



Agenda Item 4: Assessment of operational requirements to determine the implementation of improvements in communications, navigation and surveillance (CNS) capabilities for operations in route and terminal area

FOLLOW-UP TO THE PERFORMANCE AND ACTIVITIES OF REDDIG II

(Presented by the Secretariat)

SUMMARY	
This working paper presents information on the performance and activities of the SAM digital network – REDDIG, since the Twenty-third workshop/meeting of the SAM Implementation Group (SAM/IG/23).	
References	
<ul style="list-style-type: none">- REDDIG contract 22501200;- Report of the Twenty-second meeting of the REDDIG Coordination Committee - RCC/22 (Lima, Peru, 5-7 March 2019);- Twenty-third workshop/meeting of the SAM Implementation Group – SAM/IG/23 (Lima, Peru, 20-24 May 2019); and- Report of the Twenty-third (extraordinary) meeting of the REDDIG Coordination Committee - RCC/23 (Teleconference, 21 August 2019).	
ICAO strategic objectives:	<i>A – Safety</i> <i>B – Air navigation capacity and efficiency</i>

1. Background

1.1 The SAM/IG/23 meeting reviewed REDDIG II performance and activities since the SAM/IG/21 meeting, highlighting the increased availability of REDDIG II (in excess of 99.99%) reported at the RCC/21 of Technical Cooperation Project RLA/03/901.

2. Analysis

2.1 The main activities to be carried out in REDDIG II during 2019 are presented below, together with an analysis of its operational performance since the SAM/IG/22 meeting. The description covers mainly the following aspects:

- a) REDDIG II training programme
- b) Preventive maintenance programme
- c) Operation of REDDIG II and implementation of new services

REDDIG II TRAINING PROGRAMME

Sessions on REDDIG II operation and maintenance

2.2 The REDDIG II Operation and Maintenance Course was conducted on 8-26 July 2019 at the REDDIG NCC facilities in Ezeiza.

2.3 The purpose of the training course was to refresh and supplement the basic and advanced concepts concerning voice and data transmission systems used in civil aviation and supported by REDDIG, the multiservice platform.

2.4 The course was attended by 18 technicians/engineers of EANA. **Appendix A** to this working paper shows the contents of the course.

Training in technological tools for the analysis of voice and data applications carried on the REDDIG

2.5 A training course was provided within the context of the RTO/8 meeting (Santiago, 14-18 October 2019) on 16-18 October 2019 covering the terminology, general and specific concepts, and tools for analysing voice and data applications carried on REDDIG, in order to contribute to preventive and corrective maintenance of the network.

2.6 The training course was geared towards the operation and maintenance of the REDDIG station and to the analysis and knowledge of the different services carried over this network.

2.7 Twenty-seven technicians from 11 States involved in Project RLA/03/901 participated in the course. **Appendix B** to this working paper shows the contents of the course.

Course on security policies and firewall setup

2.8 Depending on the purchase of the firewall equipment, training is to be provided to the technical personnel of the REDDIG nodes, NCC staff, the Administrator and the SAM CNS officer.

2.9 The objective of the training course will be, in a first stage, to introduce the staff to the security policies and, in a second stage, to enable them to configure the equipment to be installed in each node.

2.10 The cost involved in the course will be included in the equipment, while Project RLA/03/901 will cover fellowships.

2.11 As already stated, this training course will be dependant upon the final purchase of the equipment, reason why it could be moved to 2020. The SAM Regional Office has already sent the necessary documents to allow the *Technical Cooperation Bureau* (TCB) in Montreal to start the acquisition process.

Advanced course on firewall management and monitoring

2.12 This course is addressed to NCC staff, the REDDIG Administrator, and the SAM CNS officer. It is directly related to the “Course on security policies and firewall setup”, and thus will be subject to the completion of the latter, as it is a consequence thereof.

2.13 The cost involved in the delivery of the course will be included in the purchase of the equipment, while Regional Project RLA 03/901 will cover the fellowships.

Training for the Manaus NCC staff on the use of RF measurement instruments

2.14 Training sessions on the use of RF measurement instruments for the Manaus NCC staff took place in mid 2019, at the facilities of the REDDIG NCC in Manaus.

2.15 The purpose of the training course was to learn how to use the various tools, such as the signal generator, spectrum analyser, Ofield Fox Test Equipment, power sensor, and accessories. All these tools are required for RF measurements to permit troubleshooting of the various parts of the stations involved in RF stages.

2.16 Seven technicians of the Manaus NCC participated in the course.

PREVENTIVE MAINTENANCE PROGRAMME

2.17 As was done in 2018, the REDDIG Administration has established a preventive maintenance programme for all REDDIG II equipment in the NCCs and in all REDDIG II nodes.

Visit to REDDIG nodes

2.18 The network Administrator made two visits to REDDIG nodes in 2019: one to the Cayenne node and the other to the Ezeiza node. Likewise, a technician of the Manaus NCC visited the Recife node on account of DECEA.

2.19 Node visits obey to that agreed upon at the Twenty-second meeting of the REDDIG Coordination Committee (RCC/22), especially “**Conclusion RCC/22-1, Technical visits to network nodes by the REDDIG Administrator**”.

2.20 During the visit to the node in Cayenne, French Guiana, on 4-12 May 2019, the following activities were carried out: corrective and preventive maintenance, general revision of the station, equipment inventory, and on-the-job training on the main operational and maintenance concepts.

2.21 It should be noted that many novelties were observed during the visit to the facilities, and activities were carried out to improve the condition encountered. Likewise, problems were identified in the equipment, especially in the installation. Work continues to fully restore station operations.

2.22 The activities foreseen during the visit to the node of Ezeiza, Argentina, on 8-26 July 2019, included a complete assessment and the corresponding procedures, which were performed together with the local maintenance staff.

2.23 Likewise, maintenance was provided to the Recife node in response to the suggestion made by DECEA to send an experienced technician from the Manaus NCC to carry out, together with Recife staff and the support of this Administration, the necessary tasks to resolve the issues causing degradation of this station. It was possible to significantly restore the functionality of the station.

REDDIG II NCC alternation

2.24 The visit to the node of Ezeiza, Argentina, on 8-26 July 2019, was also an opportunity for operational alternation of the NCC to Ezeiza, whereby this NCC took on the operational functions of REDDIG.

2.25 During the period in which the Ezeiza NCC took on a management role, important issues were addressed within the NCC as well as others resulting from developments in the Region. Support and collaboration was also provided to different tasks involving the States, such as system interconnection, radar data exchange, AIDC, etc.

OPERATION OF REDDIG II AND ANALYSIS OF THE IMPLEMENTATION OF NEW SERVICES

Relocation of the Bogota node

2.26 Amendment VII concerning the new node of Ezeiza and the relocation of the Bogota node split in May 2019. For the relocation of the Bogota node, the amendment was signed on 28 June 2019.

2.27 On 24 July 2019, a teleconference was held among representatives of INEO, the Colombian Administration and ICAO, during which INEO introduced the staff assigned to the project as well as the provisional schedule. Furthermore, the points of contact of the parties were defined, and details of node relocation were discussed.

2.28 Since then, monthly conferences are being held to monitor actions according to the schedule.

2.29 It was agreed that any coordination, communication, doubt, or any other issue related to the migration should be sent by e-mail, with copy to the stakeholders (INEO, Colombian Administration and ICAO). In case any other document was required, the parties would coordinate to meet the requirement.

2.30 According to contract provisions, the *Provisional Schedule* cannot be officially modified. However, it was agreed that with good execution, communication, coordination and follow-up, the relocation would take place on month 7 or 8 (of the 13 months foreseen).

2.31 The CenturyLink node will be the first to be relocated to ensure voice and data traffic to/from Colombia with users of the SAM Region. The REDDIG Administration and the Regional Office will coordinate this task with CenturyLink, in coordination with the focal points of the Colombian Administration. It should be noted that the Colombian Administration would be responsible for installing the fibre from the CenturyLink access point to the REDDIG rack.

2.32 Data traffic with the NAM/CAR Regions will be alternated with Maiquetía (the other regional hub). If additional nodes were eventually available in the United States, it would be another option for alternating data traffic. Likewise, Brasilia will be another alternative to consider for alternating traffic.

2.33 Regarding voice services, users that coordinate with the CAR Region and use MEVA will be requested to use IDD (international direct dialing) while the relocation takes place. It is expected that this period of time will be very short, just a few hours. The Colombian Administration shall give timely notice of this situation to all domestic and international users by aeronautical service message or NOTAM.

2.34 Regarding MEVA, the REDDIG Administration and the Regional Office will coordinate the transfer.

2.35 INEO committed to replace the TX and RX RF cables connecting the new antenna with the rack, and will also change the waveguide, with the agreed characteristics.

2.36 The Colombian Administration expressed its willingness to facilitate any issue related to the transfer.

2.37 In October, INEO confirmed initial payment by ICAO, which was used to purchase the antenna.

2.38 The logistics department of INEO will take the necessary steps to send all the material to Bogota so that it may reach its destination before the end of this year.

2.39 In order to avoid transferring tools unnecessarily, INEO sent a list of tools required to make sure they are available on site.

2.40 Regarding alternation of equipment and accessories to Colombia, the State would take steps and cover the cost for their release. In this sense, Colombia requested that the invoice issued by INEO make reference to ICAO to facilitate proceedings. A model will be sent to INEO in due time to facilitate the admission procedure, as stated by the representative of Colombia.

Additional ground network nodes (MPLS) for the FAA

2.41 On 26 August 2019, the Twenty-third (extraordinary) meeting of the Coordination Committee of Regional Project RLA/03/901 (REDDIG) was held via teleconference to address the FAA request to implement additional nodes in the ground network (MPLS) of REDDIG II, by contracting REDDIG access directly with CenturyLink, at no cost for the participants of Regional Project RLA/03/901.

2.42 With the approval of the States participating in Project RLA/03/901, the SAM Regional Office will coordinate at the administrative and technical level to incorporate the additional nodes of Atlanta and Salt Lake City into REDDIG II. Figure 1 shows the concept of implementation of additional nodes in the REDDIG ground network.

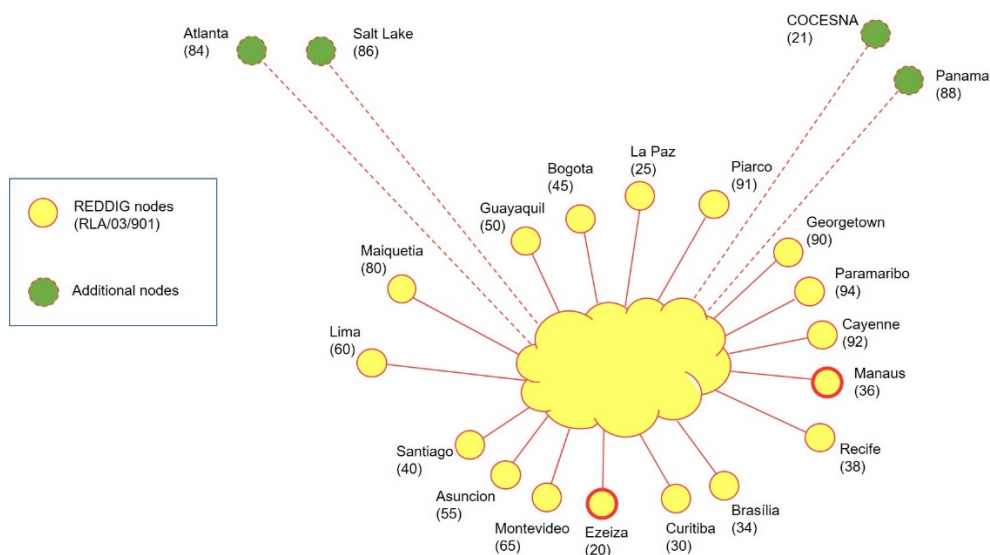


Figure 1 – Additional nodes in the REDDIG II ground network

2.43 Likewise, the proposal for the implementation of additional nodes (MPLS) was submitted to the administration of Panama and COCESNA for their analysis.

REDDIG II ground network (MPLS) bandwidth upgrade

2.44 Following a meeting held at the SAM Regional Office with representatives of CenturyLink, the REDDIG Administrator and the SAM CNS Officer, on the possibility of increasing the bandwidth of ground network nodes from 256 kbps to 1 Mbps, at no additional cost, CenturyLink sent a letter confirming the possibility of the upgrade, as shown in **Appendix C** to this working paper.

2.45 At the RCC/23 (extraordinary) meeting, the States took note of the upgrade, and following their approval, requested the SAM Regional Office to make the necessary arrangements for its implementation.

2.46 In this sense, the TCB has developed Amendment VIII to Contract 22501200, shown in **Appendix D** to this working paper. Once the aforementioned amendment is signed, CenturyLink will proceed with the upgrade in coordination with the REDDIG Administrator.

Acquisition of firewall equipment for REDDIG

2.47 The SAM Regional Office has submitted to the Technical Cooperation Bureau (TCB) the initial specifications for the acquisition of firewall equipment, in accordance with conclusion RCC/22-4 of the Coordination Committee of Regional Project RLA/03/901.

3 Suggested action

3.1 The Meeting is invited to:

- a) take note of the information provided herein;
- b) review the activities and performance of REDDIG II since the SAM/IG/23 meeting, as shown in section 2 and the corresponding appendices to this working paper; and
- c) consider any other action it may deem appropriate.

- End -

APPENDIX A

RLA/03/901 REDDIG

SESSIONS ON REDDIG II OPERATION AND MAINTENANCE

Ezeiza NCC, Argentina, July 2019

1- Introduction

Taking into account the continuous and fast development of telecommunication and network technologies, specifically applied to civil aviation, the technical staff involved in the use of the aforementioned technologies must become acquainted with the concepts that will help consolidate the knowledge gained through experience and daily work in telecommunication systems.

Training sessions are aimed at refreshing and supplementing the fundamental and advanced concepts related to the transmission systems used for the carriage of voice and data in civil aviation through the multiservice platform REDDIG.

The proposed format of the sessions focuses on the operation and maintenance of the REDDIG station of Ezeiza, which has the special feature of being an NCC.

2- Place and duration

The sessions on the Operation and Maintenance of REDDIG II will take place on 15-19 July 2019, at the facilities of the REDDIG NCC of Ezeiza at a location to be defined for theoretical sessions. The event will take place at the same location where the REDDIG node is located.

3- General objective

To get acquainted with the terminology and the general and specific concepts used in REDDIG, with a view to contributing to preventive and corrective maintenance of the REDDIG station of Ezeiza.

4- Specific objectives

To share with the participants (technicians) the basics of station operation using LAN and WAN protocols applied to the transport of voice and data (asynchronous RS232 data interfaces, synchronous serial V35 interface, fxs/fxo, asterix, etc.).

To allow participants to recognise topologies and typical conditions of a REDDIG networking scenario.

To allow participants to recognise station components and the various operational aspects of the station.

To give participants an understanding of the relevance and importance of the station within the regional context.

To allow participants to distinguish REDDIG from other services.

To allow participants to get acquainted with station monitoring tools.

To provide participants with the necessary knowledge to apply the established standards in order to solve compatibility issues among the different manufacturers and unify criteria for the implementation of telecommunication systems.

To become acquainted with TCP, UDP protocols and networking devices.

5- **Requirements**

Technical staff providing services within the field of competence of the REDDIG node of Ezeiza.

6- **Structure of sessions**

In order to achieve the proposed objectives, sessions will be divided into chapters that include the development of theoretical and theoretical-practical contents, logically correlated and based on the equipment installed in the node.

7- **Delivery of sessions**

Sessions will be face-to-face, in daily 90-minute modules, with activities assigned to supplement the theory.

8- **Methodology**

Sessions will be face-to-face, with extracurricular activities, and theoretical sections in classroom and in the REDDIG node, with active participation by the participants in the analysis and resolution of problems in the respective study areas. The knowledge gained will be applied in the laboratory (or appropriate location to that end), where participants will simulate performance conditions and solve the problems set forth.

The methodology includes reading of technical documentation, presentation of different topics and group learning, with discussions of applications and the proposed case studies.

The participants will have at their disposal all the material needed to supplement sessions, on the web. This web site will have the necessary information, in accordance with the corresponding theoretical framework.

Eventually, tools will be used in the same web environment to post the scheduled practical exercises.

9- **Teaching aids**

The contents will be developed with the specific documentary support required in this document.

Classes will be given at the REDDIG station and in a classroom equipped with a board, writing elements, eraser, chairs/desks for students, desk for the teacher, PC, projector and projection screen.

The methodology to be used will depend on available hardware and software resources.

Note: The instructor will provide all the required software. Only local administrator permits will be required in each piece of equipment for installation. The information, software and accessories will be hosted in the server or wherever defined by IT staff that provides support, with access given to participants for their exclusive use.

The aforementioned material is not essential for the sessions. The staff responsible for the location where sessions will take place will assess the aids to be used in each case.

10- **Instructor**

Sessions will be delivered by Eng. Cristian Javier Vittor, REDDIG Administrator.

11- Language used in the sessions

Sessions will be in Spanish.

SESSIONS ON REDDIG II OPERATION AND MANAGEMENT

Contents

1. REDDIG II architecture

- Satellite network
- Backup ground network
- Global IP addressing plan

2. REDDIG II nodes

- Types and components
- Local IP addressing plan

3. RF equipment

- IBUC + Redundancy
- LNB + Redundancy
- Access via HHT and TCP/IP (web)

4. Skywan modem

- Model 7000
- Model 1070
- Redundancy
- Access via ‘Telnet’ and ‘LineUp Manager’
- Performance

5. Ethernet Switch Netgear

6. Cisco router

- Interfaces
- VRRP redundancy protocol
- OSPF routing protocol
- VLANs
- On-line commands
- Interface monitoring
- Setup

7. Baseband switch (RSS) and ‘Patch Panel’

8. NMS – WhatsUp Gold

- NMS central server
- NMS remote server (local)
- Web access

- Modules and displays
- Monitors
 - Active Monitor
 - Performance Monitor
- Alarms

9. Annual preventive maintenance plan

APPENDIX B

RLA/03/901 REDDIG

TRAINING IN TECHNOLOGICAL TOOLS FOR THE ANALYSIS OF VOICE AND DATA APPLICATIONS CARRIED OVER THE REDDIG

16 to 18 October

Santiago, Chile

11- Introduction

Taking into account the continuous and fast development of telecommunication and network technologies, specifically applied to civil aviation, the technical staff involved in the use of the aforementioned technologies must become acquainted with the concepts that will help consolidate the knowledge gained through experience and daily work in telecommunication systems.

Training sessions are aimed at refreshing and supplementing the fundamental and advanced concepts related to the transmission systems used for the carriage of voice and data in civil aviation through the multiservice platform REDDIG.

The proposed format of the sessions focuses on the operation and maintenance of the REDDIG station, and on the ability to analyse and know the different services carried over this network.

12- Place and duration

This training will take place on 16-18 October 2019, at the facilities defined by the National Directorate of Civil Aviation of Chile.

13- General objective

To get acquainted with the terminology, general and specific concepts and tools for analysing voice and data applications carried over REDDIG, in order to contribute to preventive and corrective maintenance of REDDIG.

14- Specific objectives

To give the participant (technician) the basics of the operation of the various services carried over REDDIG (AMHS, AFTN, AIDC, ASTERIX, ADS-B, ADS-c, etc.).

To allow participants to recognise topologies and typical conditions of a networking scenario and service-related applications.

To allow participants to recognise the interfaces used, the topologies, and means of transportation, based on services.

To give participants an understanding of the relevance and importance of the services provided within the regional context.

To allow participants to distinguish REDDIG from other services.

To allow participants to get acquainted with service monitoring tools.

To provide participants with the necessary knowledge to apply the established standards in order to solve compatibility issues among the different manufacturers and unify criteria for the implementation of telecommunication systems.

To become acquainted with networking protocols, tools and devices.

15- Requirements

Technical staff that provides services within the field of competence of the REDDIG node.

16- Structure of training

In order to achieve the proposed objectives, training will be divided into central chapters that include the development of theoretical and theoretical-practical contents, logically correlated and based on the equipment installed in the nodes.

17- Delivery of training

Sessions will be face-to-face, in daily 90-minute modules, with activities assigned to supplement the theory.

18- Methodology

Training will be face-to-face, with extracurricular activities, with theoretical/practical training sections in classroom, with active participation of each student in the analysis and resolution of problems in the respective study areas. The knowledge gained will be applied in the laboratory (or appropriate location to that end), where participants will simulate traffic analysis and performance conditions and solve the problems set forth.

Furthermore, the methodology includes reading of technical documentation, presentation of different topics and group learning, with discussions of the applications and case studies proposed.

The participants will have at their disposal all the material needed to supplement training, through the web. This web site will have the necessary information, in accordance with the corresponding theoretical framework.

Eventually, tools will be used in the same web environment to post the scheduled practical exercises.

19- Teaching aids

The contents will be developed with the specific documentary support required in this document.

Classes will be delivered in a classroom equipped with a board, writing elements, eraser, chairs/desks for students, desk for the teacher, PC, projector and projection screen.

The methodology to be used will depend on available hardware and software resources.

Note: The instructor will provide all the software required. Only local administrator permits will be required in each piece of equipment for installation. The information, software and accessories will be hosted in the server or wherever defined by IT staff providing support, with access given to participants for their exclusive use.

The aforementioned material is not essential for training. The staff responsible for the location where training will take place will assess the aids to be used in each case.

20- Instructor

Training will be provided by Eng. Cristian Javier Vittor, REDDIG Administrator.

11- Language used in the course

The course will be delivered in Spanish, with interpretation into English if needed.

12- Training contents

- a. General concepts on CNS services
- b. Reference documents
- c. AFTN and AMHS concepts
- d. ASTERIX concepts (radar data and ADS)
- e. AIDC concepts
- f. ADS-B, ADS-C and CPDLC concepts
- g. VHF/IP concepts
- h. Analogue telephony and IP concepts
- i. Tools for analysis and their use
- j. Exercises

APPENDIX C



Lima, 2 de agosto del 2019

Para:
Fabio Faizi Rahnemay Rabbani
Regional Director
ICAO South American Office

Estimado Señor

CenturyLink está comprometido en convertirse en un aliado estratégico para nuestros clientes, para ello nos mantenemos siempre atento a las necesidades y requerimientos, como parte de este compromiso el día 04 de marzo del presente realizamos una reunión en la Oficina Regional Sudamericana de OACI con el Sr. Francisco Almeida y conversamos sobre la necesidad actual de realizar una modificación (upgrade) del ancho de banda actual de los enlaces pertenecientes a la REDDIG.

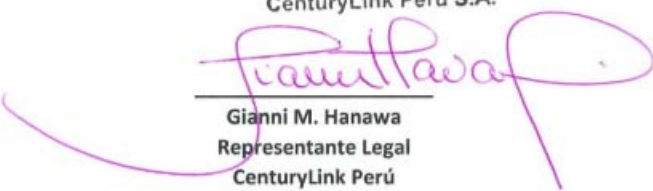
Entendiendo la necesidad de OACI y llegando al entendimiento común que esto contribuiría a mejorar la comunicación y monitoreo de REDDIG, ofrecemos por medio de este documento la propuesta de realizar un UPGRADE del ancho de banda de 256K a 1Mbps en cada uno de los puntos que conforman REDDIG; esto sin involucrar costos adicionales o extensión de contratos para los participantes del Proyecto Regional RLA/03/901.

En tal sentido quedamos a la espera que OACI remita la adenda respectiva al contrato que rige nuestra relación contractual a fin de formalizar nuestro ofrecimiento.

Agradecemos la confianza en nuestros servicios y esperamos este ofrecimiento pueda tener su aprobación para poder iniciar el proceso de upgrade a la brevedad posible.

Atentamente

Gianni Hanawa Makabe
REPRESENTANTE LEGAL
CenturyLink Perú S.A.



Gianni M. Hanawa
Representante Legal
CenturyLink Perú

APPENDIX D



Amendment VIII to Contract 22501200

Contract 22501200 for the provision of a new regional aeronautical telecommunication network (REDDIG II) and associated equipment and services for the REDDIG II Member States (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Trinidad & Tobago, Uruguay and Venezuela) is hereby amended to increase the bandwidth of all nodes of the REDDIG II network from 256 kbps to 1MBps, at no additional cost. Thus, the Contract price remains unchanged.

This Amendment VIII shall form part of ICAO Contract 22501200 between the International Civil Aviation Organization (ICAO) acting on behalf of and as mandatary for the REDDIG II Member States, and the Consortium consisting of INEO Engineering and Systems and CenturyLink Peru S.A. and shall become effective on the date of signature of this document by ICAO, INEO Engineering and Systems and CenturyLink Peru S.A.

All articles of Contract 22501200 not covered in this Amendment VIII or previous Amendments shall remain unchanged and in force.

Article no. 4.1.15 is added to the Contract:

“4.1.15 Starting from the date of Amendment VIII becoming effective, the Contractor shall increase the bandwidth for MPLS services of the Network from 256 kbps to 1 MBps at the following nodes:

	Site	Bandwidth
1	Argentina/Ezeiza	1 MBps
2	Bolivia/La Paz	1 MBps
3	Brazil/Curitiba	1 MBps
4	Brazil/Recife	1 MBps
5	Brazil/Manaus	1 MBps
6	Chile/Santiago	1 MBps
7	Colombia/Bogota	1 MBps
8	Ecuador/Guayaquil	1 MBps
9	French Guiana/Cayenne	1 MBps
10	Guyana/Georgetown	1 MBps
11	Paraguay/Asuncion	1 MBps
12	Peru/Lima	1 MBps
13	Suriname/Paramaribo	1 MBps
14	Trinidad and Tobago/Piarco	1 MBps

Site		Bandwidth
15	Uruguay/Montevideo	1 MBps
16	Venezuela/Maiquetia	1 MBps
17	Brazil/ Brasilia, subject of Amendment III	1 MBps

The Signatures hereunder are those of authorized officers empowered to enter into Contractual obligations.

Signed on _____, on behalf of:
Date

ICAO
Technical Cooperation Bureau

INEO Engineering and Systems

CenturyLink Peru S.A.