

CEC TEN-T ATM Task UK/96/94

# ACCESS

ATN Compliant Communications

European Strategy Study

ATSMHS Interoperability Trials Objectives

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## COPYRIGHT STATEMENT

The work described herein has been undertaken by the author(s) as part of the European Community ACCESS project, within the framework of the TEN-T programme, with a financial contribution by the European Commission. The following companies and administrations are involved in the project: National Air Traffic Services (NATS), Deutsche Flugsicherung (DFS) and Service Technique de la Navigation Aérienne (STNA). The ACCESS final report has been synthesized from the original work packages developed during the ACCESS project.

## EXECUTIVE SUMMARY

The "ATN Compliant Communications European Strategy Study" (ACCESS) project aims at defining the initial architecture of the ATN in Europe (i.e. selection of the initial applications, definition of the initial network topology, definition of the routing organisation and addressing plan, etc.) and participating in the ATSMHS interoperability testing activities set up in Europe.

This document contains the two deliverables of Work Package 260, covering the ATSMHS Interoperability Trials objectives and the final report structure.

The primary and secondary objectives of the ATSMHS Interoperability Trials are as follows:

- to confirm the end-to-end interoperability of two AMHS systems;
- to develop an interoperability infrastructure and a consistent approach to interoperability testing which will assist the introduction of additional AMHS systems in the future.

In outline, the structure of the final report will be as follows:

Section 1 - Introduction

Section 2 - Management/Executive Summary

Section 3 - Project Objectives

Section 4 - Scope of the ATSMHS Interoperability Trials

Section 5 - The Interoperability Test Process

Section 6 - Interoperability Trials Results

Section 7 - Conclusions

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# 1. Introduction

## 1.1 Background

The "ATN Compliant Communications European Strategy Study" (ACCESS) project that is being run under the European Commission's programme for financial aid in the field of Trans-European Transport Network (TEN-T), ATM Task UK/96/94, aims at defining the initial architecture of the ATN in Europe (i.e. selection of the initial applications, definition of the initial network topology, definition of the routing organisation and addressing plan, etc.) and participating in the ATSMHS interoperability testing activities set up in Europe.

## 1.2 Scope

The scope of the ATSMHS Interoperability Trials is limited to the ATS Message Handling System (AMHS), i.e. to the provider of the ATS Message Service as defined in the ATSMHS SARPs. Since there are no plans in Europe to support the ATN Pass-Through Service, nor to implement any AFTN/ATN Type A Gateway, such systems are out of the scope of the ATSMHS Interoperability Trials defined in ACCESS.

Work Package 260 has produced two deliverables:

1. it has defined the objectives of the ATSMHS Interoperability Trials;
2. it has defined the structure of the final report to be produced on completion of the ATSMHS interoperability trials.

### 1.2.1 Deliverable 2

The final report will contain input from the following related activities:

- the Interoperability Objectives defined within Work Package 260;
- the Trials Operating Scenarios and Trials Equipment and Facilities Requirements defined within Work Package 261;
- Work Packages 262 to 273.

### 1.2.2 Deliverable 2 Approach

It is recommended that the body of the main report should contain only limited amounts of technical detail, thereby broadening the potential readership of the report. The main body of the report should not exceed 20 pages in length.

Any detailed technical information which is required to support the final report should be provided as discrete annexes to the main report.

## 1.3 References

Reference	Title
[A260]	WP260 Define Trials Objectives
[A261]	WP261 Define Operating Scenarios
[A262]	WP262 Produce Test Specification
[A263]	WP263 Produce Test Schedule
[A264]	WP264 Define Interoperability Test Tools
[A265]	WP265 Configure Trials Scenario
[A266]	WP266 Conduct ATSMHS Trials
[A270]	WP270 Conformance Test Requirements
[A271]	WP271 Conformance Test Specification
[ICAO1]	ICAO, Aeronautical Telecommunications Network (ATN), Standards and Recommended Practices (SARPs), Sub-Volume 3, Ground-Ground Applications, Version 2.2, January 1998
[ICAO2]	Guidance Material on [ICAO1]

## 1.4 Glossary

ACCESS	ATN Compliant Communications European Strategy Study
AFTN	Aeronautical Fixed Telecommunications Network
AMHS	ATS Message Handling System
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
ATSMHS	Air Traffic Services Message Handling Services
ITU-T	International Telecommunications Union - Telecommunications branch
SARPs	Standards and Recommended Practices

## 2. Deliverable 1: ATSMHS Interoperability Trials Objectives

### 2.1 Key Objectives

The primary objective of the ATSMHS Interoperability Trials is as follows:

- to confirm the end-to-end interoperability of 2 AMHS systems, denoted as System A and System B.

The secondary objective of the ATSMHS Interoperability Trial is as follows:

- to develop an interoperability infrastructure and a consistent approach to interoperability testing which will assist the introduction of additional AMHS systems in the future.

### 2.2 The Scope of the Interoperability Testing Objectives

Within the confines of the ACCESS project, the following terminology is defined:

- Interoperability testing is defined as the testing of the interworking between two or more systems developed to a common specification.
- Conformance testing is defined as the exhaustive testing of a system under test against the functions and procedures defined in an agreed standard. A rigorous approach would test all the 'shall' and 'should' statements of the design specification.
- Reference testing is defined as the recording of responses from the reference system under test during a pre-determined set of test situations - typically in a test harness. The reference system under test is then removed and stored. Future 'Systems Under Test (SUT) should then produce the same results as the reference system when exposed to the same test situations. A reference test may contain some elements of conformance testing, but the tests need not be completely exhaustive.

To achieve the above objectives, the Interoperability Trials should cover the following aspects of interoperability testing:

- **protocol testing**, encompassing X.400 to X.400, X.400 to AFTN, AFTN to X.400 and AFTN to AFTN interoperability<sup>1</sup>, and covering both message transmission and resultant acknowledgements;
- **functionality testing**, to ensure the appropriate implementation of X.400 and/or AFTN functionality and services, and the correct mapping between X.400 and AFTN

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<sup>1</sup> Note that network protocol interoperability will not be explicitly tested. There will however be an implicit testing of network protocol interoperability during the interoperability testing of the X.400 and AFTN messaging protocols. ATN compliant network services will be used to support the Interoperability Trials wherever possible.

functions<sup>2</sup> (e.g. X.400 distribution lists and AFTN meteorological data, System to System and Flight Planning services), including rejection of messages that cannot be mapped (e.g. invalid content or body part type, invalid ATS message);

- **resilience testing**, particularly with regard to the recovery of communicating messaging systems and incomplete message transfers following system or network failure;
- **performance testing**, to ensure that the AMHS messaging systems under test are capable of meeting the message throughput required to support the agreed end-to-end service levels<sup>3</sup>;
- **control and monitoring service testing**, to ensure that the appropriate management functions and interfaces are available to support the required message tracing and audit trail services;
- **addressing scheme testing**, to ensure the full and open interoperability of AFTN and X.400 users.

Note that security testing will not be possible until the ongoing study into a general migration to ITU-T X.500 compliant security services, particularly to support authentication, has completed. The X.500 study is not scheduled to complete within the timeframe of this project.

## 2.3 Interoperability Scenarios

The end-to-end interoperability of each pair of AMHS systems participating in the Interoperability Trials will be tested.

In the longer term (i.e. beyond the scope of this project), it is anticipated that interoperability testing will continue on an end-to-end basis. However, to minimise the effort required for interoperability testing, only those systems which will interwork on an operational basis will be tested against each other.

An alternative approach to interoperability testing would be to test each AMHS system against a reference system. This approach has been discounted for the following reasons:

- it would be very difficult to select and validate the reference system;
- the ability of two AMHS systems to interwork with a reference system does not absolutely guarantee their ability to interwork with each other.

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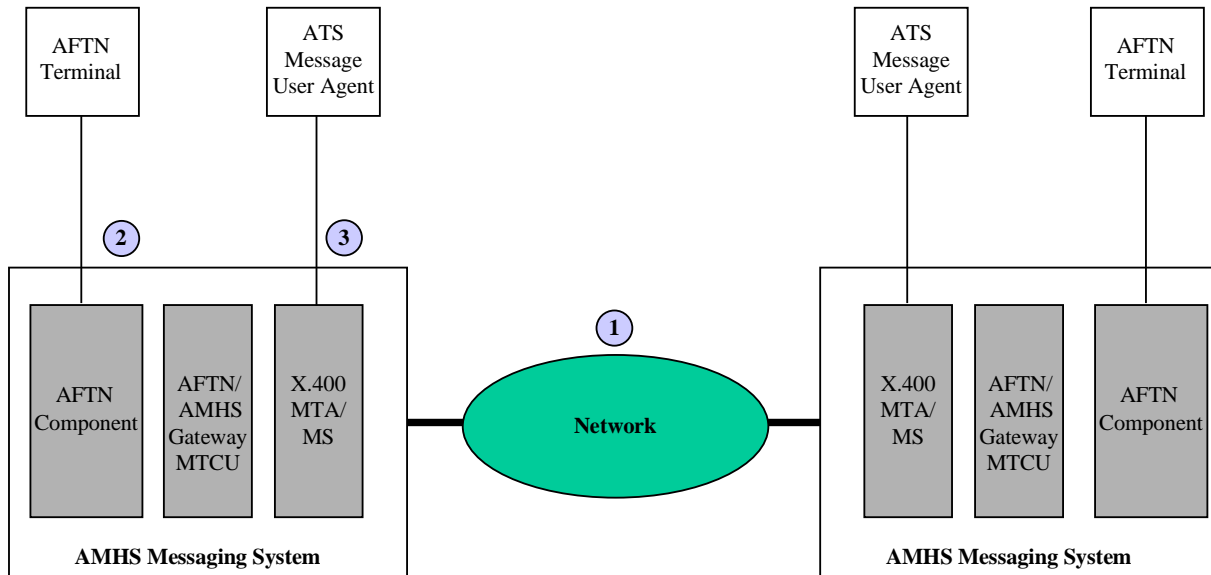
<sup>2</sup> Because of the limited functionality of AFTN compared to X.400, X.400 users will initially be restricted to the use of AFTN compatible functions (i.e. the 'basic service'). There is however work planned for 1998 which will consider the exploitation of additional X.400 features, which may impact future requirements for interoperability testing. Since this study will not complete within the timeframe for the ACCESS project, only the 'basic service' is covered by the Interoperability Trials defined by the project.

<sup>3</sup> Performance levels could be defined prior to testing or local targets could be set which would allow some confidence to be gained in the ability of the implementation to function under load.



## 2.4 Interoperability Interfaces

Figure 1 illustrates the interfaces to be tested within the scope and objectives of the Interoperability Trials.



**Figure 1: Interoperability Interfaces**

It can be seen from figure 1 that the following interfaces will be tested:

1. The X.400 (P1) interface between the AMHS messaging system under test and the remote system.
2. The AFTN terminal interface to the AMHS messaging system.
3. The X.400 (P7) terminal interface to the AMHS messaging system.

It should be noted that the AFTN and ATS Messaging User Agent terminals used to generate and receive messages to/from the AMHS messaging system are outside of the scope of the Interoperability Trials. Were they to be considered to form part of end-to-end interoperability testing, then all terminals supported by a particular message switch would have to be tested. However, since such terminals will be required to exercise the AMHS messaging system, it is important that stable and (where available) widely used terminal products are used for this purpose.

## **3. Deliverable 2: Final Report Structure**

### **3.1 Section 1 - Introduction**

### **3.2 Section 2 - Management/Executive Summary**

### **3.3 Section 3 - Project Objectives**

#### **3.3.1 Original Objectives**

This section will contain a summary of the ATSMHS Interoperability Objectives defined within Work Package 260, Deliverable 1.

- The primary high level objective is to confirm Interoperability between two ATSMHS systems.
- A secondary objective is to develop an interoperability infrastructure and a consistent approach to interoperability testing which will assist the introduction of additional ATMHS systems in the future.

#### **3.3.2 Fulfilment of Objectives**

This section will consider the degree to which the original ATSMHS Interoperability Objectives have been fulfilled and will identify and justify any objectives which were not met.

### **3.4 Section 4 - Scope of the ATSMHS Interoperability Trials**

#### **3.4.1 Services and Components**

This section will define the scope of the ATSMHS Interoperability Trials. In particular, it will:

- identify the components covered by the SARPs which are subject to Interoperability Testing;
- identify the services provided by these components which are subject to Interoperability Testing;
- explain the omission of any components and/or services which have been identified as out of scope.

#### **3.4.2 End-to-End Scenarios**

This section will define the end-to-end scenarios covered by the Interoperability Trials.

### 3.4.3 Interoperability Types

This section will identify the key elements of the Interoperability Trials, covering areas such as:

- protocol interoperability (at the messaging, but not the network, level);
- functionality;
- resilience;
- performance;
- control and monitoring
- addressing.

## 3.5 Section 5 - The Interoperability Test Process

This section will summarise the approach taken to Interoperability Testing. In particular, it will cover the following areas:

- the test environment, including project specific test systems, network connectivity and configuration requirements for systems under test;
- the approach taken to defining individual test cases, including the generic format for each test case (covered by Work Package 262);
- the (quantifiable) pass criteria, at both the individual test level and at the overall Interoperability Trial level (covered by Work Package 262);

The individual test cases, if they are to be covered by the Final Report at all, should be included within a discrete annex to the document.

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