Transition to AMHS – COMSOFT’s Experience from multiple Installations

COMSOFT's Advanced Message Handling Product Line

ERNAM, Dakar, May 28/29, 2013
The Transition to AMHS – A Global Issue

- The transition to AMHS is a fundamental change in the world-wide provision of the Aeronautical Fixed Services (AFS)

- The existing AFTN COM-Centre structure and message work flows will be completely revised

This presentation summarizes the facts gained from multiple AMHS Installations
Starting Point – Heterogeneous AFTN Environment

Existing AFTN Environment

- Adjacent AFTN Centres
- Adjacent CIDIN Centres
- CIDIN
- PSDN, PSTN, leased/direct lines, TTY, FAX, TELEX
- CIDIN/AFTN Switch
- AFTN Subcentre
- AFTN Clients (Terminals and Applications)

Transition

Proprietary domestic Environment

- AMHS Switch
- AMHS UA
- Adjacent AMHS Centres
- AMHS Applications
- ATN/IP
- AN/IP

Harmonised Environment (final stage)

- Harmonised Environment
- AFTN Clients
- AFTN Subcentre
- Transition
- Existing AFTN Environment
Transition – Identification of “Crucial” Elements (X)

The Initial Step

CIDIN/AFTN Switch

Available on the Market

AMHS Switch

Global Elements of Transition

International AFTN Connections

PSDN, PSTN, leased/direct line, TTY

AMHS Connections

ATN/IP

X Setup of ATN/IPS Connections
X Setup of AMHS connections
X Synchronization of Address Data (AMC)

Local Elements of Transition

Proprietary domestic Environment

ATN Client (Terminals and Applications)

AMHS Applications

IP

AMHS UA

PSDN, PSTN, leased/direct line, TTY, FAX, TELEX

AMHS Switch

X Revision of the domestic Infrastructure
X Upgrade of ATC/ATS Systems
X Adaptation of specific workflows
Global Issues
Global Issue – Setup of the ATN/IPS Connection

AMHS Switch COM Centre A

National Boundary

PTT 1

PTT 2

PTT 3

National Boundary

AMHS Switch COM Centre B

High Co-ordination Efforts
Global Issue – Setup of the AMHS Connection

- The setup of an AMHS connection with an adjacent country requires a strict sequence of test activities as described in the ICAO EUR AMHS Manual
  1. Appendix D – AMHS Conformance Tests
  2. Appendix E – AMHS Interoperability Tests
  3. Appendix F – AMHS Pre-operational Tests
Global Issue – Setup of the AMHS Connection

- AMHS systems who do not provide the AMHS conformity certificate in accordance with Appendix D caused during AMHS Interoperability Tests (Appendix E) the following problems:
  - Incompatibilities with basic AMHS Protocol Elements
  - Incompatibilities of AFTN ↔ AMHS conversion procedures
  - Non-conformant behaviour in error situations
Global Issue – Synchronization with AMC

- ICAO requested 2009 all ANSPs per state letter to register at the AMC and to regularly update their own AMHS address database from the global AMC AMHS address database (AIRAC Procedure)

- AMHS systems working with outdated AMHS address databases caused

  - AFTN and AMHS routing problems/errors
  - AFTN/AMHS conversion errors
Global Issue – Synchronization with AMC

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  - AFTN and AMHS routing problems/errors
  - AFTN/AMHS conversion errors
Local Issues

Local Issues
Local Issue – Example of a complex domestic Infrastructure

Noeud X.25 RENAR

Point d'entrée "X.25" étranger

Centre COM
- Lien CIDIN
- Lien CBM
- Lien AFTN/X.25

Remarques :
Ne sont pas représentés :
- les PVC/routes CIDIN (principales et secours),
- Le maillage des noeuds RENAR (Réseau fortement maillé),
- Le maillage intérieur des réseaux étrangers,
- Tous les calculateurs d'essais AFTN/X.25
Le détail pour skyguide sera donné ultérieurement
Local Issue – Upgrade of existing ATC Systems

ATC Systems

FDPS
RDP
AIS
METEO
Billing System

AFTN Interface
AFTN Interface
AFTN Interface
AFTN Interface
AFTN Interface

AMHS Interface?

AMHS Switch
Local Issue – Special Domestic Message Workflow

AFTN Switch

Incoming Messages

Outgoing Messages

Destinations

Message Copies

Additional Destinations

Special Message Work Flow

Work flow can not be provided by AMHS Standard Components
Example 2 – Special Domestic Message Workflow

Incoming Messages → AFTN Switch → Outgoing Messages

AFTN Terminal System
- local AFTN Database

Global Access

AMHS UA Terminals
- Message Store

Incoming Messages → ATS Message Server → Outgoing Messages

Message Store
- Mailbox Access

Work flow can not be provided by AMHS Standard Components
Existing AFTN environments cannot be replaced by AMHS "in one shot"
AMHS Transition Strategy – Mixed Operation of AFTN and AMHS

AFTN

Mixed Operation of AFTN and AMHS

AMHS

2007

20??

Residuals
1. Installation of an AFTN/AMHS switch and operation in the current AFTN environment

2. Upgrade of the international/domestic communication infrastructure

3. Start of the “step-by-step” AMHS transition process
AMHS Transition Strategy – “Step by Step”
COMSOFT AMHS Transition Support
AMHS Transition - COMSOFT’s Support

✓ COMSOFT provides as the only supplier on the market an integrated AFTN/AMHS product suited at best for the mixed operation of AFTN and AMHS

✓ COMSOFT provides highest expertise in deploying AMHS systems; COMSOFT AFTN/AMHS customers operate 90% of all worldwide operational international AMHS connections

✓ COMSOFT provides the AMHS/SOAP interface in order to facilitate the upgrade of existing customer end systems to AMHS

✓ COMSOFT owns a source code license of the X.400 Software (ISODE) and, if required, is able to implement specific workflows
COMSOFT's Advanced Message Handling Product Line

COMSOFT’s AMHS Solution
AIDA-NG – AFTN/CIDIN/AMHS Product

COMOSFT provides two products for AFTN/AMHS

- **AIDA-NG**
  Integrated AFTN/CIDIN/AMHS Switch

- **CADAS**
  Client-Server-based terminal system for the ATS end user

Both Products are native COMSOFT key-products, which have proven their high flexibility by being deployed in most different ATC environments
AIDA-NG – AFTN/CIDIN/AMHS Product

AIDA-NG

Aeronautical Integrated Data Exchange Agent - Next Generation

COMSOFT key product since more than 20 years

Only MHS on the market providing a common messaging framework for all types of aeronautical data
(AFTN, CIDIN, AMHS, SITA, WMO, AIDC, OLDI....)
AIDA-NG – Fully Redundant System Architecture

- Duplicated Communication Servers
- Duplicated Database Systems
- X.25/ASYNC/TG
- Automatic Line Switch Unit (ALSU)
- Serial Interfaces
- Communication Server 1
- DB System 1
- Redundant LAN Interface
- Communication Server 2
- DB System 2
- Redundant LAN Interface
- Redundant Fast/Gigabit Ethernet
- ATN
- IP
- External LAN
- Communication Partners
- IP Router
- Remote Access Router
- OWP 1
- Redundant LAN Interface
- OWP N
- Redundant LAN Interface
- Printer 1
- Shareable Printers
- N-fold redundant Operator Workingpositions
AIDA-NG – Redundant in all Components

- Duplicated serial interfaces with Automatic Line switch Unit
- Duplicated Databases provide true data redundancy (major improvement of the non-reliable RAID-based Storage Technology)
- Fully redundant LAN Architecture
- Servers working in symmetric Operational/hot standby Combination
- Switchover time 5 secs without loss of data
- N-fold Redundancy by identical OWPs

Communication Server 1
- Serial Interfaces
- Redundant LAN Interface
- Disk System 1

Communication Server 2
- Serial Interfaces
- Redundant LAN Interface
- Disk System 2

Automatic Line Switch Unit (ALSU)

OWP 1
- Redundant LAN Interface

OWP N
- Redundant LAN Interface

X.25/ASYNC/TG
AIDA-NG - What we avoid – Shared Storage Devices

- Conventional Cluster Solutions typically use "shared" components, e.g. Application Software, Data Volumes, and Storage Devices.
AIDA-NG – Integrated ATSMHS

AIDA-NG is powered by ECG Core Software

(ECG = European Communications Gateway)

The ECG Core SW is the basis for the universal ground-ground communication service of the European ANSPs

COMSOFT is official ECG supplier to EUROCONTROL
ECG Core Software – Realisation

ECG URD
Available to all member states

Definition

COTS Platform

ICAO Standards (AFTN, ATN)

Interoperability

Extensibility

Connectivity

Portability

Scalability

ECG

qualified by

COMSOFT

Development

URD = User Requirements Document
Integrated on COTS Platform
(standard server-based architecture)

Universal Connectivity
(AFTN, AMHS, SITA, WMO, OLDI, AIDC, etc.)

Deployable in every ATS Environment
(small(est), medium, big, obsolete, or advanced infrastructure…)

Maximum Support of the AMHS Migration
("online", without stopping the service)
Long-Term Mixed Operation of AFTN and AMHS
Standard (Fragmented) Solution – Suitable?

Avoided in COMSOFT’s AFTN/AMHS Product

ICAO Messaging Components

AFTN Switch  AMHS/AFTN Gateway  ATS Message Server

(Existing) System 1  Stand-alone System 2  Stand-alone System 2 (e.g. AMHS COTS Product ISODE M-Switch)

AFTN Management  MTCU Control Position  ISODE X.400 Management

AFTN Database  MTCU Database  ISODE X.400 Message Log

Avoided in COMSOFT’s AFTN/AMHS Product
The Solution

Integrated System
AIDA-NG – Integrated Messaging Services

- 100% Compliance to Standards
- 100% Integration of all messaging entities (AFTN, AMHS, SITA, WMO, OLDI, others)
- Harmonised Message Handling (AFTN, AHMS, SITA, WMO, OLDI, others)
- Unified System Management
AIDA-NG Strong Point – Horizontal/Vertical Integration

One single Application
AIDA-NG Strong Point - AFTN to AMHS Transition Support

Unified System Management

- AFTN Circuits
  - TCP/IP, X.25, CIDIN, Async/TG
- X.400 Circuits
  - TCP/IP, ATN

Online “Step-by-Step“ Migration

AFTN

AMHS
AIDA-NG Performance Values

- Platform
- Protocols/Messaging
- Throughput
- Reliability
- Maintainability
- Robustness
- Extended Supervision
Server-Based Platform

- Integrated on Intel® processor-based servers and workstations of various vendors (IBM, HP, DELL, etc.)
- RED HAT Linux Enterprise Distribution (Scientific Linux)
- Fast real-time database of any capacity
- X-Windows and Java-based GUIs
AIDA-NG Strong Point - Interfaces and Protocol Stacks

Messaging Interfaces supported in “one system”:

- Up to 130 serial redundant V.24/V.11 interfaces:
  - AFTN/ASYNC (direct, leased lines)
  - AFTN/Telegraphic Interface
  - AFTN/X.25 (PVC/SVC)
  - CIDIN/X.25 (PVC/SVC)
  - WMO/X.25 (PVC/SVC)
  - OLDI FDE ICD (X.25 SVC)
  - SITA/BATAP/EMTOX (X.25 PVC/SVC)

- Up to ten Ethernet LAN 10/100/1000 Interfaces
  - AFTN/TCP/IPv4,6 (bilateral agreement)
  - AFTN/SOAP
  - AMHS P1/ATN (via ATN Router)
  - AMHS P1,P3/TCP/IPv4,6
  - AMHS SOAP (*Service for SWIM*)
  - FMTP (TCP/IP)
  - SITA/BATAP/MATIP (TCP/IP)
AIDA-NG Strong Point – Additional Gateways

- **AFTN/SITA Gateway**
  Conversion of AFTN messages \(\leftrightarrow\) SITA messages

- **AFTN/E-mail Gateway**
  Connection to E-mail Server via SMTP/POP3
  Conversion of AFTN messages \(\leftrightarrow\) E-mail

- **AMHS/E-mail Gateway**
  Conversion of AMHS Messages \(\leftrightarrow\) e-mail
  Full support of extended services (attachments)
  Generic/individual conversion configuration

- **E-mail/FAX Gateway**
  Conversion of E-mail \(\leftrightarrow\) FAX (G3)
  Fully applicable for the AFTN/AMHS \(\leftrightarrow\) E-mail GW

- **OLDI/FMTP Gateway**
  Conversion of FDE ICD \(\leftrightarrow\) FMTP
AIDA-NG Strong Point – Access to the EURCONTROL AMC

EUROCONTROL ATS Messaging Management Centre AMC

Centralized Information Database for all ATN users with “offline” access via WEB interface

AIDA-NG

Offline Data Export

Offline Data Import

WEB Service
Strong Point – Access to the Directory Service

AIDA-NG

DUA

DAP

X.500-based Directory Service
AIDA-NG Strong Point – **EDS** Extension

**EDS** – X.500-based European Directory Service

COMSOFT is the **EDS** key supplier to
# Throughput Figures Example

## Scenario

<table>
<thead>
<tr>
<th>Traffic in/out</th>
<th>AMHS: 100 msg/sec in, 200 msg/sec out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Throughput:</td>
<td>AFTN: 70 msg/sec in, 140 msg/sec out</td>
</tr>
<tr>
<td>15 Million Messages / Day</td>
<td>Total: 170 msg/sec in, 340 msg/sec out</td>
</tr>
<tr>
<td>AFTN/AMHS G/W Traffic</td>
<td>AMHS/AFTN: 50 msg/sec</td>
</tr>
<tr>
<td></td>
<td>AFTN/AMHS: 50 msg/sec</td>
</tr>
<tr>
<td>Average msg length</td>
<td>1000 bytes</td>
</tr>
<tr>
<td>Queuing</td>
<td>No</td>
</tr>
<tr>
<td>Average Transit Time</td>
<td>AFTN → AFTN: 15 ms</td>
</tr>
<tr>
<td></td>
<td>AFTN → AMHS: 200 ms</td>
</tr>
<tr>
<td></td>
<td>AMHS → AFTN: 200 ms</td>
</tr>
<tr>
<td></td>
<td>AMHS → AMHS: 500 ms</td>
</tr>
<tr>
<td></td>
<td>average: 300 ms</td>
</tr>
<tr>
<td>Command Response Time</td>
<td>&lt; 2 sec</td>
</tr>
</tbody>
</table>
Strong Point - Message Congestion Handling

- System can hold more than 250,000 pending messages (AFTN/AMHS) in transmission queues
- Switching Performance and System Access is not degraded under this load
- System is fully protected against overload by flow control mechanisms

Manual Contingency Procedures on message level (e.g. a message drain function) are not required
## AIDA-NG/CADAS – System Availability (April, 2013)

### Excerpt of Customer Installations

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Operational Systems</th>
<th>Operational since ...</th>
<th>Number of operational hours/total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>1</td>
<td>Mar-02</td>
<td>98400</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>2</td>
<td>Dec-02</td>
<td>183600</td>
</tr>
<tr>
<td>Libya</td>
<td>1</td>
<td>May-04</td>
<td>79392</td>
</tr>
<tr>
<td>Eurocontrol CFMU</td>
<td>2</td>
<td>Nov-04</td>
<td>149952</td>
</tr>
<tr>
<td>Philippines</td>
<td>1</td>
<td>Dec-05</td>
<td>65496</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1</td>
<td>Jun-06</td>
<td>61128</td>
</tr>
<tr>
<td>Macedonia</td>
<td>1</td>
<td>Jul-06</td>
<td>60408</td>
</tr>
<tr>
<td>Serbia and Montenegro</td>
<td>1</td>
<td>Nov-06</td>
<td>57456</td>
</tr>
<tr>
<td>United Arabian Emirates</td>
<td>1</td>
<td>May-07</td>
<td>53112</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>Jun-07</td>
<td>52368</td>
</tr>
<tr>
<td>Australia</td>
<td>1</td>
<td>Jul-07</td>
<td>51648</td>
</tr>
<tr>
<td>Oman</td>
<td>1</td>
<td>Nov-07</td>
<td>48696</td>
</tr>
<tr>
<td>Morocco</td>
<td>1</td>
<td>Dec-07</td>
<td>47976</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>1</td>
<td>Apr-08</td>
<td>45048</td>
</tr>
<tr>
<td>Egypt</td>
<td>1</td>
<td>Nov-08</td>
<td>39912</td>
</tr>
<tr>
<td><strong>Total for all sites</strong></td>
<td><strong>17</strong></td>
<td></td>
<td><strong>912960</strong></td>
</tr>
</tbody>
</table>

**Field-proven system availability:**  > 99,999945%
AIDA-NG – System Maintainability

Central Boot/Configuration/Software Server

End User Terminals

Central Repository
Software Databases

AFTN/AMHS SystemServer

Download
(Manual Installation no more required)

Office (ARO, Airlines, etc.)

Tower

Pilot

Domestic Airport
Exchange of a spare server can be done in two steps:

1. Configure spare server via basic installation CD (5 minutes)
2. Reboot spare server

- Exchange can be done in approximately 10 minutes
- Installation of software, configuration, databases, etc. is not required
- No interruption of service during exchange of the server
AIDA-NG – Strong Point - Software Maintenance

System-related Upgrades

Regular Software Upgrades (ATN, ICAO)

ANSP-specific Upgrades/Extensions

COMSOFT, Karlsruhe

Submission of new Software Release

Secure Connection

WWW WAN

Import

AIDA-NG Servers 1, 2

Boot/Configuration/SW Server

AIDA-NG Release 1.0
AIDA-NG Release 1.1 (active)
AIDA-NG Release 1.2

Customer

Software Release Administration (Import, activate, delete)

Reference System

Software Release completely integrated and tested on a reference system

IBM Reference System

COMSOFT, Karlsruhe

Secure Connection

AIDA-NG Release 1.2
AIDA-NG Strong Point - Dual Site Handling

Outage of OPS Centre

“Online” Backup of operational Data

Transfer of operational Service in less than 15 Minutes
In Operation – AIDA-NG Dual Site Configuration Australia

**Operational System:** Brisbane

**Contingency System:** Melbourne

Transfer of service from Brisbane to Melbourne was executed within **30 minutes**
Strong Point - Unrivalled Benefits for Users

- Redundancy without any single point of failure
- Complete System Switchover in < 5 sec
- Fully integrated and tuned X.400 COTS product (redundancy, stability, throughput, extended queue handling, diagnostics, etc.)
- Unified System Management (AMHS, AFTN, legacy part, X.400, etc.)
- 100% protection against overflow situations
- Unmatched high message throughput
- Dual Site Operation/Contingency Management
CADAS

COMSOFT Aeronautical Data Access System

COMSOFT’s advanced client/server-based ATS Terminal System
CADAS – Client/Server Terminal System with ATS/AFTN or ATS/AMHS UA Client Terminals

- **AFTN Switch (AIDA-NG)**
- **CADAS Central Servers 1,2**
- **HTTP(S)**
- **Central X.500 Directory Server**
- **Server 1**
- **Server 2**
- **TCP/IP**
- **Message Database (AFTN/AMHS)**
- **Static Databases**
- **Local ATN Directory**
- **DMZ**
- **DHAP**
- **ATS Message Server (AIDA-NG)**
- **CADAS Terminal Server**
- **De-Militarized Zone (DMZ)**
- **Firewall**
- **Redundant CADAS WEB Servers**
- **AFTN Switch (AIDA-NG)**
- **CADAS AFTN/AMHS UA Client Terminals**

**Notes:**
- **TCP/IP**
- **WWW, VPN, PSTN**
Strong Point - Client/Server System Database Access

CADAS AFTN/AMHS UA Client Terminals
(Remote Locations, Domestic Airports, etc)

WWW
IP (LAN/WAN)
PSTN

Central Database Access

Message Database (AFTN/AMHS)
Static Databases
Local ATN Directory

CADAS Servers
(Centre)
Strong Point - Client/Server System Software Maintenance

CADAS AFTN/AMHS UA Client Terminals
(Remote Locations, Domestic Airports, etc)

WWW
IP (LAN/WAN)

Automatic SW Distribution

CADAS Servers
(Centre)

Software Repository
CADAS-ATS Security I

- CADAS security has been made bullet-proof in order to provide secure access to ATS over the Internet
- Messaging solutions based on SMTP cannot compete with CADAS’ security, ease of use and richness of functionality

- Strong password checking
- Pass phrase
- Idle timer
- Local cache clearance
- Account locking on break-in attempts
- Disclaimer
CADAS’ Internet security has been validated by independent IT Security Consultants

### Procedures:
- Analysis of system design and communication protocols
- Hacking attempts over Internet and local network

### Outcome:
- CADAS does not exhibit any known security breaches and is immune to security threats

### Conclusion:
- CADAS can be safely used over the Internet for nation-wide services
Security Framework

- **CADAS Terminal Server 1**
- **CADAS Terminal Server 2**
- **CADAS Terminal Server 3**
- **Internet**
- **Two virtual, redundant LANs for access via Internet and ISDN dial-in**
- **ISP Router 1**
- **ISP Router 2**
- **Dial-in Router 1**
- **Dial-in Router 2**
- **Inner Firewall 1**
- **Inner Firewall 2**
- **Intrusion Detection Sensor 1**
- **Intrusion Detection Sensor 2**
- **Log Server**
- **Outer Firewall 1**
- **Outer Firewall 2**
- **CREAS Terminal Clients**
- **Monitoring**
- **DMZ LAN**
- **IDS LAN**
- **Message Handling LAN**
- **Administration LAN**
- **Actually insecure or considered insecure area**
- **Actually insecure or considered insecure area**
- **Network actually unsafe or considered unsafe**
- **Network device actually unsafe or considered unsafe**
- **Network device implementing security services**
- **Device/server implementing message handling services**
- **Device implementing administrative services**
- **Inner Firewall 1**
- **Inner Firewall 2**
- **Monitoring**
- **Inner Firewall 1**
- **Inner Firewall 2**
- **Monitoring**
- **Printers 1..n**
- **Network Management Station**
- **Secured area hosting the messaging applications**
CADAS – Terminal Applications

- Centre Terminal
  Full Scope of ATS Functions for ATC Controllers, Tower, ARO, Airlines

- ATS Terminal
  Management of ATS Messages (FLP+ associated, NOTAM, METEO, free text)

- Pilot Terminal
  Proposal filing (FPL, DLA, CHG, CNL), Active flight monitoring

- Flight Strip Printing Terminal
  Automatic generation, update and printing of flight strips

- Administration Terminal
  Supervision, control and configuration of the entire system
Full support of both ATS Formats

- ICAO DOC 4444 edition 15
- Amendment 1 to DOC 4444 edition 15
CADAS – ATS Client Terminals (AFTN or AMHS)

- Platform-independent Java Application
- "Online" monitoring of incoming messages (AMHS or AFTN)
- Syntactic/semantic checking of received messages with type detection (FPL, NOTAM...)
- Template-specific view of received messages
- Automatic printout of incoming/transmitted messages
- Templates for all kinds of ATS messages (FPL+ associated, etc.) with online checking mechanisms
- Highly sophisticated message retrieval function with a multitude of filter criteria
- Support by central static databases (aircraft types, flight routes, FIRs, aerodromes, etc.)
• Pending messages (AFTN or AMHS) can be directly accessed and processed
• Several mailboxes can be monitored simultaneously

CADAS ATS Client Terminal – Mailbox Monitoring
Automatic printing of messages according to Printer Setup
Up to three printers can be assigned for auto printing on each Terminal
CADAS ATS Client Terminal - FPL Management

- Restricted Areas
- Preferential Routes
- Templates
- Online Help
- Syntax/Semantic Check
- Static Data Support
Strong Point CADAS ATS Client Terminal – Integrated AMHS Functionality

- Fully integrated AMHS User Agent
- Practically invisible to the end user

Access to central address book

Display/hide AMHS Attributes

Attachment
ATS Terminal – Creation of NOTAMs

- Auto NOTAM Series number allocation,
- Message Templates:
  - NOTAM N/R/C
  - SNOWTAM
  - ASHTAM
ATS Terminal – OPMET Templates

- Sophisticated retrieval mechanism with a multitude of selection attributes available
- METEO Message Templates with formatted Inputs and online field checking mechanisms
- Various message templates including:
  - METAR
  - SPECI
  - SIGMET
  - AIRMET
  - TAF
CADAS – Extensions

Active Flight Database
Active Flight Database

- Online monitoring of Inbound, Outbound, and Over-Flights
- Configurable time window
- Callsign filter and sorting criteria
- List of ATS message history of each flight
Services - How you get it

COMSOFT delivers "turnkey" solutions
Services – "Turnkey" Solution – Example
Valuable Add-On: COMSOFT Network Management System

Central Supervision of the entire Location
CNMS – Central Supervision of Components – Logical View
Central Supervision – Cabinets
CNMS – Central Supervision of Components - Switches
CNMS – Central Supervision of Remote Terminals
Visualisation of Performance Data

- CPU Load
- Memory Usage
- Temperature
- Availability Figures
- Number of pending messages

Performance graphics are generated automatically
Services – Support During all Project Life Cycle Phases

- Design
- Production
- Commissioning
- Long-Term System Support
Peter,
See note from Kevin confirming that the transition onto AMS-UK is now complete. I like to add my thanks to everyone at Comsoft for your support in achieving this important milestone.
The whole transition has gone very smoothly and the delay in transitioning the last Xx connections was due to a problem with the Xx system and NOT AMS-UK.
Could you please forward this on to all interested parties at Comsoft.
Regards,
Malcolm.

Gents,
I believe all of you are aware that following an extremely successful transition of almost all of the users by the 1st week in September, we were stuck with problems with Xx connections. Following another set of testing, we have subsequently been able to transition them to AMS-UK today and I can thus declare that the user transition is complete. Although this is a week later than I had planned, in comparison to previous transitions of this magnitude, I cannot emphasise enough how well this has gone and would not have been achieved without a magnificent team effort and I take my hat off to them.
Regards, Kevin
AIDA-NG Product Line – Outstanding Maturity Level

✓ More than 700,000 (!) automated module and integration tests for each customer baseline.

✓ The AIDA-NG product line has been excessively tested in a multitude of implementation projects:

✓ More than 7900 test cases witnessed by numerous FAT inspection teams since 2005
System Testing – Acceptance Tests

![Bar Chart]

Customer | Number of Tests
---|---
1 | 587
2 | 610
3 | 61
4 | 113
5 | 92
6 | 302
7 | 821
8 | 97
9 | 110
10 | 120
11 | 140
12 | 229
13 | 259
14 | 166
15 | 739
16 | 726
17 | 313
18 | 160
19 | 127
20 | 779
Added Value – Compliance with European Safety Regulations

✓ Full compliance with **European Safety Regulations** (ESARR1-6).

✓ Proven **Software Assurance Level (SWAL) 3** according to EUROCONTROL Safety Assessment Methodology (SAM) (SIL-2/IEC 61508 and AL 4/ED-109).
COMSOFT – AMHS Conformance Testing

COMSOFT AMHS Test Suite

- Full Support of both, regional EUR + ASIA/Pacific AMHS Manuals (ATN/OSI, ATN/IPS)
- Highest Automation Grade (>95%) of Test Execution
- Platform-independent Test-Suites
- Test Message Repository in XML Format
- Evaluation of Test Results as integral part of Test Suites
- Detailed Logs and Test Reports

AMHS Conformance Verification

- Suitable for any AMHS
- Use of Standard AFTN/AMHS Interfaces and Configuration
- No specific IUT Test Harness required

Customer References

Germany, EUROCONTROL, Netherlands, United Kingdom, Belgium, France, Suisse, Lithuania, Poland, Slovakia, Bosnia & Herzegovina, Serbia, Macedonia, Libya, Egypt, Saudi Arabia, Zimbabwe, Morocco, Emirates, Oman, Qatar, Pakistan, India, Macau, Singapore, Australia, Fiji, Hong Kong, Peru, Colombia, Angola, Nigeria, Kuwait, Mongolia
COMSOFT – Experience in AMHS Interoperability Tests

- **ECG**
  
  The COMSOFT ECG is used as AMHS Reference System by EUROCONTROL to perform interoperability tests for the evaluation of other AMHS products.

- **Customer Support**
  
  COMSOFT is prepared to support its customers for the setup and execution of Interoperability Tests with adjacent centres:

  - Test Harness (System Configuration, Test Messages, etc.) in accordance with AMHS Manual is available
  - Test Documentation (Configuration, Test Suites, etc.) is available
  - COMSOFT can provide
    - remote support during test phase (Option A)
    - on-site support during test phase (Option B)
IOP Tests – Supported COMSOFT Customers
(Blue Colour: COMSOFT Customers)

Option A - Remote Support:
- Bratislava ↔ Vienna: AMHS IOP Tests according to EUR AMHS Manual
- Frankfurt ↔ Copenhagen: AMHS IOP Tests according to EUR AMHS Manual
- Frankfurt ↔ Brussels, CFMU: AMHS Interconnection Tests (Subset of IOP Tests)
- Mumbai ↔ Beijing: AMHS IOP Tests according to Asia/Pacific AMHS Manual
- Bordeaux ↔ Madrid: AMHS IOP Tests according to EUR AMHS Manual
- Singapore ↔ Bangkok: Pending due to X.400 Conformance Problems of Bangkok
- Hong Kong ↔ Macau: Operational AMHS connection
- Frankfurt ↔ Madrid: Operational AMHS connection
- Sarajevo ↔ Vienna: Operational AMHS connection
- NATS, UK ↔ FAA, Atlanta: Operational AMHS connection (inter-regional)
- NATS, UK ↔ Singapore: Operational AMHS connection (inter-regional)
- Peru ↔ Quito: Operational AMHS connection

Option B - On-site Support:
- Bogota ↔ Peru: Operational AMHS connection
- Mumbai ↔ Singapore: Operational AMHS connection
- Abu Dhabi ↔ Muscat: Operational AMHS connection
- Abu Dhabi ↔ Doha: Operational AMHS connection
- Abu Dhabi ↔ Amman: Operational AMHS connection
- Abu Dhabi ↔ Egypt: Operational AMHS connection
- S. Arabia ↔ Egypt: Operational AMHS connection
- Fiji ↔ FAA, Atlanta: Operational AMHS connection (inter-regional)
- Macau ↔ Beijing: to be continued after Beijing version update
Our Success
**Customer Base - References/Projects in Europe**

### NATS, UK
- Locations: Heathrow and Gatwick
- 2 redundant AMHS/CDIN/AFTN systems
- 1 redundant AMHS/CDIN/AFTN test system

### EUROCONTROL
- Location: Brussels
- ECG Core Software Package
- EUROCONTROL AMHS Reference System

### EUROCONTROL, CFMU
- Locations: Brussels and Paris
- 4 redundant AMHS/CDIN/AFTN systems

### Belgocontrol, Belgium
- Location: Brussels
- 1 redundant operational AMHS/CDIN/AFTN system
- 1 redundant contingency AMHS/CDIN/AFTN system
- 1 redundant test/training AMHS/CDIN/AFTN system
- 45 CADAS AMHS UA/AFTN User Terminals

### LVNL, the Netherlands
- Location: Amsterdam
- 1 redundant AMHS/AFTN/CIDIN system
- 1 redundant test/development system

### DSNA (Project: MESANGE), France
- Location: Bordeaux and 10 remote sites
- 1 redundant operational AMHS/CIDIN/AFTN system
- 1 redundant contingency AMHS/CIDIN/AFTN system
- 1 redundant test/training AMHS/CIDIN/AFTN system
- 1 redundant AMHS/CIDIN/AFTN development system
- 16 concentrators installed on 10 remote sites
- up to 150 CADAS AMHS UA/AFTN User Terminals

### skyguide (Project: MESANGE), Switzerland
- Location: Geneva
- 1 redundant operational AMHS/CIDIN/AFTN system
- 1 single contingency AMHS/CIDIN/AFTN system
- 1 redundant test/training AMHS/CIDIN/AFTN system
- up to 40 CADAS AMHS UA/AFTN User Terminals

### Sakaeranavigatsia Ltd, Georgia
- Location: Belgrade
- 1 redundant AMHS/AFTN switch
- 15 CADAS AMHS UA/AFTN Terminals

### Polish Military, Poland
- Location: Warsaw
- 1 redundant AMHS/AFTN switch
- 63 CADAS AMHS UA/AFTN Terminals

### PANSA, Poland
- Location: Warsaw
- 1 redundant AMHS/CIDIN/AFTN switch
- 16 CADAS AMHS UA/AFTN User Terminals

### Russian Federation (FGUP RTC AISS)
- Locations: Rostov/Don
- 1 redundant CDIN/AFTN system
- 1 AFTN concentrator at a remote site

### EUROCONTROL
- Location: Maastricht UAC
- 1 redundant AMHS/AFTN/CIDIN system
- 1 redundant test/development system

### LVNL, the Netherlands
- Location: Amsterdam
- 1 redundant AMHS/AFTN/CIDIN system
- 1 redundant test/development system

### FEDCAD, Bosnia and Herzegovina
- Location: Sarajevo and Mostar
- 2 redundant AFTN/AMHS/AIM Systems
- 17 CADAS AFTN Terminals

### MCAA, Macedonia
- Location: Skopje and Ohrid
- 1 redundant AMHS/AFTN system
- 23 CADAS AFTN Terminals

### SMATSA, Serbia and Montenegro
- Location: Belgrade
- 1 redundant AMHS/AFTN switch
- 1 AMHS/AFTN test/training system
- 34 CADAS AMHS UA/AFTN User Terminals

### Aeronavigacia, Lithuania
- Location: Belgrade
- 1 redundant AMHS/AFTN switch
- 15 CADAS AMHS UA/AFTN Terminals

### RSCAD, Republic of Srpska
- Location: Banja Luka
- 1 redundant AMHS/AFTN system
- 5 CADAS AFTN Terminals

### Bulatsa, Bulgaria
- Location: Sofia
- 1 redundant AMHS/AFTN switch
- 20 CADAS AMHS UA/AFTN User Terminals

### Croatia Control, Croatia
- Location: Zagreb
- 1 redundant AMHS/AFTN switch
- 1 AMHS/AFTN test/training system
- 5 CADAS AMHS UA/AFTN User Terminals

### LPS, Germany
- Locations: Frankfurt and Langen
- 2 redundant AMHS/CDIN/AFTN systems
- 1 redundant AMHS/CDIN/AFTN test system

### LPS, Slovakia
- Location: Bratislava
- 1 redundant operational AMHS/CDIN/AFTN systems + 1 single contingency AMHS/CDIN/AFTN system
- 1 redundant disaster recovery AMHS/CDIN/AFTN system + 1 single contingency AMHS/AFTN/CIDIN/ system
- 16 CADAS AMHS UA/AFTN Terminals

### Sakaeranavigatsia Ltd, Georgia
- Location: Belgrade
- 1 redundant AMHS/AFTN switch
- 15 CADAS AMHS UA/AFTN Terminals

### DSNA (Project: MESANGE), France
- Location: Bordeaux and 10 remote sites
- 1 redundant operational AMHS/CIDIN/AFTN system
- 1 redundant contingency AMHS/CIDIN/AFTN system
- 1 redundant test/training AMHS/CIDIN/AFTN system
- 1 redundant AMHS/CIDIN/AFTN development system
- 16 concentrators installed on 10 remote sites
- up to 150 CADAS AMHS UA/AFTN User Terminals

### skyguide (Project: MESANGE), Switzerland
- Location: Geneva
- 1 redundant operational AMHS/CIDIN/AFTN system
- 1 single contingency AMHS/CIDIN/AFTN system
- 1 redundant test/training AMHS/CIDIN/AFTN system
- up to 40 CADAS AMHS UA/AFTN User Terminals
Customer Base - References/Projects in Middle East & Africa

**ONDA, Morocco**
Location: Casablanca
1 redundant operational AMHS/CIDIN/AFTN system
1 AMHS/CIDIN/AFTN Test/Training System
5 CADAS AMHS UA/AFTN User Terminals

**CAA, Libya**
Location: Tripoli, Benina, Metiga, Sirt, Sheba
1 redundant AMHS/CIDIN/AFTN/AIM system and
5 gateway sites with 30 CADAS AFTN/AIM User Terminals

**NAMA, Nigeria**
Location: Lagos, Kano
1 redundant AMHS/AFTN/AIM System
1 redundant AMHS/AFTN/AIM Test System
120 CADAS AMHS UA/AFTN Terminals

**ENANA, Angola**
Location: Luanda, Limbago
1 redundant AMHS/AIM System
1 test/training AMHS/AIM System
50 CADAS AMHS UA/AFTN/AIM User Terminals

**NANSC, Egypt**
Location: Cairo
1 redundant AMHS/CIDIN/AFTN system
Up to 200 CADAS AMHS UA/AFTN Terminals

**GCAA, Abu Dhabi**
Location: Abu Dhabi, UAE
2 redundant AMHS/CIDIN/AFTN systems
20 CADAS AMHS UA/AFTN User Terminals

**DGMAN, Oman**
Location: Muskat
2 redundant AMHS/AFTN/AIM system
1 contingency/test/training AMHS/AFTN/AIM System
1 test/training AIM System
25 CADAS AMHS UA/AFTN User Terminals

**QCAA, Qatar**
Location: Doha
1 redundant AMHS/AFTN/AIM System
1 redundant AMHS/AFTN/AIM Test System
up to 60 CADAS AMHS UA/AFTN Terminals

**DCA, Dubai**
Location: Dubai, UAE
1 redundant AFTN switch

**CAA, Zambia**
Location: Lusaka
1 redundant AFTN switch

**CAA, Zimbabwe**
Location: Harare
1 redundant AMHS/CIDIN/AFTN/AIM Switch
18 CADAS AMHS UA/AFTN/AIM User Terminals

**GACA, Saudi Arabia**
Location: Jeddah and Riyadh
1 redundant AMHS/CIDIN/AFTN System
1 single AMHS/CIDIN/AFTN Backup System
Up to 60 local CADAS AMHS UA/AFTN Terminals

**DGCA, Kuwait**
Location: Doha
1 redundant AMHS/AFTN/AIM System
1 contingency AMHS/AFTN/AIM System
1 test/training AMHS/AFTN/AIM System
12 CADAS AMHS UA/AFTN/AIM Terminals
Customer Base - References/Projects in the Asia Pacific Region

CAAN, Nepal
Location: Kathmandu
1 redundant AMHS/AFTN System
25 CADAS AMHS UA User Terminals

CAAB, Bangladesh
Location: Dhaka
1 redundant AMHS/AFTN System
12 CADAS AMHS UA User Terminals

CAAS, Singapore
Location: Singapore
1/1 redundant/single AMHS/AFTN+ATN Router system
12 CADAS AMHS UA/AFTN User Terminals

ATO, Philippines
Location: Manila
1 redundant AMHS/AFTN incl. ATN Router system
40 CADAS AMHS UA/AFTN Terminals

CAAM, Macau
Location: Macau
1 redundant AMHS/AFTN incl. ATN Router system
14 CADAS AMHS UA User Terminals

CAAM, Macau
Location: Macau
1 redundant AMHS/AFTN incl. ATN Router system
14 CADAS AMHS UA User Terminals

APII, Indonesia
Location: Palembang
1 redundant AFTN switch
10 CADAS AFTN User Terminals

DOTC, Indonesia
Location: Djakarta
1 redundant AMHS/AFTN/AIM Test and Reference System
10 CADAS AMHS UA/AFTN/AIM Terminals

ASA, Australia
Location: Brisbane, Melbourne
2 redundant AMHS/AFTN incl. ATN Router systems
1 redundant test/development system
up to 60 CADAS AMHS UA/AFTN User Terminals

Fiji
Location: Nadi
1 redundant AMHS/AFTN/AIM +ATN Router systems
1 single AMHS/AFTN/AIM test/training system
16 CADAS AMHS UA/AFTN/AIM User Terminals

HKCAD, China
Location: Hong Kong
2 redundant AMHS/AFTN systems
up to 150 CADAS AMHS UA/AFTN User Terminals

MCAA, Mongolia
Location: Ulan Batar
1 AMHS/AFTN Gateway

DOTC, Indonesia
Location: Djakarta
1 redundant AMHS/AFTN Gateway

Airways New Zealand
Location: Christchurch (OPS, DEV), Auckland (BCK)
3x redundant AFTN/AMHS Systems (OPS, BCK, DEV)
Up to 120 CADAS AFTN/AMHS UA User Terminals

Papua New Guinea
Location: Port Moresby
1x redundant AFTN/AMHS Systems
12 CADAS AFTN/AMHS UA User Terminals
Customer Base – References/Projects in South America/Caribbean

**U.A.E.A.C, Colombia**
Location: Bogota and 6 domestic local and remote sites
1 redundant AFTN/AMHS system
63 CADAS AMHS UA User Terminals

**CORPAC, Peru**
Location: Lima and 31 domestic local and remote sites
1 redundant AFTN/AMHS system with AIM extension
86 CADAS AMHS UA/AIM User Terminals

**TTCAA, Trinidad-Tobago**
Location: Port of Spain and 14 Caribbean
1 redundant AFTN/AMHS system
46 CADAS AMHS UA User Terminals
SITA AMHS Market Survey (published on the ICAO AMHS workshop in Santo Domingo, November 26th, 2009)

Who is your supplier?

- Comsoft: 59.3%
- Thales: 18.5%
- Ubitech: 3.7%
- Avitech: 7.4%
- Radiocom: 11.1%
- Other:

AIR TRAFFIC CONTROL KNOW-HOW
In the period from 2010 – today COMSOFT was extremely successful and won multiple AFTN/AMHS customers:

53 ANSPs are equipped with the AIDA-NG/CADAS AFTN/AMHS
AIDA-NG – Result of the Evolution

AIDA-NG has evolved to the most mature AFTN/CIDIN/AMHS system on the market

COMSOFT is the AMHS Market Leader
CAUG – COMSOFT AIDA User Group

6th Annual Meeting 07 – 08 May 2013, Karlsruhe, Germany
Contact

Manfred Schmid
Chief Executive Officer
manfred.schmid@comsoft.aero

Uwe Kurpat
Product Manager AMHS
uwe.kurpat@comsoft.aero

Peter Cornelius
Head of Department CSA
peter.cornelius@comsoft.aero

Dominik Koch
Account Manager, CSS
dominik.koch@comsoft-sat.com

Headquarters
COMSOFT GmbH
Wachhausstr. 5a
76227 Karlsruhe
Germany
Phone: +49 721 9497-0
Fax: +49-721-9497-129
info@comsoft.de
http://www.comsoft.aero/

Satellite and Terrestrial Communications
COMSOFT Satellite Services GmbH
Benzstr. 2
71720 Oberstenfeld
Germany
Phone: +49 7062 91651-10
Fax: +49 7062 91651-99
info@comsoft-sat.com
http://www.comsoft-sat.com/
Thank You!