Devices (FADs). The MEVA III operates in IS-14 satellite. State-of-the-art modem performance (Turbo Phi coding) and 8PSK modulation reduce ODU size requirements and satellite bandwidth costs.

2.6 At the middle of April 2016 a new node of REDDIG II came in operation (Brasilia) in this sense at present, the REDDIG II network comprises 17 nodes belonging to 12 countries and 1 territory of the SAM Region, 1 country of the Caribbean Region and the COCESNA organization. **Appendix B** to this working paper contains a map with the location of the REDDIG II nodes and the Level 3 ground network . A new node of REDDIG II it is expected to be implemented in Argentina in 2017 (Cordoba)

2.7 In the month of October 2015 additional service was introduced in REDDIG II network as the SITA data link from the Chilean Air Navigation Service Provider (Chile Oceanic FIR) , currently this service continue in operation with successful result but under test phase. (See **Appendix C** of this WP) A new proposal circuit configuration between SITA and REDDIG II network is under study in order to implemented in other SAM States that have requirement of air ground data link , the result is expected by the end of June 2016.

3. Action required

3.1 The meeting is invited to take note of the information supplied and consider the experience of REDDIG II implementation in the implementation of possible new regional network

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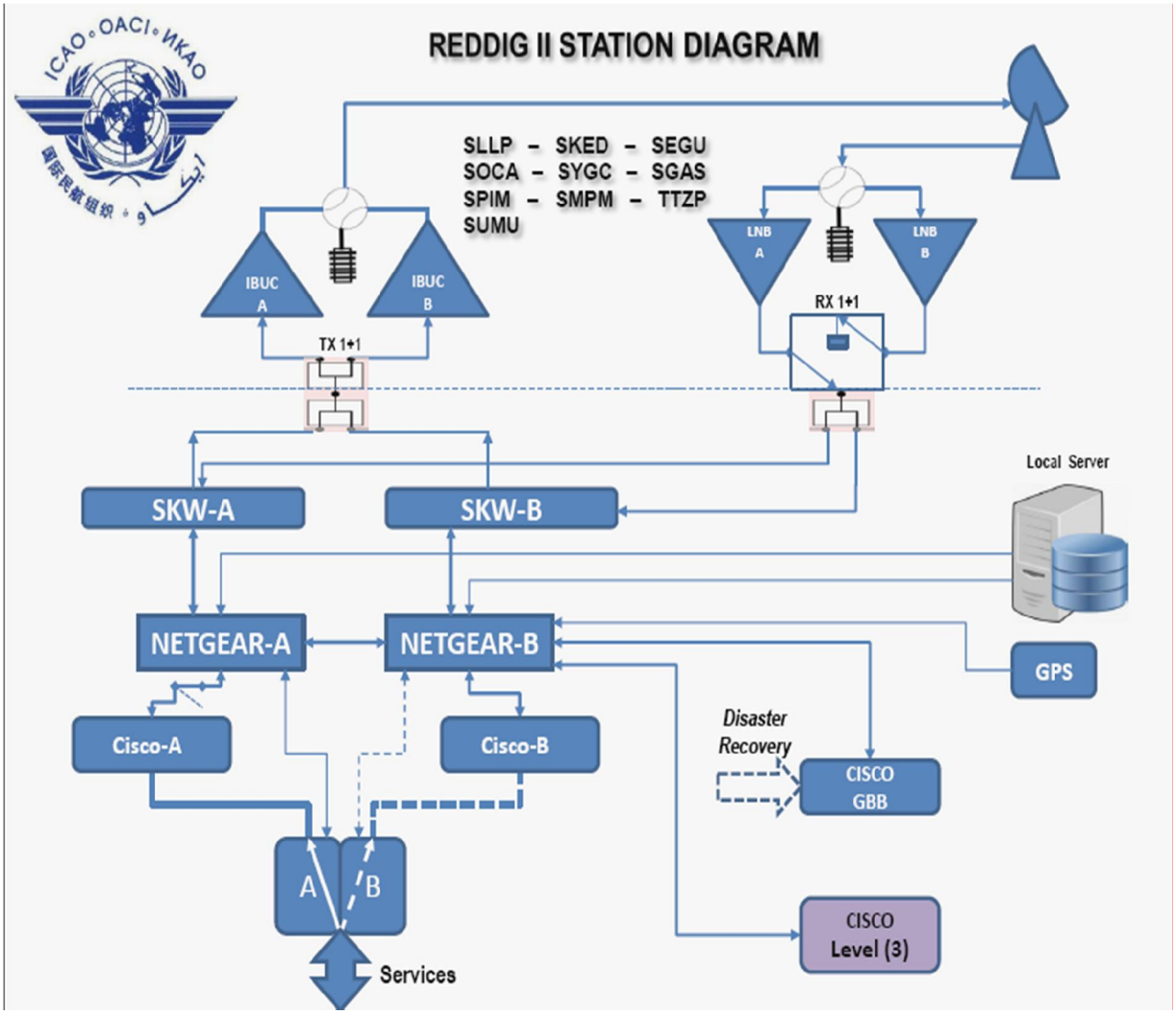
APPENDIX A


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

APPENDIX B
LOCATION OF REDDIG II NODES AND LEVEL 3 GROUND NETWORK

: Location of REDDIG II nodes

Optic fiber ground network of LEVEL 3

APPENDIX C

SITA data link services from the Chilean Air Navigation Service Provider (Chile Oceanic FIR) though REDDIG II network