*International Civil Aviation Organization*
South American Regional Office
**Nineteenth Meeting/Workshop of the SAM Implementation Group (SAM/IG/19) – RLA/06/901 Regional Project**
(Lima, Peru, 22 to 26 May 2017)

SAM/IG/19-WP/08
15/05/2017

**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 IMPLEMENTATION OF THE AMHS INTERCONNECTION

(Presented by the Secretariat)

**SUMMARY**

This working paper presents information on the activities carried out since SAM/IG/18 to date, regarding the AMHS interconnection implementation.

**REFERENCES:**

- Eighteenth Meeting/Workshop of the SAM Implementation Group (SAM/IG/18) Lima, Peru, 17 to 21, 2016.
- Report on Meeting SAT/21 (Lisbon, Portugal, 6 to 10 June 2017).
- Summary of AMHS teleconferences (25 November (SAM), 2 December (AFI/SAM), 15 December 2016 (SAM), 26 February (SAM), 3 March (SAM), 4 May 2017 (SAM) and 9 May 2017 (AFI/SAM).

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| ***ICAO Strategic Objectives:*** | *A - Safety*<br>*B - Air navigation capacity and efficiency* |

## 1. Introduction

1.1 The implementation fo the first AMHS system SAM Region started in early 2005. (Argentina). At present, all SAM States have an AMHS system installed, except for French Guiana, which continues using AFTN. Locally, Bolivia and Chile have implemented only AFTN circuits. The first regional AMHS interconnection was made on 2010 (Colombia-Peru). To date, operatational interconnections are six. 9 interconnections were operating until February 2017 but three presented problems and need to returned to AFTN.

1.2 To date 8 AMHS interconnections are in pre-operational level, expected entering into operation phase by mid-2017. The ultimate goal is to migrate all the AFTN circuits specified in the table CNS II-1 Plan AFTN (aeronautical fixed telecommunications network), of Volume II of the CAR/SAM Air Navigation Regional Plan (eANP) to AMHS circuits. This is an air navigation implementation activity considered as a priority by all SAM Region States (Bogotá Declaration). Means for the AMHS connection at the regional level is the REDDIG II since it is already established, has enough bandwidth as well as the redundancy of equipment and means of communication (satellite and ground); most of AMHS

systems installed are apparently compatible therefore the implementation of AMHS interconnections should not present problems when implementing AMHS connections.

## 2 Analysis

2.1 Reported progress and actions taken in the AMHS interconnections implementation in each SAM Region States is as follows.

### Argentina

2.2 Regarding AMHS interconnection Ezeiza-Lima, successful operational tests were carried out between Ezeiza and Lima MTAs, presenting problems with Lima AMHS system in AMHS messages transmitted by Argentina containing optional information in the header of the messages. On this respect Argentina informed that not using header could be an option but does not represent an acceptable solution, since for Argentina is a must and it is used for operative proposes; deleting it should suppose a change in Argentina's operating procedures. Further information regarding optional information in headers could be found in section 3.3.3, Chapter 3, Part II of ICAO Doc 9880.

2.3 Successful operational tests were carried out in the AMHS interconnection Ezeiza-Montevideo but a problem arises in the Gateway when transmitting AFTN information. Taking into account the AMHS positive tests between Brazil and Uruguay and that equipment from Brazil and Argentina are from the same manufacturer, Argentina coordinated consultations with Brazil in order to apply similar solutions with AMHS connections for Ezeiza and Motevideo.

2.4 During the teleconference dated 4 May 2017, the AMHS operational interconnection Brazilia-Ezeiza was scheduled and for May 9, the operational tests between Ezeiza and Santiago MTAs will continue.

2.5 With respect to AMHS interregional connections, Argentina informed beginning coordination with Spain for the AMHS circuit implementation. This circuit will be implemented through a communications service provider and will be with MPLS transport mechanisms. Regarding the circuit with Johannesburg migration from AFTN to AMHS, it could begin on 2018 once the modernization of Ezeiza's CAFSAT node is completed. In the meanwhile, Argentina proposed South Africa (teleconference of 9 May 2017) to carry out AMHS test through a VPN channel (see diagram in **Appendix A** to this Working Paper).

### Bolivia

2.6 During the teleconference of 5 May 2017 Bolivia informed that initial tests with Peru will begin on 15 May 2017. Bolivia's technical Focal Points from the tests are Mr. Hernan Tito and Mr. Luis Mamami. Bolivia reported having installed AFTN circuits nationwide.

### Brazil

2.7 Brazil reported having updated the AMHS system of Brasilia with positive operational tests with Colombia, Guyana and Uruguay. Operational phase is foreseen for 10 May 2017. Regarding AMHS connection between Brasilia and Asuncion assumption it is expected that for May 29, 2017 AMHS Asunción Brasilia circuit would enter into operational phase. Return to the connection between Brasilia and Paramaribo AMHS would be once Suriname AMHS system complete is updating.

2.8 Regarding inter-regional AMHS connections, Brazil reported that the operational connection between Brasilia and Madrid through the CAFSAT would be on May 11, 2017. There have been network connection and IP connectivity tests between the MTA of Brasilia and the AMHS Gateway of SITA. Interoperability testing is scheduled for May 10, 2017. Between Brasilia and Dakar coordination continues for the implantation of an AMHS circuit through VSAT AFISET network and in the same way the migration of the AFTN to AMHS Brasilia Atlanta circuit through the MEVA III REDDIG II interconnection.

**Chile**

2.9 Operational tests between Santiago MTA and Lima MTA will continue the week of May 8, 2017. Lima Santiago AMHS circuit is having problems with address SPZOYFYX since 6 March 2017. The Focal Points of Peru was urged to coordinate with the Focal Point of Chile to find a solution. This addressing problem has caused frequent falls of AMHS system in Chile. The status of MTA Ezeiza and MTA Santiago is described in paragraph 2.2 under Argentina's section.

**Colombia**

2.10 Operational tests between Brasilia-Bogota MTAs are currently at number 5 of tests as well as tests between Bogota-Quito. Tests between Bogota-Caracas (Maiquetia) will be made once the AMHS new system if Maiquetia enters into operation by the second semester 2017. Tests between Bogota and Panama through MEVA III REDDIG II interconnection will continue when the routing problem of IP network is solved. Further information regarding AMHS test between Bogota-Panama can be find in paragraph 2.14 in Panama section.

**Ecuador**

2.11 Only progress is reported under Colombia sesction, paragraph 2.9.

**French Guiana**

2.12 France reported the acquisition of an AMHS system from COMSOFT which will be installed in Cayenne and would be operative on 2018, together with the beginning operations of this system in the whole SAM Region. Once the new system is operative, French Guiana will coordinate with Brazil and Venezuela the migration of the current AFTN circuits to AMHS.

**Guyana**

2.13 AFTN and AMHS successful tests have been carried out with messages of SS priority between Brasilia MTA and Georgetown MTAs. Guyana was supported by AMHS service provider (Intelcan), but it was observed that Guyana receives AMHS messages without fields "authorization-time, originator-reference, precedence-policy-identifier and precedence", according to table 3.2, part II of Doc 9880.

**Panama**

2.14 Regarding the AHMS interconnection Bogota-Panama, focal points of Colombia and Panama together with the Administrator or REDDIG II and the MEVA III provider, implemented a circuit through the MEVA III/REDDIG II interconnection which is presented as **Appendix B** of this working paper. Panama reported to have locally implemented the router and the connection to the MEVA III for AMHS connection between Panama and Bogota. IP connectivity tests between MTA Panama and

REDDIG II node of Bogota have been carried out. The complete IP connectivity test will be performed once Colombia resolve their enrooting problem in their local network.

## Paraguay

2.15 Paraguay informed during the teleconference of May 4, that the Aeronautical Administration of Paraguay and the AMHS system provider (Skysoft) are arranging a contract of support, so as to have AMHS operative between Asunción MTA and Brasilia MTA by 29 May, 2017.

### Peru

2.16 Connection with Argentina: Latest tests conducted with SAEZ through P1 circuit were successful. For this purpose the system provider of Argentina made some modifications, expecting what Argentina staff expresses about the status of their system and performs the migration. Argentina reported that this circuit continues with problems (more details on paragraph 2.2 of this working paper).

2.17 Connection with Venezuela: Tests were being made on March 2017 with a provisional system of Venezuela with no positive results. On the teleconference of 4 May 2017, the focal point of Venezuela informed that approximately by August 2017 the new AMHS system would be installed and the tests will continue.

2.18 Connection with Bolivia: It is expected to carry out AMHS tests between Lima and La Paz (El Alto) by 15 May 2017.

### Suriname

2.19 The AMHS system of Suriname is being updated by the provider (INTELCAN). By the end of May 2017, Paramaribo-Brasilia test will resume. AMHS connection tests between Paramaribo and Maiquetia MTAs has been been postpone to the second half of the 2017 as stated by the focal point of Venezuela.

## Uruguay

2.20 For AMHS interconnection Montevideo - Ezeiza see Argentina's section,paragraph 2.3 of this working paper and for the operational implementation of AMHS between Brasilia MTA and Montevideo MTA see Brazil's section, paragraph 2.7.

## Venezuela

2.21 The Focal Point of Venezuela informed that the temporal AFTN system (COMSOFT) has been operating normally and the AMHS operational connection with Brasilia, Bogota, Georgetown, Quito, Lima and Paramaribo is expected by the end of the second semester of 2017 once the new AMHS system (CONSOFT) begins. AMHS tests (provisional Gateway) have been carried out with Bogota, Lima and Quito.

### General considerations of AMHS interconnection

2.22 As **Appendix C** to this working paper the AMHS interconnection requirements are presented including dates and status of implementation. **Appendix D** presents the updated list of focal points.

3. **Suggested action:**

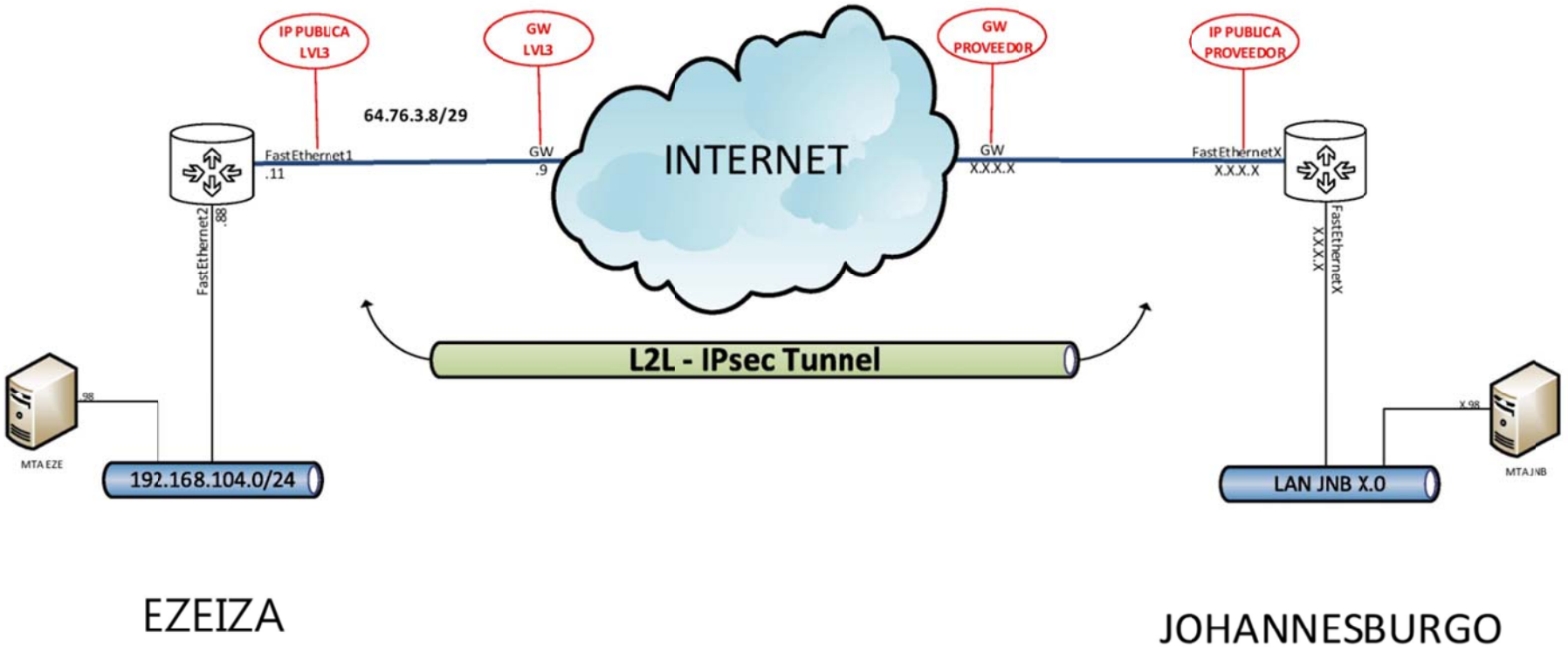
The Meeting is invited to:

a) Take note on the information presented;

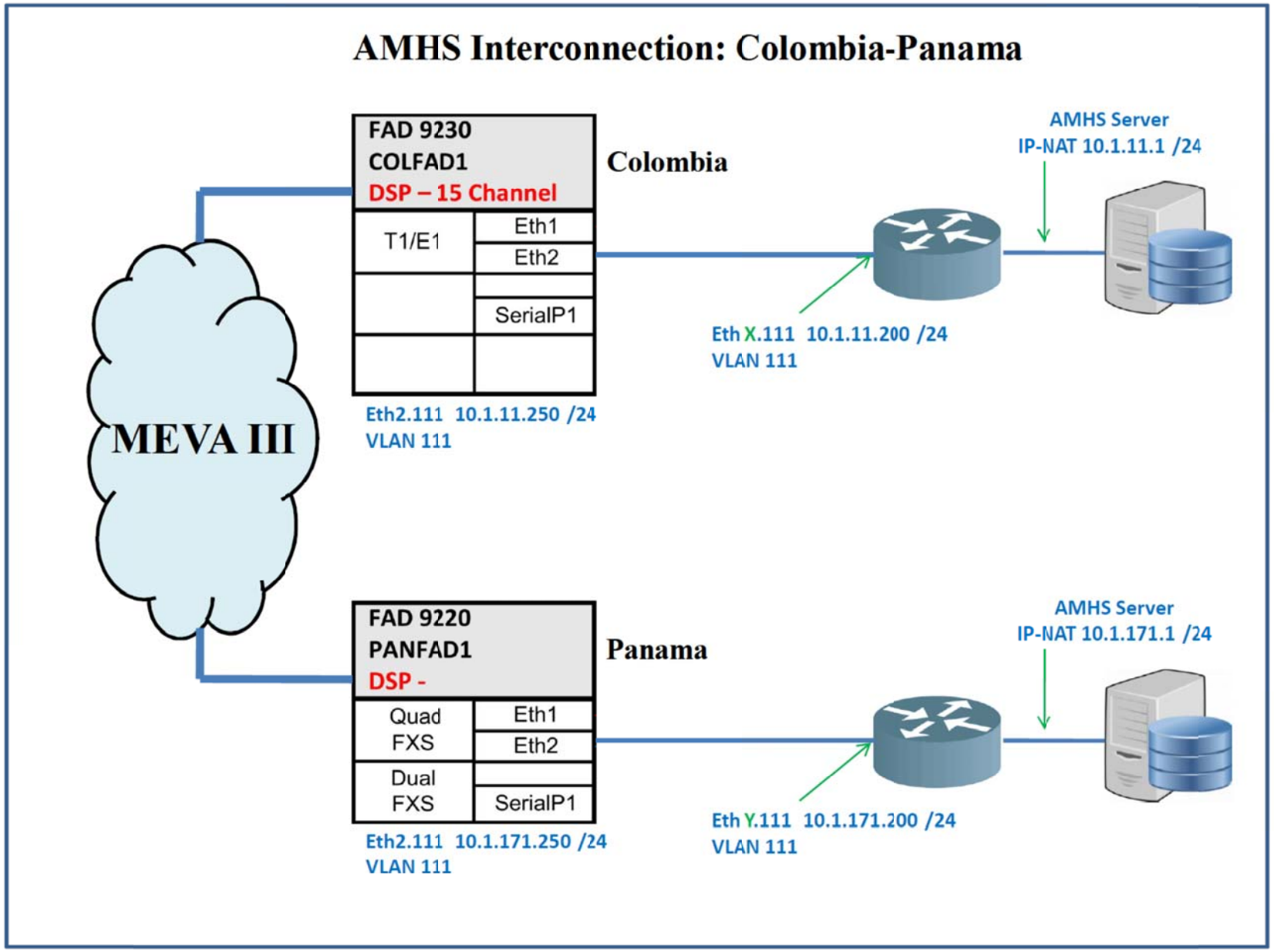
b) analyze activites carried out and foreseen described in section 2 and Appendixes A, B and C; and

c) update information presented in Section 2 and Appendixes C and D.

**APPENDIX A**


IP PUBLICA LVL3
GW LVL3
64.76.3.8/29
GW PROVEEDOR
IP PUBLICA PROVEEDOR
INTERNET
FastEthernet1
.11
GW
.9
GW
X.X.X.X
FastEthernetX
X.X.X.X
FastEthernet2
.88
FastEthernetX
X.X.X.X
L2L - IPsec Tunnel
MTA EZE
.98
192.168.104.0/24
LAN JNB X.0
X.98
MTA JNB
EZEIZA
JOHANNESBURGO

**APPENDIX B**


AMHS Interconnection: Colombia-Panama
FAD 9230
COLFAD1
DSP – 15 Channel
Colombia
T1/E1
Eth1
Eth2
SerialP1
Eth2.111 10.1.11.250 /24
VLAN 111
AMHS Server
IP-NAT 10.1.11.1 /24
Eth X.111 10.1.11.200 /24
VLAN 111
MEVA III
FAD 9220
PANFAD1
DSP -
Panama
Quad FXS
Dual FXS
Eth1
Eth2
SerialP1
Eth2.111 10.1.171.250 /24
VLAN 111
AMHS Server
IP-NAT 10.1.171.1 /24
Eth Y.111 10.1.171.200 /24
VLAN 111

## APPENDIX C

## AMHS INTERCONNECTION REQUIREMENT AND DATE OF IMPLEMENTATION

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| Argentina | Bolivia | Jun 2018 | Pending initial coordination |
| | Brazil | May 2017 | Pending operational implementation. Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Beginning of operational implementation foreseen 17 May 2017. |
| | Chile | Jun 2017 | Operational implementation foreseen by mid-2017. |
| | Paraguay | Mar 2012 | Implemented and operational |
| | Peru | Jun 2017 | Positive P1 connectivity between MTA Ezeiza y MTA Lima (March 2016). Pending operational tests foreseen by mid-2017. |
| | Uruguay | Jun 2017 | Connectivity in Protocol P1 level between MTA Ezeiza – Montevideo, operational tests May 2017. |
| | Venezuela | Sep 2017 | Implemented and operational (out of service- failure in AMHS Venezuela) since Dec 2016. Operational implementation when new AMHS system starts operations in August 2017. |
| Bolivia | Argentina | Jun 2018 | Pending initial coordination |
| | Brazil | Dec 2017 | Pending initial coordination |
| | Peru | Dec 2017 | Initial coordination made. |
| Brazil | Argentina | May 2017 | Pending operational implementation. Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Operational implementation for mid-2017. |
| | Bolivia | Dec 2016 | Pending initial coordination |
| | Colombia | Jul 2017 | Connectivity in Protocol P1 level between Brasilia and Bogota achieved (October 2016). Operational test will continue on May 2017. |
| | Guyana | Jul 2017 | Begun operations in Protocol P1 level on 16 December 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. AMHS tests resume on May 2017. |
| | French Guiana | Jul 2018 | An AMHS system is schedule to begin operations in 2018. |

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| | Paraguay | Jul 2017 | Tests of P1 interconnectivity started mid July 2016 MTA. Pending operational tests by May 2017. |
| | Peru | Dec 2015 | Implemented and operational 14 December 2015 |
| | Suriname | Jul 2017 | Entered into operation on 15 Dec 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. INTELCAN is updating the AMHS software and operational test will resume in Jul 2017. |
| | Uruguay | Jun 2017 | IP connectivity completed. (First week October 2016). IP Protocol tests successfully concluded the week of 28 Nov 2016 (30 Nov and 1 Dec). It is expected to begin operations before the end of first semester 2017. |
| | Venezuela | Sep 2017 | Connectivity in Protocol P1 level between Brasilia and Caracas achieved (October 2016). Pending operational tests on Aug 2017 when Venezuela has implemented its new AMHS system. |
| | Spain | May 2017 | Pending operational implementation. Operational tests successfully completed, Connection made through CAFSAT. Operations foreseen May 2017. |
| | United States | Dec 2017 | Technical coordination began May-Sep 2016. IP configuration under assessment by FAA. |
| Chile | Argentina | Jun 2017 | Implementation foreseen by mid-2017. |
| | Peru | Dec 2016 | Positive test made on early October 2016. |
| Colombia | Brazil | Jul 2017 | Connectivity in Protocol P1 level between Brasilia and Bogota achieved (October 2016). Resume operational tests on May 2017. |
| | Ecuador | Jul 2017 | IP connectivity tests successfully made. Pending resume of operational tests |
| | Panama | Dec 2017 | Circuital interconnection has been configured through MEVA III/REDDIG II (mid-February 2017). Initial tests May 2017. |
| | Peru | Sep 2010 | Implemented and operational |
| | Venezuela | Sep 2017 | Pending operational tests August 2017 when Venezuela implemented its new AMHS system. |

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| Ecuador | Colombia | Jul 2017 | IP connectivity tests successfully made. Pending resume of operational tests. |
| | Peru | Jul 2012 | Implemented and operational |
| | Venezuela | Sep 2017 | Pending operational tests in 2017 when Venezuela has implemented its new AMHS system. |
| French Guiana (France) | Brazil | Jul 2018 | New AMHS system for early 2018 |
| | Venezuela | Jul 2018 | New AMHS system for early 2018 |
| Guyana | Brazil | Jul 2017 | Began operations on 15 Dec 2017 at 17:00 UTC. At mid-February 2017 returned to AFTN configuration. AMHS tests will resume on May 2017. |
| | Suriname | Jun 2011 | Implemented and operational |
| | Venezuela | Sep 2017 | Pending operational tests in 2017 when Venezuela has implemented its new AMHS system. |
| Panama | Colombia | Dec 2017 | Circuital interconnection has been configured through MEVA III/REDDIG II (mid-February 2017). Initial tests May 2017. |
| Paraguay | Argentina | Mar 2012 | Implemented and operational |
| | Brazil | Jul 2017 | IP interconnectivity tests began mid July 2016. Pending of operational tests on May 2017. |
| Peru | Argentina | Jun 2017 | Positive P1 connectivity between MTA Ezeiza y MTA Lima (March 2016). Operational phase foreseen by mid-2017. |
| | Bolivia | Dec 2017 | Initial coordination made |
| | Brazil | Dec 2015 | Implemented 14 December 2015 |
| | Chile | Dec 2016 | Entered into operations the second half of Dec 2016. |
| | Colombia | Sep 2010 | Implemented |
| | Ecuador | Jul 2012 | Implemented |
| | Venezuela | Sep 2017 | Pending operational tests when Venezuela has implemented its new AMHS system |
| Suriname | Brazil | Jul 2017 | Began operations on 15 Dec 2017 at 17:00 UTC. At mid-February 2017 returned to AFTN configuration. INTELCAN is updating AMHS software and operational tests will resume on Jul 2017 |
| | Guyana | Jun 2011 | Implemented and operational |

| STATES | AMHS INTERCONNECTION REQUIREMENTS | DATE OF IMPLEMENTATION | COMMENTS |
|---|---|---|---|
| | Venezuela | Dec 2016 | Pending operational tests when Venezuela has implemented its new AMHS system. |
| Uruguay | Argentina | Jun 2017 | Positive P1 connectivity between Ezeiza and Montevideo achieved. Operational tests in May 2017. |
| | Brazil | Jun 2017 | IP connectivity tests completed (first week October 2016) Protocol P1 successfully concluded the week of 28 November 2016 (30 November and 1 December). It is expected to begin operations before the end of the first semester 2017. |
| Venezuela | Argentina | Jun 2016 | Implemented and operational (out of service- failure in AMHS Venezuela) Pending operational tests when new AMHS system starts operations on August 2017. |
| | Brazil | Sep 2017 | Pending operational tests when new AMHS system starts operations. |
| | Colombia | Apr 2017 | Pending operational tests when new AMHS system starts operations on August 2017. |
| | Ecuador | Dec 2016 | Pending operational tests when new AMHS system starts operations on August 2017. |
| | Guyana | Sep 2017 | New AMHS system will be installed in French Guiana at early 2018. |
| | French Guiana | Jul 2018 | AMHS pending implementation |
| | Peru | Sep 2017 | Pending operational tests when new AMHS system starts operations on August 2017. |
| | Suriname | Sep 2017 | Pending operational tests when new AMHS system starts operations on August 2017. |

Green highlighted AMHS interconnection operative

**APPENDIX D**

**NATIONAL FOCAL POINTS/PUNTOS FOCALES NACIONALES**
**IMPLEMENTATION OF INTERCONNECTION OF AMHS SYSTEM /IMPLANTACIÓN INTERCONEXIÓN DE SISTEMAS AMHS**

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