International Civil Aviation Organization SAM/IG/20-WP/07
South American Regional Office 10/10/17
Twentieth Workshop/Meeting of the SAM Implementation Group (SAM/IG/20) - Regional Project RLA/06/901
(Lima, Peru, 16 to 20 October 2017)

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

FOLLOW-UP TO THE IMPLEMENTATION OF AMHS INTERCONNECTIONS

(Presented by the Secretariat)

SUMMARY

This working paper presents information on the activities carried out since the SAM/IG/19 meeting for the implementation of AMHS interconnections.

REFERENCES

- Nineteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/19) Lima, Peru, 22-26 May 2017.
- Final report of the Eleventh Coordination Meeting of Project RLA/06/901 (Lima, Peru, 5 October 2017).
  Summary of teleconferences to follow up the implementation of AMHS interconnections (27 June, 31 August, and 9 October 2017).

ICAO strategic objectives:	*A – Safety* *B – Air navigation capacity and efficiency*

1 Introduction

1.1 The implementation of AMHS interconnections is one of the air navigation implementation priorities set forth in the Declaration of Bogota, which contemplated the implementation of 26 interconnections for the period 2014-2016. All of the AMHS interconnections required for the SAM Region are listed in Table CNS II-1, Volume II, of the CAR/SAM Regional Air Navigation Plan (Doc 8733 eANP).

2 Discussion

2.1 The progress and action taken for the implementation of AMHS interconnections in each SAM State are presented below.

Argentina

2.2 Regarding the **Ezeiza-Lima AMHS** interconnection, the Lima AMHS system still has problems for processing AMHS messages sent by Argentina that contain optional information in the message header (section 3.3.3 Text, Chapter 3, Part II of ICAO Doc 9880). Argentina reported (teleconference held on 9 October 2017) that this problem had not arisen during AMHS interconnection

tests conducted with Chile, Brazil and Uruguay. In this regard, it was recommended at the teleconference held on 9 October that Argentina conduct the same tests with Venezuela or Colombia, which have installed AMHS systems from the same manufacturer as Peru. Tests with Venezuela are to be conducted in November 2017.

2.3 The **Ezeiza-Montevideo** AMHS interconnection still has problems with the transmission of AFTN messages from Argentina to Uruguay. Argentina received information from Brazil regarding the setting of the Brasilia MTA for the interconnection with Uruguay. Despite this information and the recommended settings, the failure persists. Accordingly, Argentina made arrangements with Skysoft, the manufacturer of the AMHS equipment of Argentina, for the adoption of the required measures to solve the problem.

2.4 In early September 2017, pre-operational tests were conducted between the Ezeiza MTA and the Brasilia MTA, with positive results. In order to migrate to the operational phase, Argentina would need to load the global AMHS address directory in the Ezeiza AMHS system. In order for Argentina to load the global AMHS address directory in its AMHS system, it must request the global AMHS address directory from the EUROCONTROL ATS Messaging Management Centre (AMC), and must nominate an external AMHS operator for the AMC.

2.5 Operational tests were conducted between the Ezeiza MTA and the Santiago MTA, with positive results, and migration to the operational phase is scheduled for the first week of November 2017.

2.6 Regarding interregional AMHS connections, Argentina informed about the conduction of positive IP interconnectivity tests between the Ezeiza MTA and the Madrid MTA. This circuit is not contemplated in the CAR/SAM Regional Air Navigation Plan (Doc 8733). For the conduction of these tests, Argentina and Spain implemented an MPLS circuit through local communication providers. Regarding migration from AFTN to AMHS in the circuit with Johannesburg, it could start in 2018, once the modernisation of the Ezeiza CAFSAT node has been completed.

Bolivia

2.7 Positive IP interconnectivity tests were conducted in September between the La Paz MTA and the Lima MTA. Operational tests are scheduled throughout October 2017.

Brazil

2.8 In early July 2017, the AMHS circuit between Brasilia and Georgetown, Guyana, came on line again.

2.9 All tests required for checking the functionality of the AMHS interconnection (Guidance for AMHS interconnection in the SAM Region based on the EUROCONTROL AMHS Manual https://www.icao.int/SAM/eDocuments/AMHS%20Guia.pdf) between the Brasilia MTA and the Montevideo MTA were conducted successfully. The only thing pending for operational start-up is that Uruguay changes the AMHS test addresses with operational addresses. Activities for changing the addresses are scheduled for the first week of September. This circuit is expected to come on line in October or November 2017.

2.10 The AMHS interconnection between the Brasilia MTA and the Madrid MTA has already been implemented, waiting for Spain to indicate the operational start-up date. It is expected that the operational start-up date will be when the AMHS connection between the Brasilia MTA and the SITA AMHS gateway in Atlanta comes on line, which is scheduled for October-December 2017**.**

2.11 Regarding the remaining AMHS interconnections of Brazil: the AMHS interconnection between Brasilia and La Paz would take place upon completion of the AMHS interconnection between La Paz and Lima, which could take place on the first quarter of 2018. Regarding the implementation of the AMHS interconnection between the Brasilia MTA and the Asunción MTA, tests are to start once the manufacturer of the AMHS system of Paraguay updates the Montevideo AMHS. Tests with Suriname would take place once INTELCAN updates the AMHS system of Suriname; a probable date has not been provided.

2.12 Regarding AMHS interconnection tests between Brasilia and Atlanta through the MEVA III/REDDIG II interconnection and between Brasilia and Dakar through the AFISNET network, no progress has been made.

Chile

2.13 The Lima-Santiago AMHS circuit is currently operational, with no problems. The status of the interconnection between the Santiago MTA and the Ezeiza MTA is described in paragraph 2.5 under the section of Argentina.

Colombia

2.14 Operational AMHS interconnection tests were conducted successfully between the Bogota MTA and the Panama MTA through the MEVAIII/REDDIG II interconnection. During the tests, Panama informed about a change in parameter O (Organization name) of its CAAS addressing. In the SAM regional AMHS addressing table, parameter O was recorded as MPTO, and was changed to MPZL. Panama requested the EUROCONTROL AMC to change MPTO to MPZL, to be updated in the AMC on the AIRAC date of 12 October 2017. In view of the positive results of the tests, coordination with the MEVA III communication provider would start for the implementation of the AMHS circuit between Bogota and Panama. The circuit on which tests were conducted was temporarily supplied by the MEVA III communication provider.

Ecuador

2.15 No progress was reported in the implementation of the AMHS interconnection between the Quito MTA and the Bogota MTA.

French Guiana

2.16 A new AMHS system (COMSOFT) would start operating in **January 2018** but AMHS tests with the corresponding SAM States would be conducted in **October or November 2018.** Prior to the implementation of AMHS interconnections, security equipment needs to be installed to prevent possible cyber attacks**.**

Guyana

2.17 Regarding the status of implementation of the AMHS interconnection between the Georgetown MTA and the Brasilia MTA, see paragraph 2.8.

Panama

2.18 Regarding the status of implementation of the AMHS interconnection between the Panama MTA and the Bogota MTA, see paragraph 2.14.

Paraguay

2.19 No progress was reported in AMHS interconnection tests with Brazil; see paragraph 2.11.

Peru

2.20 Positive IP connectivity tests were conducted between the Lima MTA and the La Paz MTA. Operational tests between the Lima MTA and the La Paz MTA were scheduled for the week of 25 September 2017 (for more information, see paragraph 2.7). Regarding the status of implementation of the interconnection between the Lima MTA and the Ezeiza MTA, see paragraph 2.2.

Suriname

2.21 The updating of the AMHS system of Suriname has not started yet, waiting for the aeronautical authority of Suriname to approve the process. Once this process has been completed (no date was provided), AMHS interconnection tests between the Paramaribo MTA and Brasilia will be resumed.

Uruguay

2.22 Regarding the status of implementation of the AMHS interconnection between the Montevideo MTA and the Brasilia MTA, see paragraph 2.9, and between the Montevideo MTA and the Ezeiza MTA, see paragraph 2.3.

Venezuela

2.23 The new AMHS system started operating on 20 September 2017 and the corresponding aeronautical information circular (C03/A03) was published on 14 September 2017 (see **Appendix A** to this working paper). AMHS interconnection tests were started with Colombia, which are to be completed in October 2017. Likewise, AMHS interconnection tests with Trinidad and Tobago are foreseen for October, and in November with the other States with whom Venezuela has AMHS interconnection requirements.

Other AMHS considerations

2.24 The Declaration of Bogota contemplated the implementation of 26 AMHS interconnections by the end of 2016. To date, 14 AMHS interconnections have been implemented, 10 of which are in the operational phase and the remaining in the pre-operational phase, waiting for the States to migrate to the operational phase. Accordingly, the level of implementation is 58%.

2.25 The status of implementation of all AMHS interconnections in the SAM Region and the estimated date of operational implementation are shown in **Appendix B** to this working paper. Likewise, it is estimated that all AMHS interconnections listed in Table CNS II-1 of Volume II of the CAR/SAM Regional Air Navigation Plan (Doc 8733) will be completed by June 2019. **Appendix C** contains the updated list of focal points for the implementation of AMHS interconnections.

2.26 The Meeting is reminded that any changes made by a State to AMHS addressing must be communicated to the EUROCONTROL ATS messaging management centre (AMC) in accordance with the procedure established in ICAO State letter AN 7/49.1-09/34 of 14 April 2009. According to this procedure, an external operator nominated by the State must send such communication to the AMC.

2.27 Not all the States of the Region have nominated or updated their candidates for the AMC. Registration can be done at the following website: http://www.eurocontrol.int/amc. In this regard, the SAM/IG meeting formulated Conclusion SAM/18/02 Nomination and registration of candidates of the SAM Region at the EUROCONTROL AMC.

2.28 The Eleventh Coordination Meeting of Project RLA/06/901 approved the delivery of the advanced AMHS course requested at the SAM/IG/19 meeting. The content of the advanced AMHS course is shown in **Appendix D** to this working paper.

3. Suggested action

3.1 The Meeting is invited to**:**

a) take note of the information presented herein; and

b) review the activities performed and foreseen, as described in section 2 and the respective appendices.

APPENDIX A

AERONAUTICAL INFORMATION CIRCULAR

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AIC

C03/A03

14 SEP 2017

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Implementación del Sistema de Tratamiento de Mensajes Aeronáuticos de Venezuela (VE-AMHS)

El Área de Trabajo de Telecomunicaciones Aeronáuticas como parte de los Servicios a la Navegación Aérea del Instituto Nacional de Aeronáutica Civil, informa a la comunidad aeronáutica, la puesta en marcha del Sistema de Tratamiento de Mensajes Aeronáuticos (VE-AMHS), conforme a las recomendaciones dispuestas por la Organización de Aviación Civil Internacional (OACI) en las mejoras por Bloques de los Servicios a la Navegación Aérea, contempladas en el Plan Mundial de Navegación Aérea, en los SARP's del Anexo 10 y el Doc. 9880.

El sistema de tratamiento de mensajes aeronáuticos de Venezuela (VE-AMHS) es una herramienta tecnológica de gran importancia para la aeronáutica internacional, pues sirve de puerta de enlace para Norteamérica, Centroamérica, el Caribe y Europa.

El nuevo sistema AMHS extendido de Venezuela (VE-AMHS), posee redundancia en todos sus componentes, proporcionando funcionalidades como:

- Nivel de integración que permitirá operar AFTN y AMHS en una misma terminal usando una única HMI para supervisión, control y operación.

Implementation of the Venezuelan Aeronautical Message Processing System (VE-AMHS)

The Aeronautical Telecommunications Working Area, as part of the Air Navigation Services of the National Civil Aeronautics Institute, informs the aeronautical community of the implementation of the Aeronautical Message Processing System (VE-AMHS), in accordance with the recommendations established by the International Civil Aviation Organization (ICAO) in the Improvements by Air Navigation Services Blocks, contemplated in the World Air Navigation Plan, the SARPs of Annex 10 and Doc 9880.

Venezuela's aeronautical message processing system (VE-AMHS) is a technological tool of great importance for international aeronautics, serving as a gateway to North America, Central America, the Caribbean and Europe.

The new extended AMHS system of Venezuela (VE-AMHS), has redundancy in all its components, providing functionalities as:

- Level of integration that will allow AFTN and AMHS to operate in the same terminal using a single HMI for supervision, control and operation.
- System is able to keep pace with all future technological advances.

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- Avanzado sistema de monitorización de red flexible y adecuada para todo tipo de control y monitoreo de tareas.
- Puede contener más de 250.000 mensajes pendientes (AFTN/AMHS) en colas de transmisión.
- Soporte técnico rápido y fiable a través de acceso remoto al sistema.
- Interconexión de más de 200 CADAS Terminales Centrales-UA en diversas ciudades del país.
- La extensibilidad y portabilidad del software de aplicación hacen que el sistema sea capaz de mantener el ritmo de todos los avances tecnológicos futuros.
- Interoperabilidad probada y conformidad estándar con AFTN/CIDIN y AMHS.
- Servidor de Directorio.

Arquitectura del Sistema VE-AMHS:

Servidor AIDA-NG: “Aeronautical Integrated Data Agent – Next Generation/ Agente de Datos Integrados Aeronáuticos - Siguiente Generación”.

El sistema de tratamiento de mensajes aeronáuticos VE-AMHS consiste en una aplicación que proporciona manejo de mensajes totalmente integrados y uniformes, tales como colas de mensajes y rastreo para todas las redes conectadas. Posee las siguientes características:

- Advanced network monitoring system flexible and suitable for all types of monitoring and monitoring tasks.
- Can contain more than 250,000 pending messages (AFTN / AMHS) on transmission queues.
- Fast and reliable technical support through remote access to the system.
- Interconnection of more than 200 CADAS Central Terminals-UA in various cities of the country.
- The extensibility and portability of the application software make the system system able to keep pace with all future technological advances.
- Proven interoperability and standard compliance with AFTN / CIDIN and AMHS.
- Directory Server.

VE-AMHS System Architecture:

AIDA-NG Server: "Aeronautical Integrated Data Agent - Next Generation".

The VE-AMHS aeronautical message processing system consists of an application that provides fully integrated and uniform message handling, such as message queuing and tracking for all connected networks. It has the following characteristics:

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- Servidor basado en el paquete de software de núcleo ECG extendido de COMSOFT, diseñado para operar el conmutador AFTN, puerta de enlace AFTN/AMHS y servidor de mensajes ATS en Shell de mensajería común y armonizado con una gestión de sistema unificada.

- Excelente rendimiento y capacidad, de conformidad con el Doc. 9880 de la OACI.
- Soporta el concepto de redundancia.
- Sistema Operativo LINUX.
- Permite operar AFTN y AMHS como una aplicación en la misma plataforma utilizando los mismos recursos y servicios del sistema.
- Maneja un número de usuarios casi ilimitado.
- Base de datos accesible en línea para tráfico AFTN/AMHS entrante/saliente, eventos del sistema, estadísticas e información de rastreo del sistema.

El AIDA-NG se encuentra estructurado por tres (3) subsistemas:

- **AIDA-NG CSS (Core Sub-System - Subsistema del Núcleo):** Es el conmutador de mensajes y el componente de puerta de enlace, forman la unidad central de gestión de mensajes

- Server based on the COMSOFT extended ECG core software package, designed to operate the AFTN switch, AFTN / AMHS gateway and ATS messaging server in the common messaging Shell and harmonized with unified system management.

- Excellent performance and capability, in accordance with ICAO Doc 9880.
- Supports the concept of redundancy.
- LINUX Operating System.
- It allows to operate AFTN and AMHS as an application in the same platform using the same resources and services of the system.
- Handles almost unlimited number of users.
- Accessible on-line database for incoming / outgoing AFTN / AMHS traffic, system events, statistics and system trace information.

The AIDA-NG is structured by three (3) subsystems:

- **AIDA-NG CSS (Core Sub-System):** It is the message switch and the gateway component, form the central management unit

(Recepción, encaminamiento y transmisión de mensajes), responsables por la comunicación y el control general del sistema. Los dos (2) CSS´s están activos, uno operativo y otro en modo hot standby e intercambiando constantemente datos entre uno y otro, para que los dos tengan siempre la misma información y en caso de falla del CSS operativo, la unidad de conmutación automática de línea (ALSU) con el Controlador Central de Monitoreo emiten una orden de conmutación y el CSS en hot standby asume el control.

(Receiving, routing and transmission of messages), responsible for communication and general control of the system. The two CSSs are active, one operational and the other in hot standby mode and constantly exchanging data between one and the other, so that the two always have the same information and in case of operational CSS failure, the switching unit automatic line (ALSU) with the Central Monitoring Controller emit a switching command and the hot standby CSS takes over.

- **AIDA-NG RSS (Recording Sub-System – Subsistema de Grabación):** Es el componente de la base de datos, forman la base de datos redundante del sistema almacenan mensajes de tráfico, eventos técnicos, datos estadísticos y cualquier tipo de información no volátil del sistema, como parámetros del sistema, plantillas de mensaje y ajustes de usuario en diferentes bases de datos. Ambos RSS´s funcionan paralelamente y almacenan los mismos datos en el mismo momento, es decir, no existe ningún modo "hot standby" como en el caso de los CSS´s.

- **AIDA-NG RSS (Recording Sub-System):** It is the component of the database, form the redundant database of the system stored traffic messages, technical events, statistical data and any kind of non-volatile information of the system parameters such as system parameters, message templates and user settings in different databases. Both RSSs work in parallel and store the same data at the same time, ie there is no hot standby mode as in the case of CSS.

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- **AIDA-NG OSS (Operator Sub-System - Subsistema del Operador):** es el subsistema para las posiciones de trabajo, permite al operador manejar, controlar y supervisar el sistema. Todos los OSS´s se configuran idénticamente y tienen el mismo software instalado. Aún, cuando todos ofrecen las mismas funciones y características el acceso puede ser restringido por el administrador del sistema, que puede configurar perfiles de usuario en conformidad con las diferentes tareas del operador.

- **AIDA-NG OSS (Operator Sub-System):** it is the subsystem for working positions; it allows the operator to manage, control and monitor the system. All OSSs are configured identically and have the same software installed. Still, when all offer the same functions and features the access can be restricted by the system administrator, who can configure user profiles in accordance with the different tasks of the operator.

Servidor CADAS ATS: "COMSOFT Aeronautical Data Access System – Sistema de Acceso de Datos Aeronáuticos COMSOFT".

Es un sistema cliente/servidor que proporciona servicios completos a los usuarios finales ATS, compatible con la operación de terminales cliente AFTN y terminales cliente AMHS en paralelo, lo que permite una transición sin problemas de AFTN a AMHS y posibilidades máximas de actualización que permite seguir el ritmo de los avances tecnológicos.

ATS CADAS server: "COMSOFT Aeronautical Data Access System - COMSOFT Aeronautical Data Access System".

It is a client / server system that provides complete services to ATS end users, compatible with the operation of AFTN client terminals and parallel AMHS client terminals, allowing a seamless transition from AFTN to AMHS and maximum update possibilities that allow the pace of technological advances.

CADAS Terminales Centrales -UA:

Estaciones cliente que operan bajo el sistema operativo Linux y se conectan al servidor CADAS del sistema central, implementando la red de datos de la entidad.

CADAS Central Terminals -UA:

Client stations that operate under the Linux operating system and connect to the central system's CADAS server, implementing the entity's data network.

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La aplicación CADAS cliente o Agente Usuario administra el tráfico local correspondiente a la transmisión y recepción de mensajes ATS, interpreta los mensajes entrantes y saliente y almacena la información.
Este terminal monitorea los buzones y es responsable del tráfico configurado.

Servidor CADIR/CNMS:
CADIR: "COMSOFT ATN Directory - Directorio ATN COMSOFT".
Servicio de directorio redundante con libreta de direcciones central X.500 cuya característica principal es la flexibilidad para la integración con un servicio de directorio global; así como con las aplicaciones locales. Solución probada para el Directorio ATN de la OACI y el Servicio de Directorio Europeo (EDS). Permite agregar hasta 10.000 entradas, posee funciones de monitoreo. Cumple con las normas internacionales, regionales y específicas del dominio, incluidas las normas UIT-T y la serie ISO/IEC X.500, normas de Internet, OACI Doc.9880 y el Manual EUR AMHS (Documento EURO 020 de la OACI)

The CADAS client or User Agent application manages the local traffic corresponding to the transmission and reception of ATS messages, interprets the incoming and outgoing messages, and stores the information.This terminal monitors the mailboxes and is responsible for configured traffic.

CADIR / CNMS server:
CADIR: "COMSOFT ATN Directory - Directory ATN COMSOFT".
Redundant directory service with X.500 central address book whose main feature is flexibility for integration with a global directory service; as well as local applications. Proven solution for the ICAO ATN Directory and the European Directory Service (EDS). Allows to add up to 10,000 entries, has monitoring functions. It complies with international, regional and domain-specific standards, including ITU-T and ISO / IEC X.500 series, Internet standards, ICAO Doc.9880 and the EUR AMHS Handbook (ICAO Document EURO 020)

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CNMS: "**COMSOFT Network Management System** - **Sistema de Gestión de Redes COMSOFT".**

Servidor que proporciona un potente medio para monitorear y controlar todos los componentes del sistema (AIDA-NG, CADAS, servidores de directorio, componentes de red, etc). Se basa en el protocolo SNMP (Simple Network Management Protocol). El núcleo de CNMS se basa en el paquete de software Nagios, el estándar de facto de código abierto para el monitoreo de redes. Está probado como una solución de monitorización de servicios de red (SMTP, POP3, HTTP, SNMP...) en muchas grandes empresas. CNMS es capaz de ejecutar manejadores de eventos, donde éstos pueden ser configurados para alertar al administrador vía alarma acústica y visual, así como por correo electrónico.

Entre las tareas que pueden realizarse, se encuentran:

- Supervisar estado de la red IP como el estado de las aplicaciones de software y hardware de forma totalmente integrada, mediante una interfaz de usuario para las tareas de supervisión pertinentes.
- Navegar fácilmente desde una vista general del sistema de nivel superior a una vista detallada del componente.
- Supervisar:
  - Estado de las interfaces serie y conexiones de red.

CNMS: "COMSOFT Network Management System - COMSOFT Network Management System".

Server that provides a powerful means to monitor and control all system components (AIDA-NG, CADAS, directory servers, network components, etc.). It is based on the Simple Network Management Protocol (SNMP). The core of CNMS is based on the Nagios software package, the de facto open-source standard for network monitoring. It is proven as a network services monitoring solution (SMTP, POP3, HTTP, SNMP ...) in many large companies. CNMS is able to execute event handlers, where these can be configured to alert the administrator via acoustic and visual alarm, as well as by e-mail.

Among the tasks that can be performed are:

- Monitor the status of the IP network as the state of the software and hardware applications in a fully integrated way, through a user interface for the relevant monitoring tasks.
- Easily navigate from a top-level system overview to a detailed view of the component.
- Supervise:
  - or Status of serial interfaces and network connections.

- Estado de los canales (AFTN, AMHS).
- Estado de los terminales AFTN/AMHS (conectados, desconectados, etc.).

CCMS: "COMSOFT Configuration Management Suite – Suite de Configuración y Administración COMSOFT".

Permite crear, configurar, implementar y mantener el entorno en el que todas las aplicaciones están operando.

Entre otras bondades, el CCMS proporciona funciones para:

- Gestión centralizada de versiones de software para las distintas aplicaciones.
- Asignación de aplicaciones de software a las plataformas del hardware.
- Configurar un subsistema para reiniciar automáticamente al detectar un error.
- Distribución de datos de configuración y versiones de software a sitios y sistemas remotos.
- Definir los procedimientos de instalación de la plataforma para reinstalar rápida y convenientemente una plataforma.
- Instalación de sistemas completos mediante la configuración almacenada en DVD.

- or Channel Status (AFTN, AMHS)
- or Status of AFTN / AMHS terminals (connected, disconnected, etc.).

CCMS: "COMSOFT Configuration Management Suite - COMSOFT Configuration and Administration Suite".

It allows you to create, configure, deploy and maintain the environment in which all applications are operating.

Among other benefits, the CCMS provides functions for:

- Centralized management of software versions for different applications.
- Assigning software applications to hardware platforms.
- Configure a subsystem to restart automatically when an error is detected.
- Distribution of configuration data and software versions to remote sites and systems.
- Define platform installation procedures to quickly and conveniently reinstall a platform.
- Installation of complete systems through the configuration stored on DVD.

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CCMS está instalado en todas las soluciones COMSOFT proporcionadas, plataformas de hardware basadas en Linux (servidores y estaciones de trabajo).

Otros Componentes del Sistema:

LAN del Sistema (SYSLAN):
La SYSLAN conecta a todos los subsistemas, basado en TCP/IP con verificaciones de conectividad adicionales en el nivel de aplicación (mantenido por el CSS operativo) y disposición redundante.

Impresoras de Red:
Utilizan el protocolo de transferencia de hipertexto (HTTP) o el Protocolo de Impresión de Internet (IPP) y no tienen diseño redundante.

Sistema de Pruebas:
El Sistema AMHS de Venezuela adicionalmente cuenta con un Sistema de Pruebas que permitirá realizar procedimientos de interconexiones nacionales e internacionales. De igual forma, servirá para la capacitación de los técnicos aeronáuticos de los Servicios a la Navegación Aérea.

CCMS is installed on all COMSOFT solutions provided, Linux-based hardware platforms (servers and workstations).

Other System Components:

System LAN (SYSLAN):
SYSLAN connects to all subsystems, based on TCP / IP with additional connectivity verifications at the application level (maintained by the operating CSS) and redundant provisioning.

Network Printers:
They use Hypertext Transfer Protocol (HTTP) or Internet Printing Protocol (IPP) and have no redundant design.

Testing System:
The AMHS System of Venezuela additionally has a System of Tests that will allow to carry out procedures of national and international interconnections. In the same way, it will serve for the training of the aeronautical technicians of the Services to the Air Navigation.

APPENDIX B

AMHS INTERCONNECTION REQUIREMENT AND DATE OF IMPLEMENTATION

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
Argentina	Bolivia	Dec 2018	Pending initial coordination
	Brazil	Nov 2017	Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Pending decision from authorities of Argentina and Brazil for operational implementation.
	Chile	Nov 2017	Positive operational tests carried out on mid December 2016. Pending decision from authorities of Argentina and Chile for operational implementation.
	Paraguay	Mar 2012	Implemented and operational
	Peru	Nov 2017	Positive operational tests carried out at the end of 2016. Pending decision from authorities of Argentina and Peru for operational implementation.
	South Africa	Jun 2019	Coordination began on December 2016. Interconnection implementation will be made through CAFSAT. Modernization of CAFSAT node Ezeiza is foreseen by mid-2018.
	Uruguay	Dec 2017	Connectivity in Protocol P1 level between MTA Ezeiza – Montevideo. Operational test foreseen November 2017.
	Venezuela	Dec 2017	Implemented and operational (out of service- failure in AMHS Venezuela) since Dec 2016. Operational since 20 September 2017. Tests foreseen for November 2017.
Bolivia	Argentina	Dec 2018	Pending initial coordination
	Brazil	Jun 2018	Pending initial coordination
	Peru	Mar 2018	IP connectivity between La Paz and Lima MTAs achieved.
Brazil	Argentina	Nov 2017	Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Pending decision from authorities of Argentina and Brazil for operational implementation.
	Bolivia	Jun 2018	Pending initial coordination
	Colombia	May 2017	Operational May 2017.
	Spain	Sep 2017	Operational since mid-September 2017. AMHS circuit implemented through CAFSAT. To date in pre-operational

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
			phase. For beginning operations, Brazil is expecting confirmation from Spain to migrate to operational phase.
	United States	Jun 2018	Coordination began between Brazil and United States. Circuit implementation will be made through MEVAIII/REDDIGII.
	Guyana	Sep 2017	Operations in Protocol P1 level begun on 16 December 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. AMHS tests resume on May 2017. Connection resume on July 2017.
	French Guiana	Dec 2018	Operation of an AMHS (CONSOFT) system is schedule by January 2018. AMHS interconnection scheduled October 2018.
	Paraguay	Dec 2017	Positive P1 connectivity tests were carried out. Pending operational tests by October 2017.
	Peru	Dec 2015	Implemented and operational 14 December 2015
	Senegal	Dec 2018	Coordination began between Brazil and Senegal (Dec 2016). Interconnection will be made through AFISNET satellite network which Brazilian node was installed in Recife.
	Sita (Atlanta)	Sep 2017	Successful operational and IP interoperability tests carried out in August 2017. Operation foreseen by last quarter of 2017.
	Suriname	Mar 2018	Entered into operation on 15 Dec 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. Pending updating of AMHS system by Suriname.
	Uruguay	Sep 2017	IP connectivity completed. (First week October 2016). IP Protocol tests successfully concluded the week of 28 Nov 2016 (30 Nov and 1 Dec). Positive operational tests made in August 2017 and commissioning in September 2017.
	Venezuela	Dec 2017	Positive connectivity in Protocol P1 level between Brasilia and Caracas (Oct 2016). Operational since 20 September 2017. Tests foreseen November 2017.
Chile	Argentina	Nov 2017	Positive operational tests carried out in mid-December 2016. Pending decision from authorities of Argentina and Chile for operational implementation.
	Peru	Dec 2016	Began operations on mid-December 2016.

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
Colombia	Brazil	May 2017	Operational May 2017.
	Ecuador	Dec 2017	Successful IP connectivity tests Pending resume of operational tests
	Panama	Mar 2018	Circuital interconnection has been configured through MEVA III/REDDIG II (Mid-February 2017). Positive operational tests August 2017. Operational implementation will be carried out once Colombia and Panama contract the AMHS circuit with MEVA III communication provider in MEVAIII/REDDIGII interconnection.
	Peru	Sep 2010	Implemented and operational
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
Ecuador	Colombia	Dec 2017	IP connectivity tests successfully made. Pending resume of operational tests.
	Peru	Jul 2012	Implemented and operational
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
French Guiana (France)	Brazil	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin October 2018.
	Venezuela	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin on October 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 resumed on May 2017. Operational connection resumed on July 2017.
	Suriname	Jun 2011	Implemented and operational
	Trinidad & Tobago	Dec 2018	Pending coordination
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
Panama	Colombia	Mar 2018	Circuital interconnection has been configured through MEVA III/REDDIG II (mid-February 2017). Positive operational tests made on August 2017. Operational implementation will take place once Colombia and Panama contract AMHS circuit to the MEVA III

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
			communications provider in MEVAIII/REDDIGII interconnection.
Paraguay	Argentina	Mar 2012	Implemented and operational
	Brazil	Dec 2017	IP interconnectivity tests began mid July 2016. Pending of operational tests on October 2017.
Peru	Argentina	Nov 2017	Positive operational tests carried out at the end of 2016. Pending decision from authorities of Argentina and Chile for operational implementation.
	Bolivia	Mar 2018	Successful IP connectivity between La Paz MTA and Lima MTA.
	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
	United States	Dec 2018	Initial coordination has begun for the AMHS connection through the MEVAIII/REDDIGII interconnection.
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen October 2017.
Suriname	Brazil	Mar 2018	Began operations on 15 Dec 2016 at 17:00 UTC. At mid-February 2017 returned to AFTN configuration. Pending Suriname AMHS system updating.
	Guyana	Jun 2011	Implemented and operational
	Venezuela	Mar 2018	Pending operational tests to be made when Venezuela has implemented its new AMHS system (September 2017) and Suriname has updated its AHMS system (date TBD). New AMHS system operative in Venezuela since 20 September 2017.
Uruguay	Argentina	Dec 2017	Positive P1 connectivity between Ezeiza and Montevideo achieved. Operational tests foreseen November 2017.
	Brazil	Sep 2017	IP connectivity tests completed (first week October 2016) Protocol P1 successfully concluded the week of 28 November 2016 (30 November and 1 December). Positive operational test made on August 2017. Commissioning September 2017.

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
Venezuela	Argentina	Dec 2017	Implemented and operational (out of service- failure in AMHS Venezuela) New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Brazil	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Colombia	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Spain	Dec 2018	Pending initial coordination. Interconnection will be made through a communication circuit rented to a local provider.
	United States	Dec 2018	Pending initial coordination. AMHS circuit will be implemented through MEVAIII/REDDIGII interconnection.
	Ecuador	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Guyana	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	French Guiana	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin on October 2018.
	Peru	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Suriname	May 2018	Pending operational tests to be made when Venezuela has implemented its new AMHS system (September 2017) and Suriname has updated its AHMS system (date TBD).
	Trinidad & Tobago	Dec 2018	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.

Green highlighted: AMHS interconnection operative
Light green: almost operational

APPENDIX C

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

STATE/ ESTADO	ADMINISTRATION/ ADMINISTRACIÓN	NAME/ NOMBRE	POST/ CARGO	TELEPHONE/ TELEFONO	E-MAIL
ARGENTINA	EANA /ANAC	Hernan Gabriel Canna	Especialista CNS EANA	(54 11) 4480-2362	hcanna@eana.com.ar
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		Moira Callegare	Jefe departamento CNS (ANAC)	(54 11) 594-13097	mcallegare@anac.gob.ar
BOLIVIA	AASANA	Remigio Blanco	Responsable de Telecomunicaciones AASANA	(591 2) 237-0340	rblanco@aasana.bo
BRAZIL/ BRASIL	DECEA	Eduardo Alberto do Nascimento Fontes	Coordinación técnica SDTE/DECEA	552121016620	eduardoeanf@decea.gov.br
		Tomy Marques de Souza	Asesor de Comunicaciones	(5521) 21016392 (5521)982547971	tomytms@decea.gov.br
COLOMBIA	UAEAC	Gabriel Guzmán	Especialista de Comunicaciones	(571) 296-2940 (57) 317-656 7202	gabriel.guzman@aerocivil.gov.co
		Robinson Quintero	Especialista de Comunicaciones	(57) 1 296 2241	robinson.quintero@aerocivil.gov.co
CHILE	DGAC	Christian Vergara	Especialista comunicaciones	(56 2) 836-4005 (56 2) 644-8345	cvergara@dgac.gob.cl
ECUADOR	DAC	Raul Avellan	Especialista CNS coordinador sistema AMHS	(593 4) 269-2829 (593 9) 9530-2735	raul.avellan@aviacioncivil.gob.ec
GUYANA	Guyana Civil Aviation	Mortimer Salisbury	Supervisor - AN & T	(592) 261-2569	mbsalisbury2000@yahoo.com

STATE/ ESTADO	ADMINISTRATION/ ADMINISTRACIÓN	NAME/ NOMBRE	POST/ CARGO	TELEPHONE/ TELEFONO	E-MAIL
GUYANA FR./FRENCH GUIANA	Dirección de los servicios de navegación aérea (Francia)	Michel Areno	Jefe del centro de control del aeropuerto de Cayena	594 594 359395	michel.areno@aviation-civile.gouv.fr
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		Abdiel Vásquez	Jefe Depart. CNS	507) 315-9877/78/44	abvasquez@aeronautica.gob.pa
PARAGUAY	DINAC	Víctor Morán Maldonado	Jefe Departamento de Comunicaciones	(595 21) 758 5208	moranchu@gmail.com
		Aldo Pereira	Jefe departamento técnico AMHS	595217585257 / +595217585255	aldopereira26@gmail.com
PERÚ	CORPAC	Jorge Garcia	Jefe de Comunicaciones	5112301000 Ext 3131	jgarcia@corpac.gob.pe
		Raul Anastasio Granda	Supervisor Comunicaciones AMHS-AFTN Área de Comunicaciones Fijas Aeronáuticas	(511) 230-1018	ranastacio@corpac.gob.pe
SURINAM/ SURINAME	Ministry of Transport, Communication and Tourism, Civil Aviation Department	Mitchell Themen	CNS Technical Division	(597) 325-123 (597) 325-172 (597) 497-143	mickiano@live.com
URUGUAY	DINACIA	Raul Pelayo	Jefe de Comunicaciones		wiledda@hotmail.com
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		Norelys Blanco	Servicios Integrados COM Maiquetía (SIM-COM)	58 212 3552010	norelys.blanco@inac.gob.ve

APPENDIX D

OFFER FOR THE DELIVERY OF AN ADVANCED COM-AMHS (ATS-MESSAGE HANLING SYSTEMS) COURSE

Lima (Perú), 2018

1. OBJECTIVES.

ICAO has defined the new AMHS (ATS-Messaging Handling System) system, based on X.400 protocol, as the substitute of the current AFTN network and it will be implemented all over the world in the following years.

The objective of this course is to give an OPERATIONAL AND TECHNICAL VIEW on real AMHS implementations based on the experience acquired by ANSPs during the last 17 years managing AMHS procedures.

The material contained in the course are going to:

- Provide technical criteria to be able to design the migration of AFTN/CIDIN systems to AMHS.
- Provide experience about strategies for migrating domestic AFTN users and applications to AMHS.
- Provide experience about the definition of AMHS system management tools.
- Provide experience defining operational procedures for AMHS operation.

2. TO WHO IS ADDRESSED.

This course will be directed to Engineering, Technical and/or Maintenance professionals of the Air Navigation Service provider (ANSP).

3. PROPOSED TABLE OF CONTENS.

The detailed table of contents of this course is collected as follows:

MODULE 01: THEORY FOR THE USER

TABLE OF CONTENTS

MODULE 02: AMHS SYSTEM DESIGN AND TECHNICAL ISSUES

TABLE OF CONTENTS

MODULE 03: AMHS OPERATIONAL ISSUES

TABLE OF CONTENTS

MODULE 04: AMC (ATS MANAGEMENT CENTER)

TABLE OF CONTENTS

MODULE 05: EDS (DIRECTORY SERVICES)

TABLE OF CONTENTS

4. COURSE MATERIAL.

Although the material previously described composes the main body of this training activity, table of contents could be adapted to the specific needs of an Organisation contracting this course.

The material of the course is developed using ‘PowerPoint’ slides including a very comprehensive description of each one as notes, provided in a ‘pdf’ format.

A practical training document containing the exercises to be performed by the student during the course has been generated.

The material of the course has been developed completely in English. Nevertheless, the delivery of the course will be done in Spanish.

5. COURSE DELIVERY PROPOSAL.

The proposed time to deliver the course is 30 hours (5 days).

During the delivery of the course, interactive sessions between professor and students will be promoted. The idea is to pay a major attention to questions raised by students in order to customise the explanations and to take the maximum benefit for the time spent in this training activity.

6. LOCATION OF THE COURSE DELIVERY.

The AMHS course will be delivered at the ICAO Regional Office Training Centre located in Lima (Perú).

The exact dates for the delivery of this course will be defined.

7. COST OF THE COURSE.

The cost of the course is a fixed price of 10.000 euros including the trainer travelling costs.