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# ACCESS

ATN Compliant Communications

European Strategy Study

ATSMHS Interoperability Trials Operating Scenarios

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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.

The documents intended audience is the author(s) of the ATSMHS Interoperability Test List and the ATSMHS Interoperability Test Specification, which are the subject of work package 262.

This document contains the two deliverables of work package 261:

1. It defines the ATSMHS operating scenarios required to meet the interoperability objectives identified in ATSMHS Interoperability Objectives. This allows the selection of operating scenarios to test any given component in an AMHS. Altogether, fifty scenarios are described which cover both normal and abnormal conditions to which the components may be subjected.
2. It defines the equipment, facilities and test tools necessary to implement the ATSMHS interoperability trials operating scenarios. The tools required are largely off-the-shelf products, most of which would be procured with a gateway or would be readily available anyway. It gives a budgetary estimate for the time required for development of 44 man days.

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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

Work Package 261 will produce two deliverables:

1. It will define the ATSMHS operating scenarios required to meet the interoperability objectives identified in ATSMHS Interoperability Objectives [A260]. It will allow the selection of operating scenarios to test any given component in an AMHS;
2. It will define the equipment, facilities and test tools necessary to implement the ATSMHS interoperability trials operating scenarios. It will also give budgetary estimates for the time required for development.

The documents intended audience is the author(s) of the ATSMHS Interoperability Test List and the ATSMHS Interoperability Test Specification, which are the subject of work package 262.

## 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]
[ICA16]	ATSMHS SARPs
[ICA17]	ATSMHS Guidance Material

## 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
IPM	Interpersonal Message
IUT	Implementation Under Test
LAN	Local Area Network
UA	User Agent
WAN	Wide Area Network

## 2. Deliverable 1: ATSMHS Interoperability Trials Operating Scenarios

### 2.1 Background

The ATSMHS Interoperability objectives [A260] define a high level set of objectives for the interoperability tests to be performed on any AMHS component. The component functions identified in the ATSMHS SARPs [ICA16] are as follows:

- AFTN/AMHS Gateway, hereafter called a “Gateway”
- ATS Message Server, hereafter called a “Message Server”
- ATS Message User Agent, hereafter called a “User Agent”

When an organisation procures a component of the AMHS, it will be required to perform interoperability tests with other components with which it will be required to inter-operate. The component is known as the implementation under test (IUT).

There will be cases where the IUT performs the functions of more than one component. For example, a single component may have the functionality of both a message server and a gateway. Where this situation occurs, the tests for both components will have to be combined.

Situations will occur where two components will be tested at the same time. The first interoperability tests will, of course, be in this situation. In such cases, it will be possible to merge the tests. For example, the test that checks that a message can be sent from a gateway to another will also act as a test that the other gateway can receive a message.

Each scenario has a reference number to provide for traceability back to the trials objectives, and to allow the test specifications to provide for traceability to the operating scenarios. The reference has three fields, e.g. OSC-XX-nn where:

- OSC - Operating scenario
- XX - identifies the type of IUT - GW for a gateway, MS for a message server and UA for a user agent
- nn - is a serial number

Annex A contains a matrix for tracing test scenarios back to the trials objectives.

Strictly speaking, some of the scenarios are not interoperability tests, since they are only local tests, and do not involve a remote system. In any given situation, it may or may not be appropriate to use these scenarios as a basis for testing. These local tests perform a test on the functionality of the IUT that does not involve communication with a remote system.

It should also be noted that there are scenarios included that are designed to test performance. It is not possible to define the required performance level in this document. When an implementation is established, it will be necessary to define the required performance level of that particular implementation. For example, a major node in the messaging network will have a much higher performance requirement than a small system serving only a few users. Performance tests will have to be performed against the required level of performance for the given implementation.



## 2.2 Gateway Scenarios

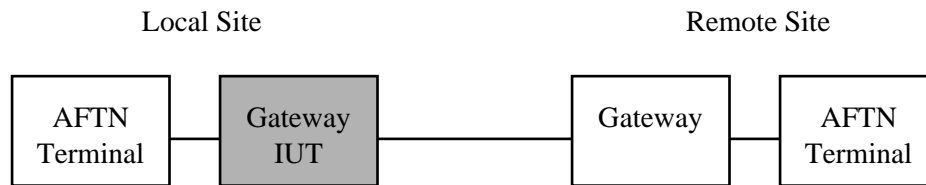
### 2.2.1 Introduction

This section defines operating scenarios that can be used as a basis for tests for a gateway that conforms to the ATSMHS SARPs [ICA16].

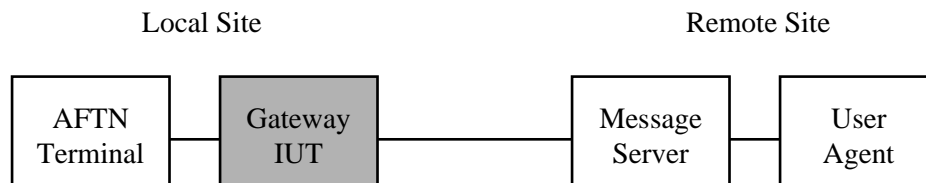
### 2.2.2 Gateway Configurations

Figures 2-1 and 2-2 show the two configurations used for the gateway scenarios. The configuration that should be used depends on the type of systems that are on the remote site:

- if the remote site has a gateway and no message server functionality, then configuration 1 is all that is required;
- if the remote site has a message server but no gateway functionality, then configuration 2 is all that is required;
- if the remote site has both message server and gateway functionality, then both configurations are needed, and the tests will have to be run against both configurations separately.



**Figure 2-1: Configuration 1 - gateway to gateway**



**Figure 2-2: Configuration 2 - gateway to message server**

It should be noted that some tests are appropriate to both configurations, whereas some are only appropriate to one configuration. For example, in configuration 1 it is possible to test that the translation methods of the two gateways are compatible, since the resulting AFTN message should be the same as the original AFTN message. However it is not possible, under configuration 1, to check that the translation performed is conformant with the translation required by the ATSMHS SARPs. On the other hand, in configuration 2 it is possible to check that the translation has been performed correctly.

## 2.2.3 Normal Condition Gateway Scenarios

### 2.2.3.1 Sending a priority two message from a gateway to the remote system

Reference	OSC-GW-01
Scenario	A DD or FF priority message will be sent from the gateway to the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the sending of messages	X	X
• the sending of messages is logged correctly in the gateway	X	X
• the gateway maps the priority indicator to the correct message transfer envelope priority		X
• the gateway maps the ATS message parts to the IPM text correctly		X
• the gateway generates the IPM identifier correctly		X
• the gateway sets the IPM notification requests correctly		X
• the gateway sets the delivery report requests correctly		X
• the gateway generates the per message indicators correctly		X
• the gateway generates the trace information correctly		X
• there is interoperability between the address translation methods of the two gateways	X	
• the gateway translates outgoing addresses correctly		X

**2.2.3.2 Sending a priority three message from a gateway to the remote system**

Reference	OSC-GW-02
Scenario	A GG or KK priority message will be sent from the gateway to the remote system. At least two recipients will be specified one of whom must not exist at the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the sending of messages	X	X
• the sending of messages is logged correctly in the gateway	X	X
• the gateway maps the priority indicator to the correct message transfer envelope priority		X
• the gateway maps the ATS message parts to the IPM text correctly		X
• the gateway generates the IPM identifier correctly		X
• the gateway sets the IPM notification requests correctly		X
• the gateway sets the delivery report requests correctly		X
• the gateway generates the per message indicators correctly		X
• the gateway generates the trace information correctly		X
• there is interoperability between the address translation methods of the two gateways	X	
• the gateway translates outgoing addresses correctly		X

**2.2.3.3 Sending a priority one message from a gateway to the remote system**

Reference	OSC-GW-03
Scenario	A SS priority message will be sent from the gateway to the remote system

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the sending of messages	X	X
• the sending of messages is logged correctly in the gateway	X	X
• the gateway maps the priority indicator to the correct message transfer envelope priority		X
• the gateway maps the ATS message parts to the IPM text correctly		X
• the gateway generates the IPM identifier correctly		X
• the gateway sets the IPM notification requests correctly		X
• the gateway sets the delivery report requests correctly		X
• the gateway generates the per message indicators correctly		X
• the gateway generates the trace information correctly		X
• there is interoperability between the address translation methods of the two gateways	X	
• the gateway translates outgoing addresses correctly		X

**2.2.3.4 Receiving a priority two message from a remote system**

Reference	OSC-GW-04		
Scenario	A DD or FF priority message will be sent from the remote system to the gateway. At least two recipients will be specified one of whom must not exist at the AFTN terminal.		
Purpose of test, to ensure that:	Configuration 1	Configuration 2	
• there is protocol interoperability with the remote system for the receiving of messages	X	X	
• the reception of messages is logged correctly in the gateway	X	X	
• the AFTN message is mapped from the IPM text correctly			X
• there is interoperability between the address translation methods of the two gateways	X		
• the gateway translates incoming addresses correctly			X

**2.2.3.5 Receiving a priority one message from a remote system**

Reference	OSC-GW-05		
Scenario	A SS priority message will be sent from the remote system to the gateway.		
Purpose of test, to ensure that:	Configuration 1	Configuration 2	
• there is protocol interoperability with the remote system for the receiving of messages	X	X	
• the reception of messages is logged correctly in the gateway	X	X	
• the AFTN message is mapped from the IPM text correctly			X
• the gateway generates receipt notification correctly			X
• there is interoperability between the address translation methods of the two gateways	X		
• the gateway translates incoming addresses correctly			X

**2.2.3.6 Receiving a long message from a remote system**

Reference	OSC-GW-06
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Scenario A message of length about 4500 characters will be sent from the remote system to the gateway.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the AFTN message is mapped from the IPM text correctly		X
• the gateway generates three AFTN messages correctly		X
• the gateway translates incoming addresses correctly		X

### 2.2.3.7 Receiving a message with more than 21 recipients from a remote system

Reference OSC-GW-07

Scenario A message containing 50 recipients will be sent from the remote system to the gateway.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the AFTN message is mapped from the IPM text correctly		X
• the gateway generates three AFTN messages correctly		X
• the gateway translates incoming addresses correctly		X

### 2.2.3.8 Receiving a large message with more than 21 recipients from a remote system

Reference OSC-GW-08

Scenario A message of 100k characters containing 50 recipients will be sent from the remote system to the gateway.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
----------------------------------	--------------------	--------------------

- |   |   |
|---|---|
| • there is protocol interoperability with the remote system for the receiving of messages | X |
| • the reception of messages is logged correctly in the gateway                            | X |
| • the AFTN message is mapped from the IPM text correctly                                  | X |
| • the gateway generates the correct number of AFTN messages                               | X |
| • the gateway sends the whole message to each group of recipients                         | X |
| • the gateway translates incoming addresses correctly                                     | X |

### 2.2.3.9 Conversion from AMHS IP RN to AFTN Acknowledgement Message

Reference            OSC-GW-09

Scenario            A receipt notification will be sent by the remote system to the gateway.

This scenario should follow the sending of an SS priority message by the gateway in 2.2.3.3

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of AMHS IP RNs	X	X
• the AMHS IP RN is logged correctly in the gateway	X	X
• there is interoperability between the IP RN translation methods of the two gateways	X	
• the AMHS IP RN is correctly translated into an AFTN acknowledgement message	X	X

### 2.2.3.10 Conversion from AFTN Acknowledgement Message to AMHS IP RN

Reference            OSC-GW-10

Scenario            A receipt notification will be sent to the remote system by the gateway.

This scenario should follow the receiving of an SS priority message to the gateway in 2.2.3.5

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote	X	X

system for the sending of AMHS IP RNs

- |   |                   |                           |
|---|-------------------|---------------------------|
| <ul style="list-style-type: none"> <li>• the AMHS IP RN is logged correctly in the gateway</li> <li>• there is interoperability between the IP RN translation methods of the two gateways</li> <li>• the AFTN acknowledgement message is correctly translated into an AMHS IP RN</li> </ul> | <p>X</p> <p>X</p> | <p>X</p> <p></p> <p>X</p> |
|---|-------------------|---------------------------|

### 2.2.3.11 Conversion from AMHS NDR (unrecognised O/R name) to AFTN Unknown Addressee Service Message

Reference OSC-GW-11

Scenario A non delivery notification (unrecognised O/R name) will be sent by the remote system to the gateway.

This scenario should follow the sending of the message by the gateway in 2.2.3.2

Purpose of test, to ensure that:	Configuration 1	Configuration 2
<ul style="list-style-type: none"> <li>• there is protocol interoperability with the remote message server for the receiving of AMHS NDRs</li> <li>• the AMHS NDR is logged correctly in the gateway</li> <li>• there is interoperability between the NDR translation methods of the two gateways</li> <li>• the AMHS NDR is correctly translated into an AFTN unknown addressee service message</li> </ul>	<p>X</p> <p>X</p> <p>X</p>	<p>X</p> <p>X</p> <p></p> <p>X</p>



### 2.2.3.12 Conversion from AFTN Unknown Addressee Service Message to AMHS NDR (unrecognised O/R name)

Reference OSC-GW-12

Scenario A non delivery notification (unrecognised O/R name) will be sent to the remote system by the gateway.

This scenario should follow the receiving of the message by the remote system in 2.2.3.4

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote message server for the sending of AMHS NDRs	X	X
• the AMHS NDR is logged correctly in the gateway	X	X
• there is interoperability between the NDR translation methods of the two gateways	X	
• the AFTN unknown addressee service message is correctly translated into an AMHS NDR		X

### 2.2.3.13 Gateway Throughput

Reference OSC-GW-13

Scenario A large number of messages, RNs and NDRs are sent through the gateway both to and from the remote system over a short period of time.

The required performance levels must be agreed on a case by case basis before this scenario can be implemented.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• the gateway is resilient when heavily loaded	X	X
• the gateway meets the required performance levels	X	X

## 2.2.4 Abnormal Condition Gateway Scenarios

### 2.2.4.1 Network Failure and Recovery

Reference	OSC-GW-14
Scenario	The gateway will be sending messages when a transient network failure occurs.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• the gateway is resilient to transient network failures	X	X
• the gateway logs the failure and recovery correctly	X	X
• the gateway is able to recover from a network failure	X	X
• the gateway continues to send messages following recovery from a network failure	X	X

### 2.2.4.2 Unavailability of Remote System

Reference	OSC-GW-15
Scenario	The gateway will be trying to sending a message to an unavailable remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• the gateway logs the failure correctly	X	X
• the gateway stores the complete AFTN message	X	X

### 2.2.4.3 Unsuccessful Conversion of Addressee Indicator in Incoming AFTN Message

Reference	OSC-GW-16
Scenario	An AFTN message containing an unknown addressee will be received by the gateway from the AFTN terminal.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• the gateway logs the error correctly	X	X
• the gateway sends an unknown addressee service message to the originator	X	X

**2.2.4.4 Unsuccessful Conversion of Originator Indicator in Incoming AFTN Message**

Reference	OSC-GW-17		
Scenario	An AFTN message containing an unknown originator will be received by the gateway from the AFTN terminal.		
Purpose of test, to ensure that:	Configuration	Configuration	
	1	2	
• the gateway logs the error	X	X	
• the gateway stores the complete AFTN message	X	X	

**2.2.4.5 Unsuccessful Conversion of Recipient O/R Name in Incoming AMHS Message**

Reference	OSC-GW-18		
Scenario	An AMHS message containing at least one valid recipient address and one recipient address that cannot be translated will be received by the gateway from the remote system.		
Purpose of test, to ensure that:	Configuration	Configuration	
	1	2	
• there is protocol interoperability with the remote system for the receiving of messages	X	X	
• the reception of messages is logged correctly in the gateway	X	X	
• the gateway returns a non-delivery report for the unknown recipient correctly	X	X	
• the AFTN message is mapped from the IPM text correctly	X	X	
• there is interoperability between the address translation methods of the two gateways	X		
• the gateway translates incoming addresses correctly	X	X	

**2.2.4.6 Unsuccessful Conversion of Originator O/R Name in Incoming AMHS Message**

Reference	OSC-GW-19
Scenario	An AMHS message containing an originator address that cannot be translated will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages	X	X
• the reception of messages is logged correctly in the gateway	X	X
• the gateway returns a non-delivery report for all recipients correctly	X	X

**2.2.4.7 Receiving an Incoming AMHS Message with an invalid Content Type**

Reference	OSC-GW-20
Scenario	An AMHS message containing a non-IPM content type will be received by the gateway from the remote system.

This test requires the ability to generate a non-IPM content type, eg. Pdi, at the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

**2.2.4.8 Receiving an Incoming AMHS Message with a non-AFTN compatible body part**

Reference            OSC-GW-21

Scenario            An AMHS message containing a non-AFTN compatible body part will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

**2.2.4.9 Receiving an Incoming AMHS Message with multiple IPM body parts**

Reference            OSC-GW-22

Scenario            An AMHS message containing two or more IA5 text body parts will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

**2.2.4.10 Receiving an Incoming AMHS Message with a missing ATS Message Header**

Reference	OSC-GW-23
Scenario	An AMHS message without an ATS Message Header will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

**2.2.4.11 Receiving an Incoming AMHS Message with an invalid ATS Message Header**

Reference	OSC-GW-24
Scenario	An AMHS message with an error, eg. an invalid priority indicator, in the ATS Message Header will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

**2.2.4.12 Receiving an Incoming AMHS Message containing an invalid character**

Reference	OSC-GW-25
Scenario	An AMHS message with conversion-with-loss-prohibited set to “prohibited” and containing a semicolon (;) in the message text will be received by the gateway from the remote system.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• there is protocol interoperability with the remote system for the receiving of messages		X
• the reception of messages is logged correctly in the gateway		X
• the gateway returns a non-delivery report for all recipients correctly		X

## 2.3 Message Server Scenarios

### 2.3.1 Introduction

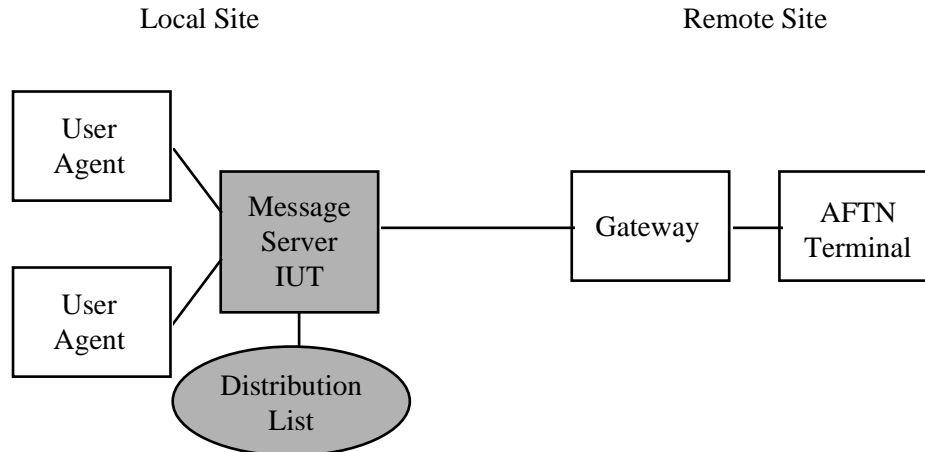
This section defines operating scenarios that can be used as a basis for tests for a message server that conforms to the ATSMHS SARPs [ICA16].

### 2.3.2 Message Server Configurations

Figures 3-1, 3-2 and 3-3 show the three configurations used for the message server scenarios. The configuration that should be used depends on the testing and type of systems that are on the remote site.

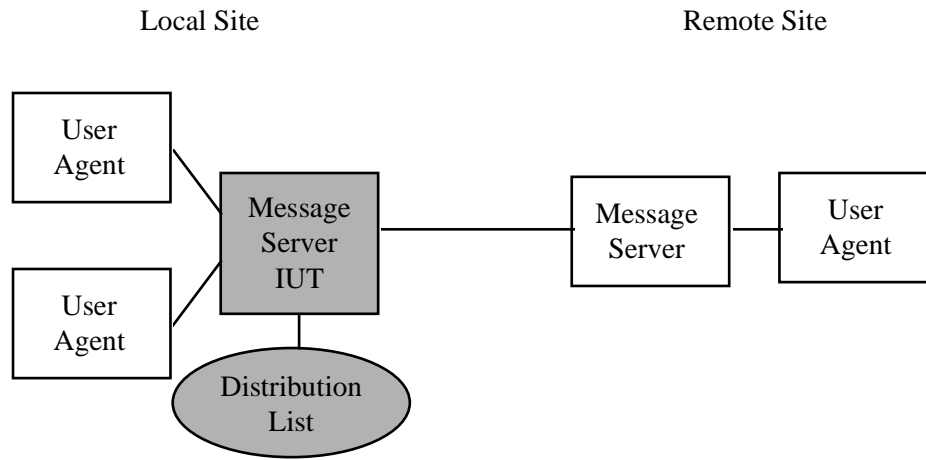
- if the remote site has a gateway and no message server functionality, then configuration 3 is all that is required
- if the remote site has a message server but no gateway functionality, then configuration 4 is all that is required
- if the remote site has both message server and gateway functionality, then both configurations are needed, and the tests will have to be run against both configurations separately
- for testing the user agent to message server functionality the local only configuration 5 is all that is required.

The presence of a distribution list is only necessary when performing the distribution list tests.

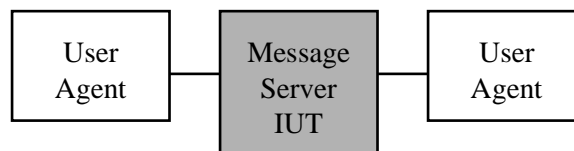


**Figure 3-1: Configuration 3 - message server to gateway**





**Figure 3-2: Configuration 4 - message server to message server**



**Figure 3-3: Configuration 5 - user agent to message server**

### 2.3.3 Message Server Transfer Scenarios

#### 2.3.3.1 Outgoing IPM Transfer

Reference OSC-MS-01

Scenario A message will be transferred from the message server to the remote system.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• There is protocol interoperability with the remote system for the sending of IPMs	X	X
• the IPM is logged correctly in the message server	X	

**2.3.3.2 Incoming IPM Transfer**

Reference OSC-MS-02  
 Scenario A message will be received from the remote system by the message server.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• there is protocol interoperability with the remote system for the receiving of IPMs	X	X
• the IPM is logged correctly in the message server	X	X

**2.3.3.3 Outgoing Probe Transfer**

Reference OSC-MS-03  
 Scenario A probe message will be sent from the message server to the remote system.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• There is protocol interoperability with the remote system for the sending of probes		X
• the probe is logged correctly in the message server	X	X

**2.3.3.4 Incoming Probe Transfer**

Reference OSC-MS-04  
 Scenario A probe message will be received from the remote system by the message server.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• There is protocol interoperability with the remote system for the receiving of probes		X
• the probe is logged correctly in the message server		X

### 2.3.3.5 Outgoing Delivery Report Transfer

Reference	OSC-MS-05
Scenario	A message will be sent from the remote system requesting delivery reports. The message will have at least one valid recipient and one unknown recipient.

The message server will generate and transfer a delivery report and non-delivery report to the remote system.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• there is protocol interoperability with the remote system for the sending of NDRs		X
• there is protocol interoperability with the remote system for the sending of DRs		X
• the DR and NDR are logged correctly in the message server		X

### 2.3.3.6 Incoming Delivery Report Transfer

Reference	OSC-MS-06
Scenario	A message will be sent from the message server requesting delivery reports. The message will have at least one valid recipient and one unknown recipient.

A delivery report and a non-delivery report will be received from the remote system by the message server.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• There is protocol interoperability with the remote system for the receiving of DRs and NDRs	X	X
• the DR and NDR is logged correctly in the message server	X	X

### 2.3.3.7 Message Server Throughput

Reference	OSC-MS-07
Scenario	A large number of messages, RNs and NDRs are sent through the message server both to and from the remote system over a short period of time.

The required performance levels must be agreed on a case by case basis before this scenario can be implemented.

Purpose of test, to ensure that:	Configuration 1	Configuration 2
• the message server is resilient when heavily loaded	X	X
• the message server meets the required performance levels	X	X

### 2.3.4 Message Server Distribution List Scenarios

#### 2.3.4.1 Locally Generated Message Sent to Distribution List

Reference	OSC-MS-08
Scenario	A locally generated message is sent to a distribution list on the local system containing one local user and a user on the remote system.

The resulting expansion of the message is transferred and delivered as appropriate.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• the message and DL expansion is logged correctly in the message server	X	X
• the message is sent to all the members of the distribution list following the expansion	X	X
• messages resulting from the expansion can be successfully transferred to the remote system and delivered locally	X	X

### 2.3.4.2 Remotely Generated Message Sent to Distribution List

Reference	OSC-MS-09
Scenario	A message generated by the remote system is sent to a distribution list on the local system containing one local user and a user on the remote system.  The resulting expansion of the message is transferred and delivered as appropriate.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• the message and DL expansion is logged correctly in the message server	X	X
• the message is sent to all the members of the distribution list following the expansion	X	X
• messages resulting from the expansion can be successfully transferred to the remote system and delivered locally	X	X

## 2.3.5 Message Server Submission Scenarios

### 2.3.5.1 Message Submission

Reference	OSC-MS-10
Scenario	A message will be submitted by a user agent to the message server for transfer.

Purpose of test, to ensure that:	Configuration 5
• The message server logs the submission correctly	X
• a message can be submitted for sending by the message server	X
• the message server returns the result of the submission correctly	X

### 2.3.5.2 Probe Submission

Reference	OSC-MS-11
Scenario	A probe will be submitted by a user agent to the message server for transfer.

Purpose of test, to ensure that:	Configuration 5
<ul style="list-style-type: none"> <li>the message server logs the submission correctly</li> </ul>	X
<ul style="list-style-type: none"> <li>a probe can be submitted for sending by the message server</li> </ul>	X
<ul style="list-style-type: none"> <li>the message server returns the result of the submission correctly</li> </ul>	X

## 2.3.6 Message Server Delivery Scenarios

### 2.3.6.1 Message Delivery

Reference	OSC-MS-12
Scenario	A message will be delivered by the message server to a user agent.

Purpose of test, to ensure that:	Configuration 5
<ul style="list-style-type: none"> <li>the message server logs the delivery correctly</li> </ul>	X
<ul style="list-style-type: none"> <li>a message can be delivered by the message server</li> </ul>	X
<ul style="list-style-type: none"> <li>the message server delivers the message content correctly</li> </ul>	X

### 2.3.6.2 Delivery Report Delivery

Reference	OSC-MS-13
Scenario	A delivery report will be delivered by the message server to a user agent.

Purpose of test, to ensure that:	Configuration 5
<ul style="list-style-type: none"> <li>the message server logs the delivery correctly</li> </ul>	X
<ul style="list-style-type: none"> <li>a delivery report can be delivered by the message server</li> </ul>	X
<ul style="list-style-type: none"> <li>the message server delivers the report content correctly</li> </ul>	X

### 2.3.6.3 Non-Delivery Report Delivery

Reference	OSC-MS-14
Scenario	A non-delivery report will be delivered by the message server to a user agent.

Purpose of test, to ensure that:	Configuration 5
• the message server logs the delivery correctly	X
• a non-delivery report can be delivered by the message server	X
• the message server delivers the report content correctly	X

## 2.3.7 Message Server Message Store Access Scenarios

### 2.3.7.1 Indirect Submission

Reference	OSC-MS-15
Scenario	A message will be submitted by a user agent to the message server message store for transfer.

Purpose of test, to ensure that:	Configuration 5
• The message server logs the submission correctly	X
• a message can be submitted for sending by the message server message store	X
• the message server returns the result of the submission correctly	X

### 2.3.7.2 Summary of Message Store

Reference	OSC-MS-16
Scenario	The user agent will ask the message server message store for a summary of the numbers and types of entries in the user's message store.

Purpose of test, to ensure that:	Configuration 5
• The message server returns the summary correctly	X

### 2.3.7.3 Listing Messages

Reference	OSC-MS-17
Scenario	The user agent will ask the message server message store for a list of attributes of entries in the user's message store.
Purpose of test, to ensure that:	Configuration 5
• the message server returns the list correctly	X

### 2.3.7.4 Fetching a Message

Reference	OSC-MS-18
Scenario	The user agent will ask the message server message store to return a message from the user's message store.
Purpose of test, to ensure that:	Configuration 5
• the message server returns a message correctly	X

### 2.3.7.5 Deleting a Message

Reference	OSC-MS-19
Scenario	The user agent will ask the message server message store to delete a message from the user's message store.
Purpose of test, to ensure that:	Configuration 5
• the message server deletes a message correctly	X

## 2.3.8 Message Server Abnormal Condition Scenarios

### 2.3.8.1 Message Non-delivery

Reference	OSC-MS-20
Scenario	Messages will be submitted to the message server which will cause it to report non-delivery failures.
	These should include: unrecognised O/R name, maximum time expired, DL expansion prohibited
Purpose of test, to ensure that:	Configuration 5
• the message server logs the non-delivery correctly	X
• the message server non-delivers messages correctly	X



### 2.3.8.2 Distribution List Loop Detection

Reference OSC-MS-21

Scenario A distribution list will be created which includes itself as one of the list's members.

The user agent will submit a message to the message server which has the distribution list as one of the recipients.

Purpose of test, to ensure that: Configuration 5

- The message server logs the exception correctly X
- the message server discards the message and does not return any reports X

### 2.3.8.3 Prohibited Use of Distribution List

Reference OSC-MS-22

Scenario The user agent will submit a message to the message server which has distribution list as one of the recipients and has DL-expansion-prohibited set to "prohibited".

Purpose of test, to ensure that: Configuration 5

- the message server logs the non-delivery correctly X
- the message server returns a non-delivery report correctly X

### 2.3.8.4 Distribution List containing a recipient which does not exist

Reference OSC-MS-23

Scenario The user agent will submit a message to the message server which has distribution list as one of the recipients. One of the DL members will be a recipient name that does not exist.

Purpose of test, to ensure that: Configuration 5

- the message server logs the non-delivery correctly X
- the message server returns a non-delivery report correctly X

### 2.3.8.5 Network Failure and Recovery

Reference	OSC-MS-24
Scenario	The message server will be transmitting messages when a transient network failure occurs.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• the message server is resilient to transient network failures	X	X
• the failure is logged correctly in the message server	X	X
• the message server is able to recover from a network failure	X	X
• the message server continues to send messages following recovery from a network failure	X	X

### 2.3.8.6 Unavailability of Remote System

Reference	OSC-MS-25
Scenario	The message server will be trying to sending a message to a remote system which is initially unavailable. After a period the remote system is made available.

The length of time should be chosen so that the message server will try more than once to send the message.

Purpose of test, to ensure that:	Configuration 3	Configuration 4
• the failure is logged correctly in the message server	X	X
• the message server is able to recover from the temporary loss of a remote system.	X	X
• the message server sends the message after the remote system becomes available	X	X

### 3. Deliverable 2: ATSMHS Interoperability Trials Equipment and Facilities Requirements

#### 3.1 Equipment Requirements

The following table is an inventory of equipment, communication requirements and specific test tools that will be required to conduct the tests.

<i>Item</i>	<i>Description</i>	<i>Required if IUT is a:</i>			<i>Special development required?</i>
		<i>Gateway</i>	<i>Message Server no MS</i>	<i>Message Server and MS</i>	
IUT	The Implementation Under Test.	X	X	X	This should be part of the procured equipment configuration.
AFTN terminal	An AFTN terminal will be needed as the source and sink of the tests. In order to allow the tests to be scripted, the AFTN terminal should be capable of taking instructions from pre-prepared batch files.	X			This should be part of the procured equipment configuration.
UAs	Two UAs will be needed as the source and sink of the tests. In order to allow the tests to be scripted, the UA should be capable of taking instructions from pre-prepared batch files.  The second UA is not required for all tests.		X		This should be part of the procured equipment configuration.
Remote UA	A Remote UA will be needed as the source and sink of the tests of the Message Server Message Store.			X	This should be part of the procured equipment configuration.
Local AFTN terminal Communication	Communication between the AFTN terminal and the IUT will be done through a LAN or serial line connection (depending on the facilities available on the IUT).	X			This should be part of the procured equipment configuration.
Local UA Communications	Communication between a UA and the IUT will be done over a LAN		X		

<i>Item</i>	<i>Description</i>	<i>Required if IUT is a:</i>			<i>Special development required?</i>
		<i>Gateway</i>	<i>Message Server no MS</i>	<i>Message Server and MS</i>	
Remote UA Communications	Communication between the Remote UA and the IUT will be done over a LAN or ATN WAN connection. Depending on the capabilities of the Remote UA and IUT			X	
Remote Communication	Communication between the IUT and the remote system will be through an ATN WAN connection. Depending on the capabilities of the IUT, an ATN router will probably be required on the LAN.	X	X		This should be part of the procured equipment configuration.
Configuration files for IUT	For each test to be performed, the IUT will have to be pre-configured for the test. The configuration files may be prepared in advance to speed up the testing process.	X	X	X	The pre-configured files must be developed.
Configuration files for AFTN terminal	For each test to be performed, the AFTN terminal may have to be pre-configured for the test. The configuration files may be prepared in advance to speed up the testing process.	X			The pre-configured files must be developed.
Configuration files for User Agent	For each test to be performed, the UA may have to be pre-configured for the test. The configuration files may be prepared in advance to speed up the testing process.		X	X	The pre-configured files must be developed.
Configuration 1	A gateway and AFTN Terminal will be required.	X			If not pre-existing systems they should be part of the procured equipment configuration.
Configuration 2	A Message Server and two User Agents will be required	X			If not pre-existing systems they should be part of the procured equipment configuration.

<i>Item</i>	<i>Description</i>	<i>Required if IUT is a:</i>			<i>Special development required?</i>
		<i>Gateway</i>	<i>Message Server no MS</i>	<i>Message Server and MS</i>	
Configuration 3	A gateway and AFTN Terminal will be required.		X	X	If not pre-existing systems they should be part of the procured equipment configuration.
Configuration 4	A Message Server and two User Agents will be required		X	X	If not pre-existing systems they should be part of the procured equipment configuration.
Configuration 5	Two local or remote User Agents will be required		X	X	If not pre-existing systems they should be part of the procured equipment configuration.
Scripted tests	<p>All the tests should be run through scripts. This will ensure that</p> <ul style="list-style-type: none"> <li>• There is consistency between one set of interoperability tests and another;</li> <li>• it is certain that a repeated test is exactly the same as the initial test;</li> <li>• the exact sequence of inputs can be checked in the case of test failure.</li> </ul>	X	X	X	The scripted tests must be developed.

## 3.2 Development

This section provides an estimate of the development effort required to produce test scripts and configuration files.

The main items for development are the configuration files and the test scripts. The ATSMHS Interoperability Test Specification (to be produced as part of work package 262) will define the requirements for the configuration of the different systems as well as for the test scripts.

The ATSMHS Interoperability Trials Operating Scenarios indicate the approximate number of tests to perform for each type of IUT. That is:

- for gateways - approximately 25 tests, and 2 configuration files (gateway and AFTN terminal);
- for message servers - approximately 25 tests, and 2 configuration files (message server and user agent);

In setting budgetary estimates for the time required to create the test scripts, the following assumptions have been made:

- learn the scripting language - 3 days
- generate test cases - 3 test cases per day
- review and correction of test cases - 3 test cases per day
- learn the structure of the configuration files and develop the required test structure - 1 day

Also assuming that the scripting language and configuration file formats are different for each type of IUT, the learning process will have to be duplicated. (This is the worst case scenario.) Rounding up the time to the nearest whole day, the following estimates can be made for the budgetary effort required for developing test scripts and configuration files:

- gateway - 22 days
- message server - 22 days

These estimates are for a single site. Initially, two systems will be tested against each other; this will double the estimate. It should be noted that this is a worst case scenario. In practice, much of the work will be duplicated, and so the effort can be reduced. For example, in practice the test script language used for one system may be the same as the test script language used for another. Thus the learning effort required will be reduced. Several scenarios may be combined into one test case.

## Annex A - Objectives Traceability Matrix

The table below lists each test scenario defined in section 2 against the trials objectives specified in reference [A260] by providing a check list of the type of interoperability testing covered by each scenario.

Scenario	Protocol	Functional	Resilience	Control and Monitoring	Addressing	Performance
Gateway Scenarios						
OSC-GW-01	X	X		X	X	
OSC-GW-02	X	X		X	X	
OSC-GW-03	X	X		X	X	
OSC-GW-04	X	X		X	X	
OSC-GW-05	X	X		X	X	
OSC-GW-06	X	X		X	X	
OSC-GW-07	X	X		X	X	
OSC-GW-08	X	X		X	X	
OSC-GW-09	X	X		X	X	
OSC-GW-10	X	X		X	X	
OSC-GW-11	X	X		X	X	
OSC-GW-12	X	X		X	X	
OSC-GW-13			X	X		X
OSC-GW-14	X	X	X	X		
OSC-GW-15		X	X	X		
OSC-GW-16		X		X	X	
OSC-GW-17		X		X	X	
OSC-GW-18	X	X		X	X	
OSC-GW-19	X	X		X	X	
OSC-GW-20	X	X		X		
OSC-GW-21	X	X		X		
OSC-GW-22	X	X		X		
OSC-GW-23	X	X		X		
OSC-GW-24	X	X		X		
OSC-GW-25	X	X		X		
Message Server Scenarios						
OSC-MS-01	X	X		X	X	
OSC-MS-02	X	X		X	X	
OSC-MS-03	X	X		X	X	
OSC-MS-04	X	X		X	X	
OSC-MS-05	X	X		X	X	
OSC-MS-06	X	X		X	X	
OSC-MS-07			X	X		X
OSC-MS-08	X	X		X	X	
OSC-MS-09	X	X		X	X	

Scenario	Protocol	Functional	Resilience	Control and Monitoring	Addressing	Performance
OSC-MS-10		X		X	X	
OSC-MS-11		X		X	X	
OSC-MS-12	X	X		X	X	
OSC-MS-13	X	X		X	X	
OSC-MS-14	X	X		X	X	
OSC-MS-15	X	X		X	X	
OSC-MS-16	X	X				
OSC-MS-17	X	X				
OSC-MS-18	X	X				
OSC-MS-19	X	X				
OSC-MS-20	X	X		X	X	
OSC-MS-21	X	X		X	X	
OSC-MS-22	X	X		X		
OSC-MS-23	X	X		X	X	
OSC-MS-24			X	X		
OSC-MS-25			X	X		