



Cuestión 5 del Orden del Día:

Seguimiento de la implementación de las actividades de capacitación en materia de navegación aérea y seguridad operacional en la Región

SEGUIMIENTO DE LA IMPLANTACIÓN DE ACTIVIDADES DE INSTRUCCIÓN EN LAS ÁREAS DE COMUNICACIÓN, NAVEGACIÓN Y VIGILANCIA (CNS)

(Presentado por la Secretaría)

RESUMEN	
Esta nota de estudio presenta información sobre actividades de instrucción en relación al área CNS desde la Reunión CIAC/16 hasta la fecha y las actividades previstas a realizarse en el año 2018.	
Referencias	
<ul style="list-style-type: none">• Informe de la Décimo sexta Reunión de Directores de Centros de Instrucción de Aviación Civil (CIAC/16) Lima, Perú, del 21 al 25 de noviembre de 2016.• Informe del Décimo Noveno Taller/Reunión del Grupo de Implantación SAM (SAM/IG/19) Lima, Perú, 22 al 26 de mayo de 2017.• Informe del Vigésimo Taller/Reunión del Grupo de Implantación SAM (SAM/IG/20) Lima, Perú, 16 – 20 de octubre de 2017.	
Objetivos estratégicos de la OACI:	<i>B – Capacidad y eficiencia de Navegación Aérea</i>

1. Introducción

1.1 Durante la Reunión CIAC/16 se informó de las actividades de instrucción realizadas en el 2016 y las actividades a realizarse en el 2017, en las áreas de comunicaciones, navegación y vigilancia.

1.2 De las actividades de instrucción realizadas en el 2016 se informó que en el área de comunicaciones se llevaron a cabo dos eventos, el curso básico de router y switch CISCO (*Interconnecting Cisco Network Devices Part 2 ICND2*), que se realizó en Lima, Perú, del 4 al 8 de abril y el curso de operación y mantenimiento de la REDDIG II que se dictó en dos idiomas, uno en lengua española que se desarrolló en las instalaciones del Centro de Instrucción, Perfeccionamiento y Experimentación (CIPE) de la ANAC, Aeropuerto Internacional “Ministro Pistarini” Ezeiza, Provincia de Buenos Aires, Argentina, del 5 al 9 de septiembre y el otro en lengua inglesa, realizado en el Aeropuerto Internacional Cheddi Jagan de Georgetown, Guyana, del 26 al 30 de septiembre. El resumen del curso en español se presente en el siguiente portal web: https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2016-REDDIGIOPSMANT

1.3 En el área de navegación se realizó un Seminario/taller para la implementación de infraestructura de navegación para soportar la PBN y las operaciones de aproximación de precisión GNSS

en las Regiones NAM/CAR/SAM en la Oficina Regional Sudamericana de la OACI en Lima, Perú, del 15 al 17 de agosto. Toda la información de este evento se presenta en el siguiente portal: <http://www2010.icao.int/SAM/Pages/MeetingsDocumentation.aspx?m=2016-PBNGNSS>

1.4 Se realizó en el área de vigilancia y automatización un Taller para la implementación de enlaces de datos en Philipsburg, Sint Maarten, del 18 al 21 de abril. Todas las presentaciones del evento y el resumen se pueden encontrar en el siguiente portal web <http://www.icao.int/NACC/Pages/meetings.aspx?year=2016&cM=02&cY=2016>. Asimismo se realizó un curso práctico del AIDC y programación de las bases de datos de los sistemas automatizados para el AIDC en Asunción, Paraguay, del 14 al 18 de noviembre.

1.5 En la Reunión CIAC/16 se informó que para el 2017 en el área CNS se llevarían a cabo las siguientes actividades de instrucción:

- Taller sobre el uso de la nueva herramienta de selección de frecuencias de la OACI.
- Curso avanzado de operación de la REDDIG II.
- Curso de redes IP aplicado a la REDDIG II.
- Taller/Reunión para la implantación del ADS B en las Regiones NAM /CAR/SAM.
- Taller de implantación ASBU y revisión del Plan Regional de implantación de navegación aérea basado en performance (PBIP).

2 Análisis

2.1 A continuación se presentan las actividades de instrucción realizadas en el área de comunicaciones, navegación y vigilancia desde la Reunión CIAC/16 a la fecha:

Actividades de instrucción CNS realizadas desde la CIAC/16 a la fecha

Comunicaciones

Taller sobre el uso de la nueva herramienta de selección de frecuencias de la OACI

2.2 El taller se llevó a cabo en Lima, Perú, del 6 al 10 de marzo de 2017, en él se trataron aspectos relacionados a temas de planificación de frecuencia, el uso efectivo del espectro de frecuencias aeronáuticas, la revisión del plan de asignación de frecuencias aeronáuticas en la Región SAM, y el uso de la nueva herramienta de gestión de la OACI para la asignación de VHF de Comunicaciones (COM lista 3) llamada *Frquency Finder*.

2.3 El taller contó con asistencia de 23 delegados de 10 Estados de la Región SAM (Argentina, Bolivia, Brasil, Chile, Ecuador, Panamá, Paraguay, Perú, Uruguay y Venezuela). La información presentada se encuentra en el siguiente portal web de la OACI: https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2017-NEWTOOL

Curso avanzado de operación de la REDDIG II

2.4 El Curso se llevó a cabo del 13 al 16 de junio de 2017 en las instalaciones de la Sección de Instrucción y Actualización Técnica (SIAT), Cuarto Centro Integrado de Defensa Aérea y Control del Tránsito Aéreo (CINDACTA IV), en Manaus, Brasil.

2.5 El contenido del Curso se presenta en el **Apéndice A** de esta nota de estudio. El Curso contó con la participación de 36 delegados pertenecientes a los Estados de Argentina, Brasil, Chile, Colombia, Ecuador, Guyana, Paraguay, Perú, Surinam, Trinidad & Tobago y Venezuela.

Curso de redes IP aplicado a la REDDIG II

2.6 El curso se llevó a cabo en las instalaciones de la Sección de Instrucción y Actualización Técnica (SIAT), Cuarto Centro Integrado de Defensa Aérea y Control del Tránsito Aéreo (CINDACTA IV), en Manaus, Brasil del 13 al 17 de noviembre de 2017.

2.7 El contenido del Curso se presenta en el **Apéndice B** de esta nota de estudio. El Curso contó con la participación de 32 delegados pertenecientes a los Estados de Argentina, Brasil, Chile, Colombia, Ecuador, Guyana, Paraguay, Surinam, Trinidad & Tobago y Venezuela.

Vigilancia

2.8 Del 13 al 17 de noviembre de 2017 se llevó a cabo en Lima, Perú, la Reunión/Taller de Implementación de la Vigilancia Dependiente Automática – Radiodifusión (ADS-B) (ADS-B/IMP para las Regiones NAM/CAR/SAM. El objetivo de la Reunión/Taller fue asistir a los Estados en la implementación del ADS-B de acuerdo con la meta establecida con los Objetivos Regionales de Performance (RPO) de conciencia situacional (Modulo B0-ASUR y B0-SURF) especificados en el Plan regional NAM/CAR de Implementación de Navegación Aérea Basado en la Performance (RPBANIP) y el Plan de Implantación del Sistema de Navegación Aérea Basado en Rendimiento (PBIP) para la Región SAM.

2.9 El evento contó con la participación de 35 personas de 11 Estados de las Regiones NAM/CAR/SAM, una organización internacional y 5 representaciones de la industria. La información presentada en este evento se encuentra en el siguiente enlace WEB: https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2017-ADSB

Otras actividades de capacitación

2.10 Del al 14 al 18 de agosto de 2017 en Lima, Perú, se llevó a cabo el *Taller de implantación ASBU y revisión del Plan Regional de implantación de navegación aérea basado en performance (PBIP)*. Este evento tuvo como objetivo informar sobre la nueva edición del plan mundial de navegación de navegación aérea (GANP V edición) y los cambios en los bloques y módulos del ASBU, así como la revisión del PBIP y los planes nacionales de navegación aérea alineados con el ASBU.

2.11 Asistieron al evento 33 participantes de 8 Estados de la Región SAM (Argentina, Bolivia, Brasil, Chile, Panamá, Paraguay, Perú, y Venezuela), un Estado de la Región CAR (Estados Unidos), así como representantes de ATECH, IATA y THALES ALENIA SPACE. La información presentada en este evento se presenta en el siguiente enlace WEB: https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2017-ASBU

Actividades de instrucción CNS previstas para el año 2018

2.12 La Onceava Reunión del Comité de Coordinación (RCC/11) del Proyecto Regional RLA/06/901 (*Asistencia para la implantación de un sistema regional de ATM considerando el concepto operacional de ATM y el soporte de tecnología en comunicaciones, navegación y vigilancia (CNS)*) aprobó la realización en el 2018 de un curso avanzado de AMHS, el cual se estaría dictando en Lima, Perú, del 6 al 10 de agosto de 2018. En este curso se presentará información técnica y operacional avanzada sobre el sistema AMHS a fin de garantizar la operación actual del AMHS. El curso será dictado inicialmente por la empresa Gaelicam. Los detalles del curso se presentan como **Apéndice C** de esta nota de estudio.

2.13 Asimismo la RCC/11 aprobó la realización de la cuarta reunión de implantación del AIDC el cual incluirá un seminario sobre la evolución del AIDC, el módulo B1 FICE del ASBU, que incorpora el FF-ICE (Información de vuelo y flujo en un ambiente colaborativo. Este evento está previsto tentativamente en Lima, Perú, del 16 al 20 de abril.

2.14 Para el segundo semestre de 2018 está prevista la realización de un curso sobre el Modem Satelital SKYWAN IDU 7000/1070 “Network Commission & Operation”, que tiene como objetivo principal planificar y configurar una red entera compuesta por modem satelital SKYWAN, configurar los parámetros relevantes de gestión de red, supervisar y controlar los parámetros relevante para la operación propia de la red y el mantenimiento del grado de servicio requerido de la red. El contenido del curso se presenta como **Apéndice D** de esta nota de estudio.

3. Acción sugerida

3.1 Se invita a la Reunión a tomar nota de las actividades de instrucción realizadas desde la Reunión CIAC/16 hasta la fecha y las previstas para el año 2018, y analizar la posibilidad que instructores de los CIACs en las áreas CNS interesados puedan participar en las actividades de capacitación de 2018 en el área CNS.

APÉNDICE A**Contenido del Curso avanzado de operación de la REDDIG II****1. Arquitectura**

- Red Satelital
- Red Terrestre de respaldo
- Plan de direccionamiento IP (Global y Local)
Equipos y Servicios
- Tipos de Nodos

2. Equipos de RF

- IBUC + LNB
- Redundancia
- Supervisión/Configuración vía HHT, TCP/IP (Web) y Telnet

3. Modem Skywan

- Modelo 7000
- Modelo 1070
- Acceso vía “LineUp Manager”
Software Upload
Set Parameters
Tests
Operations
Monitoring Screens
Log Files
- Performance, análisis de parámetros

4. Ethernet Switch Netgear**5. Router Cisco**

- Interfaces
- Protocolo de redundancia VRRP
- Protocolo de ruteo OSPF
- VLANs
- Comandos en línea
- Monitoría de las interfaces
- Configuraciones

6. Conmutador de banda de base (RSS) y “Patch Panel”**7. NMS – WhatsUp Gold**

- Servidor Central NMS
- Servidor Remoto NMS (Local)
- Acceso vía Web
- Módulos y visualizaciones
- Monitores
 - Active Monitor
 - Performance Monitor
- Alarmas

APÉNDICE B

Proyecto Regional RLA/03/901 – Sistema de Gestión de la REDDIG y Administración del Segmento Satelital

CURSO DE REDES IP APLICADO A LA REDDIG II

(Manaos, Brasil, 13 al 17 de noviembre de 2017)

CONTENIDO

Día 1

1. InternetNetworking

- Modelo OSI y modelo TCP / IP
- Funciones básica de capa física, enlace, red y transporte
- Encapsulamiento, overhead de PDU

2. Operación del software Cisco IOS

- Características y funciones
- CLI Modos User y Privileged
- Comandos básicos en modo privilegiado
- Comandos de ayuda
- Mensajes de error (logs)
- Tipos de memoria de un enrutador
- Presentación sobre el hardware de los routers y switches utilizados en REDDIG

3. LAN

- Dominio de colisión y broadcast
- Diferencias entre hubs y switches
- Frame Ethernet
- Mac Address y tipos de comunicación en una red (unidifusión / broadcast / multicast)
- Enrutamiento de frames en un switch
- Modos Full-Duplex y half-Duplex y velocidad (troubleshooting)
- Particularidades del hardware y software del switch Netgear

4. VLAN

- Importancia de las VLANs
- Frame Ethernet 802.1q
- Tipo de interfaz en VLAN (trunk / Access)
- VLAN nativa en un puerto
- STP
- Configuración de VLANs en Netgear
- Mapeo de las VLANS REDDIG

5. Laboratorio de configuración de VLANs (Packet Trace y Netgear)

Día 2**1. Direccionamiento IP**

- Header IP
- Clases de direcciones IP (comparar con el direccionamiento REDDIG)
- Subnetting / Mascaras
- VLSM
- Estructura de direccionamiento IP de REDDIG
- Laboratorio de direccionamiento IP / Subnet

2. Capa de Transporte

- Diferencias TCP / UDP
- ¿Qué aplicaciones REDDIG utilizan TCP y UDP?

3. Configuración inicial de un router y un switch

- Configuración lógica inicial del router Cisco y del switch Netgear
- Direccionamiento IP de interfaz y de administración.
- Licencias de software
- Formas de acceso al router
- CDP / LLDP
- ARP
- Ejemplo breve de cómo un paquete viaja en una red con switches y routers

4. VRRP

- Funcionamiento
- Ventajas
- Configuración del VRRP en la REDDIG
- Prioridad
- IPSLA Tracks

5. Enrutamiento IP

- Funciones de un router
- Particularidades de un router Cisco (CEF)
- Determinación de un path y tabla de enrutamiento
- Distancia administrativa
- Tipos de rutas (direct, static, dynamic y default) - mostrar como referencia la tabla de rutas de la REDDIG

Día 3

1. Enrutamiento estático

- Ventajas y desventajas de las rutas estáticas
- Formas de configurar rutas estáticas (next-hop / interface)
- Rutas por default
- Configuración de enrutamiento estático en REDDIG (Level-3)
- Mostrar ruta IP

2. Enrutamiento dinámico

- Áreas
- Tipo de routers en OSPF (DR, BDR, ASBR, ABR)
- LSDB / SPF / Hello
- Vecindad y adyacencia (ver router REDDIG)
- Estado de interfaz con adyacencias
- Elección de DR / BDR
- LSA / Tipos de LSA
- Comandos de troubleshooting
- Información del SH IP OSPF, base de datos de un router REDDIG
- Estado del SH IP OSPF neighbors

3. Enrutamiento inter-VLAN

- Objetivos de enrutamiento entre VLANs
- Enrutamiento de las VLANs en los trunks de la REDDIG

4. Laboratorios que involucran el enrutamiento estático, dinámico e inter-VLANs

Día 4

1. Listas de acceso

- Uso de ACLs
- Tipos de ACLs
- Construcción de ACLs
- Wildcards
- ACL usados en REDDIG

2. NAT

- Uso de NAT
- Tipos de NAT (static, PAT)
- Uso de NAT en REDDIG

3. QoS

- Importancia
- Parámetros básicos de una red (Jitter, Delay, pérdida de paquetes)
- Diffserv
- Clasificación del tráfico
- Policers
- Aplicación de QoS en interfaces
- Comandos de troubleshooting para QoS
- Configuración de QoS en los routers Cisco de REDDIG

4. Tunelización de tráfico

- Funcionamiento
- BSTUN
- GRE
- Configuración de túneles en la REDDIG

5. Laboratorios que involucra ACL, NAT, QoS y túneles)

Día 5

1. VOIP

- Interfaces analógicas y digitales
- Conceptos básicos de los protocolos de señalización SIP
- Tipos de códec
- Configuración de VOIP en Cisco
- Call-manager
- Dial-peers
- Reglas de traducción
- Configuración de VOIP en REDDIG

2. Tecnologías WAN

- Protocolos de capa de enlace
- Configuración de enlaces punto a punto
- Configuración de enlaces WAN de los módems SkyWAN
- Configuración de protocolos de enrutamiento en los módems SkyWAN

3. MPLS

- Conceptos básicos del funcionamiento de una red MPLS del proveedor de servicios
- Enrutamiento del tráfico de la REDDIG a través de la red MPLS de Level-3



APÉNDICE C

**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 CONTENTS.

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

MODULE 01: THEORY FOR THE USER

TABLE OF CONTENTS	.....
1. INTRODUCTION	.....
Module Objectives	.....
The References for this course	.....
2. DATA COMMUNICATIONS TECHNOLOGY	.....
Seven Layers	.....
Role of Communications in an ATM System	.....
ICAO Data Applications	.....
ATN Upper/Lower Layer Protocols	.....
The move to IP	.....
So, what is ATN ?	.....
The Way Forward	.....
3. X.400 : DEFINING THE TERMS	.....
What is MHS?	.....
Standards Development	.....
What is a Message Handling System?	.....
Message Structure	.....
MHS Information Objects	.....
MHS Services	.....
The MHS Architecture	.....
(A)MHS components: (ATS) Message Server	.....
(A)MHS components: (ATS) User Agent	.....
(A)MHS Components: The Message Store	.....
(A)MHS Components: Access Units	.....
The Journey of a Message	.....
Management Domains	.....
ADMDS and PRMDs	.....
AMHS Management Domains (1)	.....
AMHS Management Domains (2)	.....
'XX' Country Codes	.....
OR-Address Forms	.....
The Need for Directory Services	.....
Directory Overview	.....
Security Threats	.....
The MHS Security Functional Groups	.....
4. X.400 - THE COMMUNICATIONS PROTOCOLS	.....
Connecting MHS System Components	.....
MHS Protocols	.....
Underlying Networks: Physical vs. Logical Connections	.....
AMHS Network over underlying network	.....
Levels of connectivity in the AMHS architecture	.....
Why not SMTP ?	.....
5. X.400 - MTS AND IPMS	.....

MTS Functional Groups.....

Basic MTS Envelope

Delivery Reports

Non-Delivery Reports

The IPMS Elements of Service & IPM Heading.....

Receipt, Non-Receipt & Other Notifications.....

6. FROM MHS TO AMHS - ICAO ATN SARPS.....

AMHS SARPs Development

Basic and Extended Services.....

Selected Functions of the Extended Services

AMHS components: AFTN/AMHS Gateway

AMHS Message Formats

Message and Report Mappings

Message Field Mappings

Scenarii for an AFTN SS Message

AMHS address types.....

The A in AMHS.....

7. AMHS IN THE WORLD

AMHS in CARSAM

AMHS in ASIAPAC.....

AMHS in EUR.....

AMHS in AFI.....

8. CONCLUSION.....

Conclusion

Programme

GLOSSARY

MODULE 02: AMHS SYSTEM DESIGN AND TECHNICAL ISSUES

TABLE OF CONTENTS .....	.....
1. INTRODUCTION.....	.....
Objectives .....	.....
2. DRIVERS FOR AFTN/CIDIN MIGRATION .....	.....
Reminder: Why migrate to AMHS .....	.....
3. AMHS SYSTEM DESCRIPTION .....	.....
AMHS System Description .....	.....
General AMHS Overview .....	.....
ATSMHS traffic flows.....	.....
How does an X.400 system work ? .....	.....
AMHS information model .....	.....
AMHS Objects .....	.....
Flow of Information Objects in AMHS .....	.....
AMHS activity over underlying networks.....	.....
ATM applications over UNDERLYING NETWORKS.....	.....
Topology of AMHS servers: centralised vs. distributed .....	.....
Network characteristics determined by topology .....	.....
AMHS QoS Requirements .....	.....
4. AMHS SYSTEM DESIGN CRITERIA .....	.....
Phases for AMHS Deployment.....	.....
Transaction Examples .....	.....
Technical Criteria.....	.....
Modular Solution.....	.....
Scalable and Portable Solution .....	.....
5. EXAMPLE: SPANISH AMHS SOLUTION .....	.....
AFTN/CIDIN/AMHS Solution in Spain.....	.....
AMHS Topology in Spain .....	.....
IP network (REDAN) Infrastructure .....	.....
6. AMHS USER TYPES.....	.....
Evolution/Migration of Users .....	.....
Type of ATM COMs SERVICES .....	.....
Objectives for the User Migration Process.....	.....
How does a User Agent Work ? .....	.....
What does the User do ? .....	.....
... and what tools does the user have ? .....	.....
UA: Free Text Format Message .....	.....
UA: Auto-Formatting AIS Messages .....	.....
UA: Auto-Formatting ATS Messages .....	.....
UA: Auto-Formatting MET Messages .....	.....
UA: Non Delivery Reports (NDR) .....	.....
UA: Receipt Notifications (RN) .....	.....

UA: Tracking Sent Messages.....

UA: Filtering Tool.....

UA: Message Backup (1).....

AU: Access Unit.....

Access Unit: EAD Solution.....

Access Unit: EURONOTAM.....

Exercises.....

7. AMHS SYSTEM MANAGEMENT TOOLS.....

Support Levels.....

Main AMHS Management Tools.....

High Level Administration Tool (HILA).....

Local and Central Supervision.....

SNMP Alarms Supervision.....

End-to-End View Based on SNMP.....

Tracking Tools.....

Messaging Activity Monitor.....

Control Position.....

AMHS Queue Monitoring.....

Historical Data Storage Manager.....

Statistics.....

Time Synchronisation: Network Time Protocol NTP.....

Remote Monitoring.....

8. AMHS COMMON FACILITIES.....

Common Facilities.....

IP networks. Example: Pan-European Network (PENS).....

Considerations about SWIM, AMHS and IP networks.....

Transition Plan IPv4/IPv6.....

ATS Messaging Management Centre (AMC).....

Directory Services (Name Resolution, Address Conversion, DUA).....

Inter-Regional Gateways.....

SITA TYPE X / AMHS Gateway.....

AMHS Security.....

Testing and Training Facilities.....

GLOSSARY.....

MODULE 03: AMHS OPERATIONAL ISSUES

TABLE OF CONTENTS	.....
1. AMHS OPERATIONAL ISSUES	.....
Main AMHS Operational Issues	.....
AMHS Addressing (CAAS and XF)	.....
XF Address Conversion: Use of the ICAO registry	.....
CAAS Addr. Conversion: Use of the ICAO registry	.....
Global AMHS Address Registration	.....
International Topology and Routing Strategy	.....
Conversion between an AMHS IPM and an AFTN message	.....
Mapping priorities	.....
Conversion of AFTN Service Messages (Acknowledgement of SS-priority messages and unknown address)	.....
Operational management of error situations:	
Reception of an AMHS message with ATS-Message-header SS and RN not requested	.....
Reception of an AMHS message with ATS-Message-header no SS and RN requested	.....
Reception of RN with subject message not generated by the AFTN/AMHS GW	.....
AMHS to AFTN Direction (reception of a Non-Receipt-Notification)	.....
Message rejection due to the use of an unknown addressee indicator or recipient	.....
Message rejection due to the use of an unknown addressee indicator or recipient	.....
Rejection of an AFTN-to-AMHS message: Transfer of NDR to the control position	.....
Reception of NDR with subject message not generated by the AFTN/AMHS GW	.....
AFTN to AMHS direction: Unsuccessful conversion of addressee indicator in incomi	.....
AFTN to AMHS Direction (unsuccessful conversion of origin OGN indicator)	.....
AMHS to AFTN Direction (unsuccessful conversion)	.....
AMHS to AFTN Direction (non-delivery and out-of-line situations)	.....
Legal AMHS Recording	.....
Management of MTA names and passwords	.....
Associations between MTAs: Dialogue mode	.....
Simultaneous P1 associations	.....
Application and network timers optimization	.....
2. OPERATIONAL AFTN/CIDIN MIGRATION TO AMHS	.....
AFTN/CIDIN to AMHS Migration	.....
Decisions during AMHS Planning	.....
Pre-requisite tasks	.....
Tasks to be performed with every AMHS COM centre	.....
Testing phases	.....
Preoperational scenario	.....
Details of the preoperational phase	.....
AFTN Flows migration to AMHS: Objectives	.....
Detailed description of AFTN/CIDIN Flows migration to AMHS	.....
4. CONCLUSION , DOCUMENTATION AND GLOSSARY	.....

ICAO documentation
AMHS SARPs sub-volume 3.....
Need for Amendment to SARPS (PDRs).....
Glossary.....
Conclusion

GLOSSARY

MODULE 04: AMC (ATS MANAGEMENT CENTER)

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- 1. AMC CONCEPT**
 - Need for the ATS Messaging Management Center (AMC)
 - AMC concept
 - AMC participants
 - Types of AMC Users
 - AMC: menu and window structure
 - Areas of Managed Data.....
 - AMC Validation Data phases:
 - Phase I: Data entry
 - Phase II: Data Validation and processing
 - Phase III: Acknowledgement
 - Phase IV: Acknowledgement Processing.....
 - Phase V: Data retrieval and implementation.....
 - AMC OPERATIONAL FUNCTIONS (AMF-O):
 - Network inventory
 - Routing management.....
 - Address management.....
 - SITA Type B / AFTN Gateways
 - SITA Type X / AMHS Gateways
 - AMHS user capabilities management
 - Statistics
 - COM Charts
 - Miscellaneous
 - AMC IMPLEMENTATION SUPPORT FUNCTIONS (AMF-I):
 - AMHS MD Contacts.....
 - AMHS Implementation Planning.....
 - INTER-WORKING Test Support.
 - Monitoring of AMHS documentation maintenance.....
 - Helpepdesk functions.....
 - CONCLUSIONS

MODULE 05: EDS (DIRECTORY SERVICES)

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1. X.500 DIRECTORY SERVICES AND ATN DIRECTORY	
X.500 Overview.....	
X.500 protocols and services.....	
ATN Directory Overview.....	
ATN Directory schema.....	

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.

IND SATCOM

SKYWAN IDU 7000/1070 COURSE OVERVIEW



Premium Satellite Communications
Systems & Solutions

Version: August 2015

ND SATCOM

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1 COURSE OVERVIEW: SKYWAN 7000/1070 SATELLITE NETWORKS (VSAT)

ND SatCom offers training in various areas such as installations, operations, maintenance and management of our products and solutions. Convenient **classroom & hands-on training** is available all year-round at our training center in Friedrichshafen. We also offer trainings on request at our regional branches or at customer premises.

ND SatCom training is the most efficient way to get a full comprehension of ND SatCom products and solutions.



The following training course catalogue is based on the current SKYWAN generation with IDU 7000 series and IDU 1070 series. Detailed descriptions of well-proven predefined courses about SKYWAN are available for review.



Beside the SKYWAN predefined courses various customized training packages are possible. Such courses will be defined according to customer specific needs and requirements. The flexible content can be a selection of existing course modules enriched by additional customer topics. For the arrangement of a customized package please contact our training experts. The professional training courses covering all relevant topics for SKYWAN satellite networks.

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Our hands-on training enables you to quickly install your VSAT stations, discover how to commissioning and operate your network and learn through ongoing monitoring and maintenance how network downtime can be minimized.

The following figure illustrates the standard course overview for SKYWAN satellite networks:

Tasks	Network Designer	Network Operator	Station Commissioner
Entry	Satellite communication fundamentals (VSAT) Course 8000 / 2 days		
			Installation basics (VSAT station) Entry level Course 8010 / 1 day
Basic / Specialist	Network design & engineering Basic level Course 8340 / 3 days	Network commissioning & operation Basic level Course 8240 / 5 days	Station commissioning Basic level Course 8140 / 1 day
Advanced / Expert	Network design & engineering Advanced level Course 8350 / 2 days	Network commissioning & operation Advanced level Course 8250 / 4 days	Station commissioning, installation & maintenance Advanced level Course 8150 / 2 days
Optional		Configuration of SKYWAN FAD Basic level Course 8243 / 2 days	
	Expert Certification Network Designer 1 day	Expert Certification Network Operator 1 day	Expert Certification Station Commissioner 1 day

The following course descriptions will provide the necessary detailed information about available course modules.

ND SATCOM

1.1 Station Commissioning (8140)

Title	8140 - SKYWAN IDU 7000/1070 Station Commissioning
Level	Basic / Specialist
Objectives	<p>The participant will be able to: Prepare & commission a SKYWAN station to become a member of a SKYWAN network and perform tests at station level, i.e.:</p> <ul style="list-style-type: none"> • Install a SKYWAN indoor unit, • Setup a SKYWAN IDU with a predefined parameter set, • Run station specific functional tests, • Control relevant parameters for proper station operation.
Contents	<p>Description of SKYWAN solution:</p> <ul style="list-style-type: none"> • SKYWAN features, hardware & interfaces, • Configuration file & software images, • Interfacing of outdoor unit (RFT, LNB, cabling), • SKYWAN station setup wizard. <p>Installation check of outdoor equipment (ODU):</p> <ul style="list-style-type: none"> • Visual checks, • Check of antenna pointing. <p>Installation steps & Line-up procedure:</p> <ul style="list-style-type: none"> • Loading a predefined configuration, • Change essential configuration parameters, • Required information for proper Line-up, • Procedures (perform tests, final adjustments, cross-pol & power settings). <p>Initial station operation:</p> <ul style="list-style-type: none"> • Basic monitoring (i.e. via LuM and LED indications), • Essential adjustments, • General pitfalls, • Troubleshooting procedure (Identify & localize general failures).
Target Group	Station commissioner (installation staff)
Duration	1 day
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Good knowledge in 'satellite communication fundamentals (VSAT)', • Good knowledge in 'installation basics (VSAT)' (e.g. like course 8010) • General good English language skills.
Environment	SKYWAN IDU 7000/1070 hardware, PC or notebook with SKYWAN Line-up Manager software (LuM), antenna system with RFT & LNB.
Methods	Lecture, hands-on (partly outside classroom), demonstrations, practical exercises.

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1.2 Advanced Station Commissioning, Installation & Maintenance (8150)

Title	8150 – SKYWAN IDU 7000/1070 Station Commissioning, Installation & Maintenance
Level	Advanced / Expert
Objectives	<p>The participant will be able to: Commission a SKYWAN station to become a member of a SKYWAN network and perform tests at station level, i.e.:</p> <ul style="list-style-type: none"> • Install a SKYWAN indoor unit, • Setup a SKYWAN IDU with a predefined parameter set, • Run station specific functional tests, • Control relevant parameters for proper station operation, • Perform basic maintenance tasks. <p>This course is the mandatory prerequisite for the participation in the additional certification course ‘Expert SKYWAN IDU 7000/1070 Station Commissioner’.</p>
Contents	<p>Work on various installation example cases:</p> <ul style="list-style-type: none"> • Focus on frequent pitfalls and most critical installation steps. <p>Station commissioning and operation:</p> <ul style="list-style-type: none"> • Run standard site acceptance test (SAT) procedure, • Run advanced trouble shooting procedures, • Interaction with the SKYWAN Network Operator. • Advanced monitoring. <p>Station maintenance:</p> <ul style="list-style-type: none"> • Perform basic / preventive maintenance tasks, • Failure localization, • Exchange of station components (IDU, IDU-boards, LNB, RFT).
Target Group	Station commissioner (installation staff)
Duration	2 days(if certification is required 1 additional day for certification)
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • ND SatCom course 8140, • General good English language skills.
Environment	SKYWAN IDU 7000/1070 hardware, PC or notebook, antenna system with RFT & LNB.
Methods	Lecture, hands-on (partly outside classroom), demonstrations, practical exercises.

ND SATCOM

1.3 Network Commissioning & Operation (8240)

Title	8240 - SKYWAN IDU 7000/1070 Network Commissioning & Operation
Level	Basic / Specialist
Objectives	<p>The participant will be able to: Plan and configure an entire SKYWAN network ready for network operation based on a predefined design, i.e.:</p> <ul style="list-style-type: none"> • Set initial network & station parameter configuration, • Configure network management relevant parameters, • Monitor & control relevant parameters for proper network operation, • Maintain the required grade of service within the network.
Contents	<p>Description of SKYWAN solution:</p> <ul style="list-style-type: none"> • SKYWAN IDU features, • SKYWAN NMS features. <p>SKYWAN NMS installation: Initial parameter configuration:</p> <ul style="list-style-type: none"> • Network Configurator (Configuration groups & profiles concept; network planning, profile activation & configuration upload), • Satellite link (Configuration of station; network & master/ backup-master), • Network management parameter (Access control for node- & network management). <p>Monitor & control relevant parameters:</p> <ul style="list-style-type: none"> • Monitoring TDMA parameters (LED indications; essential parameters; monitoring screens), • Reconfiguration cases (Fully meshed to star; new frequencies; add 2nd demodulator), • Basic Pitfalls & Troubleshooting. <p>Configure user traffic:</p> <ul style="list-style-type: none"> • IP-feature overview (OSPF, RoHC, load-balancing, IP multicast, TCP-A) and IP-router configuration, • FR-feature overview and basic port configuration. <p>SKYWAN NMS network tasks:</p> <ul style="list-style-type: none"> • Network adjustments, • MIB statistics, • Useful graphs, • Network trouble-shooting procedures.
Target Group	Network Operator
Duration	5 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Good knowledge in TCP/IP basics, • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	SKYWAN IDU 7000/1070 hardware, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations for a small network.
Methods	Lecture, hands-on with NMS tools, demonstrations, practical exercises.

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1.4 Advanced Network Commissioning & Operation (8250)

Title	8250 - SKYWAN IDU 7000/1070 Network Commissioning & Operation
Level	Advanced / Expert
Objectives	<p>The participant will be able to: Plan and configure an entire SKYWAN network ready for network operation based on a predefined design, i.e.:</p> <ul style="list-style-type: none"> • Set initial network & station parameter configuration, • Configure network management relevant parameters, • Monitor & control relevant parameters for proper network operation, • Maintain the required grade of service within the network, • Perform necessary FAT- and NAT-procedures. <p>This course is the mandatory prerequisite for the participation in the additional certification course 'Expert SKYWAN IDU 7000/1070 Network Operator'.</p>
Contents	<p>Parameter configuration for certain use cases:</p> <ul style="list-style-type: none"> • Network Configurator (Configuration groups & profiles concept; network planning, profile activation & configuration upload), • Satellite link (Configuration of station; network & master/ backup-master), • Network management parameter (Access control for node- & network management). <p>Acceptance tests:</p> <ul style="list-style-type: none"> • Run FAT procedure, • Run NAT procedure, • Troubleshooting approach. <p>Special configurations:</p> <ul style="list-style-type: none"> • Station & network redundancy, • Basic configuration of serial interfaces (i.e. for standard user FR-traffic). <p>Configure & optimize user IP-traffic:</p> <ul style="list-style-type: none"> • Quality-of-Service features for IP-traffic, • Advanced router configuration. <p>SKYWAN NMS advanced network tasks:</p> <ul style="list-style-type: none"> • Advanced network adjustments, • Additional useful graphs.
Target Group	Network Operator
Duration	4 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • ND SatCom course 8240, • Good knowledge in TCP/IP basics, • General good English language skills.
Environment	SKYWAN IDU 7000/1070 hardware, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations for a small network.
Methods	Lecture, hands-on with NMS tools, demonstrations, practical exercises.

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1.5 Network Design & Engineering (8340)

Title	8340 - SKYWAN IDU 7000/1070 Network Design & Engineering
Level	Basic / Specialist
Objectives	The participant will have general knowledge about: <ul style="list-style-type: none"> • Designing & engineering SKYWAN satellite networks, • Usage of the SKYWAN IDU 7000/1070 TDMA calculation tool.
Contents	<p>Description of SKYWAN solution & features:</p> <p>General carrier design:</p> <ul style="list-style-type: none"> • Traffic calculation (Networking features overview; calculation tool & procedure), • Carrier design (Essential satellite link layer features: Master/ Slave concept, channel coding & modulation, topologies and populations, reference burst modes, data transport; TDMA parameter optimization tool & procedure). <p>Outdoor unit design (incl. satellite selection):</p> <ul style="list-style-type: none"> • Essential satellite link features, • Choice of satellite / transponder, • Outdoor unit design process, • SKYWAN link budget tool & procedure. <p>Detailed indoor unit design:</p> <ul style="list-style-type: none"> • Detailed SKYWAN IDU data, • IP features: IP router, static routing, dynamic routing (OSPF), differentiated services, robust header compression (ROHC), TCP-Acceleration, IP multicast, load balancing, • FR features: port types, basic FR service, traffic shaping, congestion management, communication services, FR multicast), <p>Design finalization & cost optimization:</p> <ul style="list-style-type: none"> • Optimization of network design, • Operational costs versus hardware costs.
Target Group	Network Designer
Duration	3 days
Prerequisites	The following prerequisites are mandatory for the participant: <ul style="list-style-type: none"> • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	PC or notebook with SKYWAN IDU 7000/1070 TDMA calculation tool and MS Excel and SKYWAN link budget tool.
Methods	Lecture, demonstrations & exercises, hands-on tool training.

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1.6 Advanced Network Design & Engineering (8350)

Title	8350 - SKYWAN IDU 7000/1070 Network Design & Engineering
Level	Advanced / Expert
Objectives	<p>The participant will have good knowledge about:</p> <ul style="list-style-type: none"> • Designing & engineering SKYWAN satellite networks, • Usage of the SKYWAN IDU 7000/1070 TDMA calculation tool. <p>This course is the mandatory prerequisite for the participation in the additional certification course 'Expert SKYWAN IDU 7000/1070 Network Designer'.</p>
Contents	<p>Work on various engineering example cases:</p> <p>Carrier & outdoor unit design:</p> <ul style="list-style-type: none"> • Focus on frequent pitfalls and most critical design steps. • Approaches for design optimization, • Usage of DDD template & result documentation, • Interfacing with 'Network Commissioning'. <p>Advanced traffic analysis and QoS-requirements.</p>
Target Group	Network Designer
Duration	3 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Participation in ND SatCom course 8340, • General good English language skills.
Environment	PC or notebook with SKYWAN IDU 7000/1070 TDMA calculation tool and MS Excel and SKYWAN link budget tool.
Methods	Lecture, advanced exercises, hands-on tool training.

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2 OPTIONAL COURSE MODULES

For certain solutions e.g. with FAD voice multiplexers or flyaway antennas, dedicated / optional courses are available. Some examples you will find on the pages below:

2.1 Configuration of SKYWAN FAD (8243)

8243 – Configuration of SKYWAN FAD	
Title	8243 – Configuration of SKYWAN FAD
Level	Basic / Specialist
Objectives	<p>The participant will be able to: Configure a SKYWAN FAD for basic operation within the SKYWAN network, i.e.:</p> <ul style="list-style-type: none"> • Install a SKYWAN FAD unit, • Setup a SKYWAN FAD with a predefined parameter set, • Run specific functional tests of the unit and within a SKYWAN network.
Contents	<p>Description of SKYWAN FAD solution:</p> <ul style="list-style-type: none"> • Overview about FAD Series 9220 / 9230, • SKYWAN FAD features, • Hardware (interfaces, boards, functionalities, DSP SIMM), • WAN connection & PVC/R protocol, • Supported data protocols & voice codecs, • Configuration file & software images, • Interfacing with SKYWAN IDU. <p>Operator access & command line interface.</p> <p>Configuration section & relevant parameters.</p> <p>Basic pitfalls, test procedures and troubleshooting.</p>
Target Group	Network Operator or Application Configurator FAD
Duration	2 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Participation in ND SatCom course 8240, • Good knowledge in TCP/IP basics, • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	SKYWAN IDU 7000 series hardware, SKYWAN FAD hardware, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations (with FAD) for a small network.
Methods	Lecture, demonstrations, practical hand-on exercises.

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2.2 Installation basics (8010)

Title	8010 – Installation Basics (VSAT Station)
Level	Entry / Beginners
Objectives	The participant will be able to: <ul style="list-style-type: none"> • perform the proper installation of a VSAT station, • do the antenna pointing, • use the necessary equipment & tools.
Contents	The following topics are included: <ul style="list-style-type: none"> • Antenna assembling & mounting, • Grounding & lightning protection, • Cabling & soldering (optional), • Mounting of ODU equipment, • Antenna pointing.
Target Group	Especially for persons new with installation tasks, who want to participate in the product specific courses (i.e. ND SatCom course for “station commissioning”).
Duration	1 day
Prerequisites	The following prerequisites are mandatory for the participant: <ul style="list-style-type: none"> • Basic knowledge in ‘satellite communication fundamentals (VSAT)’, • General good English language skills.
Environment	Spectrum analyzer, antenna system with RFT & LNB.
Methods	Lecture, hands-on (partly outside classroom), demonstrations, practical exercises.

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2.3 Satellite communication fundamentals (8000)

Title	8000 Satellite Communication Fundamentals (VSAT)
Level	Entry / Beginners
Objectives	The participant will get good knowledge about satellite communication fundamentals and will get the prerequisite knowledge to continue with our product specific courses.
Contents	<p>The following topics are included:</p> <ul style="list-style-type: none"> • History & benefits of satellite communication, • The satellite & the satellite link, • Units & definitions, • Multiplexing methods, • From voice to bits – digitization basics, • From bits to waves – modulation basics, • Basic VSAT ground station overview, • Antenna basics, • Transmit & receive components (demonstration waveguide), • Safety at work, • Spectrum analyzer basics, • Optional: Hands-on antenna pointing exercise.
Target Group	Anyone interested in satellite communication or persons new in satellite communication technology.
Duration	2 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • General good English language skills.
Environment	Classroom
Methods	Lecture, discussion, demonstrations.

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3 COURSE CERTIFICATE

The ND SatCom courses will provide a solid knowledge about the selected topic for the participant. The following knowledge levels within the available course sequence are introduced:

- Entry level (Beginners)
- Basic level (Silver - Specialist)
- Advanced level (Gold - Expert)

Customer will be able to go for:

- Participation in entry / basic / advanced level courses (without test),
- Participation in additional dedicated Expert certification courses.

ND SatCom provides currently the following standardized certification courses:

- Expert SKYWAN 7000 Network Designer,
- Expert SKYWAN 7000 Network Operator,
- Expert SKYWAN 7000 Station Commissioner.

By passing our certification courses a common and exchangeable base of proven knowledge and skills will be guaranteed.

All Expert certificates are valid for **2 years**. Prolongation requires a dedicated and timely re-certification.