



## **Solving the Air Traffic Control Messaging Challenge**

**Isode Solutions for AMHS and AMHS-AFTN/CIDIN interworking**

**isode**

5 Castle Business Village  
36 Station Road  
Hampton TW12 2BX  
t: +44 (0) 20 8783 0203  
f: +44 (0) 20 8783 9292  
[www.isode.com](http://www.isode.com)



## Table of Contents

<b>Aviation Industry Solutions Overview.....</b>	<b>3</b>
<b>Isode M-Switch X.400.....</b>	<b>5</b>
<b>Isode M-Store X.400.....</b>	<b>6</b>
<b>Isode M-Vault X.500.....</b>	<b>7</b>
<b>AMHS Integration Library.....</b>	<b>8</b>
<b>Appendix 1: Press Release .....</b>	<b>10</b>
<b>Appendix 2: Website Links .....</b>	<b>12</b>

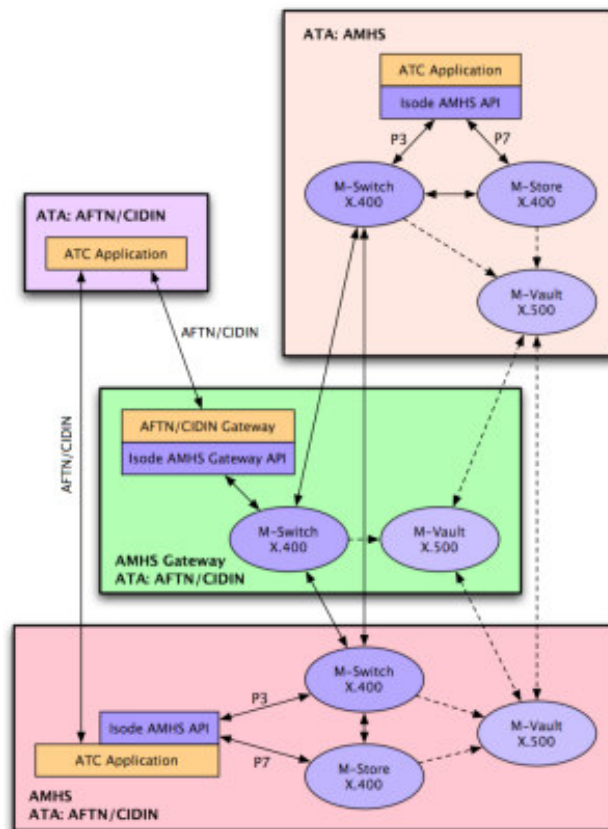
# Aviation Industry Solutions Overview

The aviation industry is adopting AMHS (Aeronautical Message Handling Systems) to support ground to ground communications for services such as flight plans and meteorological data. This will eventually replace the current AFTN (Aeronautical Fixed Telecommunication Network). Isode provides ICAO (International Civil Aviation Organization) SARPS (Standard and Recommended Practices) conformant solutions for AMHS and AMHS-AFTN/CIDIN interworking.

## The Migration Challenge

AFTN and CIDN-based system users are now migrating to new solutions using communication infrastructure provided by the ATN (Air Traffic Network) and using the X.400 application infrastructure of AMHS but, as with any new standard, significant numbers of legacy AFTN and CIDIN systems remain in operation and will do so for the foreseeable future.

The Air Traffic industry is therefore demanding both AMHS solutions and gateway solutions for two-way AMHS to AFTN/CIDIN communication.



In the preceding diagram 3 Air Traffic Authorities (ATAs) are shown operating:

- A legacy AFTN/CIDIN system
- An AMHS system,
- A mixed AFTN/CIDIN and AMHS system and
- An AMHS transitional/gateway solution

This diagram illustrates the role of Isode's products in achieving this

- M-Switch X.400: An X.400 MTA (Message Transfer Agent) for switching messages.
- M-Store X.400: An X.400 Message Store, for storing messages
- M-Vault X.500: An X.500 and LDAP directory server, which is used to configure the Isode AMHS solution, and may also provide an independent directory service

The Isode AMHS API is used to connect AMHS applications to Isode servers using X.400 P3 (to M-Switch X.400) or X.400 P7 (to M-Store X.400) . This API product can also be used to build an AFTN/CIDIN to AMHS gateway.

## Core Server Products

Isode's M-Switch X.400, M-Store X.400 and M-Vault X.500 products are ideally suited to providing an AMHS service, and are conformant to the SARPS specifications, including support of the appropriate transport protocols.

An aviation solution can be integrated with Isode's products using open protocols (X.400 P7 or X.400 P3) or by one of Isode's mail gateway interfaces. There are two types of integration which can be done:

- To directly support an AMHS end application, operating over X.400.
- To integrate with an AFTN product, and thus provide an AFTN/AMHS gateway.

# Isode M-Switch X.400

*M-Switch X.400 is a high performance, highly flexible and robust Message Transfer Agent, which supports both Internet Mail (SMTP/MIME) and X.400 protocols as core services. These characteristics make it suitable for use either as part of a messaging backbone or for service provider message switching services.*

This multi-process message switch utilizes channels, which can be used for protocol conversion and management operations. The use of channels allows many different functions to occur in parallel and enables processes to be added or modified easily. This approach is fundamental to the superior scalability, flexibility and extensibility of the Isode product.

M-Switch X.400 contains a number of leading edge management features which include:

- LDAP/X.500 based configuration, according to the MHS-DS specifications (RFC 1801).
- Flexible address mapping and manipulation.
- Message authorization and access control.
- SNMP monitoring using the MADMAN specifications (RFC 2249).
- MIXER mapping between X.400 and SMTP/MIME, to enable maximum interoperability between X.400 and Internet users.

## Key Benefits

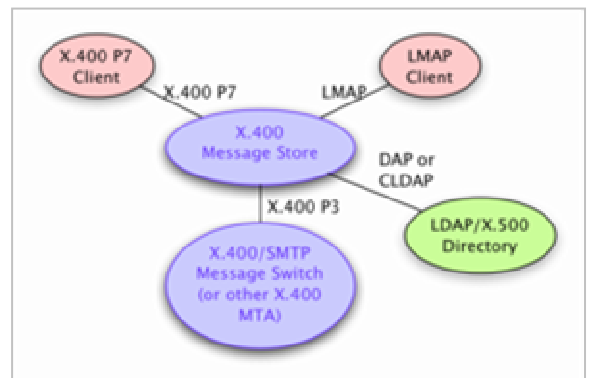
- Fully conformant X.400 MTA (Message Transfer Agent), conforming to OSI profiles and to IACAO SARPS
- High performance message switching.
- High availability, including fail-over clustering
- APIs to enable AFTN/CDIN gateways (Open Group X.400 Gateway API, and Isode AMHS API)
- Easy to use graphical management and monitoring tools
- Management APIs, which enable AFTN/CIDIN vendors to provide and integrated external management tool
- Excellent scheduling and operational characteristics. The Queue Manager (QMGR) and channel architecture described below enables a sophisticated scheduling approach, which combined with the Message Switch's queue structure leads to a product which works exceedingly well in demanding operational environments
- Direct client access via X.400 P3 as alternate to Message Store

# Isode M-Store X.400

X.400 clients (User Agents) use the X.400 P7 protocol to access a Message Store. The Isode Message Store supports P7, and also X.400 P3 to connect to the Isode Message Switch. It serves as an intermediary between User Agents and the Message Transfer Agent, accepting delivery of messages on the user's behalf and storing them for subsequent retrieval. The Message Store also provides an indirect submission service and facilities for searching, listing and deleting messages.

Message Store and client configuration management is integrated into the messaging infrastructure using the LDAP/X.500 directory.

The Isode X.400 Message Store also supports the Lightweight Message Access Protocol (LMAP) which enables lightweight interconnection of X.400 clients that do not support P7.



## Deployment Targets

The Isode X.400 Message Store is designed for use in either a commercial or military X.400 deployment. It is a high performance product, which will support large numbers of users.

## Key Benefits

### High performance

The product is fast and can support large numbers of users.

### Flexible Approach/ M-Switch Integration

Use of directory message store configuration gives a highly flexible approach, integrated with the configuration of the M-Switch. This allows for client/server configuration management and sharing of configuration information between servers.

This configuration is managed with graphical or scripting interfaces, described in the Isode M-Switch Management Product Overview.

### Support of the P3 protocol

The Message Store does not need to be co-located with the message switch, which means that a single message switch can support many message stores. This gives a high degree of flexibility.

# Isode M-Vault X.500

*M-Vault X.500 is a high performance directory server, which can operate as a full X.500 DSA (Directory System Agent) as well as providing LDAP access. It supports the X.500 DAP (Directory Access Protocol), DSP (Directory System Protocol) and DISP (Directory Information Shadowing Protocol).*

M-Vault can be used as a standalone X.500 service, or to provide a configuration database for M-Switch X.400: and M-Store X.400.

## Management and Security

M-Vault X.500 is a conformant X.500 Directory System Agent, which can be configured and managed with easy to use graphical tools. M-Vault is ideal for managing X.509 PKI (Public Key Infrastructure) and offers data confidentiality using TLS (Transport Layer Security).

## High Performance

M-Vault manages millions of entries and processes tens of thousands of queries per second. Performance can be monitored and tuned based on usage and service needs. SMP (Symmetric Multiprocessing) is supported to exploit the power of multiprocessing architectures.

## High Availability

A high-end database transaction subsystem provides assurance that hardware, operating system or application features do not corrupt a directory server database. Transaction support also enables online backup procedures for disaster recovery.

M-Vault X.500 also provides fail-over clustering, and replication using X.500 DISP

## Powerful Cross-Platform Tools

M-Vault features the most powerful and flexible directory management tools available. Our Linux, Solaris and Windows Management GUIs are designed to enable low-cost management within complex environments.

Server configuration, security control and data administration can be managed centrally or delegated to suppliers, partners or customers. M-Vault has the flexibility to allow you to define different access profiles for the multiple administrative, management and user groups requiring a relationship with data and data administration features.

# AMHS Integration Library

*X.400 provides an extensive and powerful set of features, and as a consequence, generic approaches to integrate applications are complex. Isode's AMHS Integration Library provides a simple abstraction of the X.400 functionality to meet the needs of AMHS applications*

Applications developed over the AMHS Integration Library can be deployed in three ways:

1. Over X.400 P7, to access the X.400 Message Store. This is useful for AMHS end applications that require storage services from AMHS.
2. Over X.400 P3 to directly access M-Switch X.400. This is useful for AMHS applications that provide their own reliable storage, and wish to transfer messages over AMHS without the overhead of a Message Store.
3. Co-resident with M-Switch X.400. This is primarily intended for AMHS/AFTN gateway applications, which need to access X.400 functionality that is not available over P3 or P7. The library provides all of the AMHS side of an AMHS/AFTN gateway, making it very straightforward for a vendor with an AFTN product to offer an AMHS/AFTN gateway.

## Deployment Targets

The Isode AMHS Integration library is designed for use by vendors building solutions for the aviation industry, in developing ground to ground applications that operate over AMHS, and for integrating AMHS applications with the AFTN network.

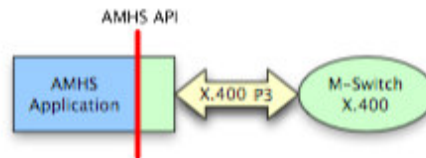
## Key Benefits

The Isode AMHS Integration Library offers the following benefits:

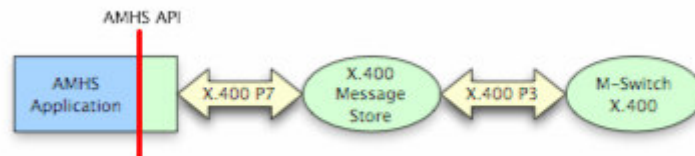
- For developers of AMHS applications, it provides a very simple abstraction, which can be used with new applications or to support existing AFTN applications working directly over AFTN.
- For AFTN vendors, it provides a simple mechanism to provide an AFTN/AMHS gateway or CIDIN/AMHS gateway, by abstracting key X.400 and gateway functionality.
- Although the X.400 complexity is abstracted, the API is designed so that all X.400 services can be selected and modified if required.
- The API is cross platform - available on both Windows, Linux, and Solaris
- The API gives access to both basic and extended AMHS services.
- The API gives access to LDAP and X.500 directory services, to provide simple client lookup and routing capabilities.
- The same basic API can be used for three different modes of deployment (local; P3; P7)

## Architecture

The AMHS Integration Library can be used in three distinct ways, as illustrated below. In the first architecture, the library connects the application to M-Switch X.400 using P3. This is appropriate for AMHS applications that need to send and receive messages, and deal with message storage as a part of the application.



The second option, shown below, connects to Isode's X.400 Message Store using P7. In addition to sending and receiving messages, this architecture enables message storage, and is appropriate for applications that need the infrastructure to support message storage (e.g., to permit access to a message by a second terminal, in the event of a hardware failure).



The final version of the API is co-resident with M-Switch X.400. This is primarily intended for building AFTN or CIDIN gateways, which require access to X.400 (message transfer) service elements which are not available over P3 or P7. This architecture could be used for general AMHS applications, although Isode recommends use of the P3 architecture for AMHS applications co-located with M-Switch X.400.



## Security

Authentication over protocol can use one way or two way password based authentication. When operating over TCP/IP, encryption can be provided by use of IPsec.

## Use of Directory

The AMHS integration library provides for directory calls, to enable lookup of X.400 addressing information for AMHS recipients, that can be used to address messages, so that the application does not have to handle X.400 addressing directly. This API can be used of X.500 DAP or LDAP.

# Appendix 1: Press Release

## **Isode announces AMHS Server Solution supported by 8 key industry partners (December 17, 2003).**

*Isode, the London-based supplier of email and directory server products, today announced the release of version 10.2 of its X.400 message transfer and message store products and X.500 directory server.*

AMHS (Aeronautical Message Handling System) defined by the ICAO (International Civil Aviation Authority) is the new standard for message handling in ground to ground communications between airports, air traffic control facilities and airline companies and is gradually replacing existing systems based on the older AFTN standard.

In this critical and specialised market robustness amongst the component parts of an AMHS solution is vital. Isode's server products are ideally suited to this market and form a key element of AMHS solutions offered to civil and military aviation by leading solution providers in this market including; Airtel ATN of Ireland, Avitech and Comsoft of Germany, Artemis and Boldon James of the UK, RadioCom of Argentina and BCI and GWDI of the USA.

### **Conformance and Robustness**

In the latest releases of M-Vault, M-Store X.400 and M-Switch X.400, Isode has added significant extra functionality to address the evolving demands of AMHS solution providers.

Failover clustering support has been added with configurations for Windows, Linux and Solaris. These servers can now be operated in a hot-standby configuration enabling the continuation of operations should the primary system fail.

Logging and auditing has been extended to achieve compliance with ICAO Standards and Recommended Practices, including all protocol capabilities required for basic compliance and some extended elements.

### **AMHS Integration**

X.400 provides an extensive and powerful set of features, not all of which are directly applicable to the requirements of AMHS. A new X.400 integration API, shipped with 10.2 provides a simple cross-platform abstraction of X.400 functionality to meet the needs of AMHS application. The API can be deployed in three ways:

- For use in situations where the AMHS solution requires storage services, the API enables an AMHS application to access M-Store X.400, using the X.400 P7 protocol.
- For AMHS solutions that have their own storage and wish to transfer messages over AMHS without a message store overhead, the API provides protocol access to M-Switch X.400, using the X.400 P3 protocol.
- Where there is a need to access X.400 functionality to enable an AMHS/AFTN or AMHS/CDIN gateway solutions. Isode does not supply gateways, but provides X.400 functionality which makes it straightforward for partners to offer gateway products.

Isode CEO, Steve Kille said: "As a key component supplier to solutions providers in the AMHS arena, Isode is determined to ensure that the X.400 products we provide help our partners to continue to secure market share in this fiercely competitive market."

"Our new X.400 product releases help our partners to maintain the lead they have built up in supplying both AMHS services and integration between AMHS and legacy AFTN systems."

The Isode launch is supported worldwide by 8 Isode Partners, each prominent in the AMHS market:

- Airtel
- Artemis
- Avitech AG
- BCI
- Boldon James
- Comsoft
- GWDI
- Radiocom

Details on the partners supporting this launch can be found on the Isode website at [http://www.isode.com/company/launch\\_partners.html](http://www.isode.com/company/launch_partners.html).

#### **About Isode**

Isode is a software product company, originally established in 1992. Its M-Vault (LDAP Directory Server) and M-Switch (SMTP Message Switch) are used around the world by Multinational Corporations, Government Departments, ISPs, and Universities.

## Appendix 2: Website Links

For more information on Isode please see:

[www.isode.com](http://www.isode.com)

For more information on Isode's Aviation Industry Solutions, please see:

[www.isode.com/solutions/aviation.html](http://www.isode.com/solutions/aviation.html)

For more information on M-Switch X.400, please see:

[www.isode.com/products/x400.html](http://www.isode.com/products/x400.html)

For more information on M-Store X.400, please see:

[www.isode.com/products/x400-store.html](http://www.isode.com/products/x400-store.html)

For more information on M-Vault X.500, please see

[www.isode.com/products/m-vault-x500.html](http://www.isode.com/products/m-vault-x500.html)

For more information on the Isode AMHS Integration Library, please see:

[www.isode.com/products/amhs-integration-library.html](http://www.isode.com/products/amhs-integration-library.html)

For information on current Isode Aviation Industry Partners, please see:

[www.isode.com/company/launch\\_partners.html](http://www.isode.com/company/launch_partners.html)